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9. ABSTRACT
 Mississippi State University was asked by the Government of Bolivia to supply designs and equipment specifications for two additional seed processing/storage facilities. The Zudanes plant will be equipped to handle seeds of cereal crops and forages. The facility for Yaciuba will be equipped to handle oilseeds, peanuts, and soybeans, in addition to seeds of cereal crops and forages. This facility will be designed so that it can be expanded in the future. These two facilities are described in detail. Equipment specifications are given in Appendix I and reference is made to known suppliers of each item of equipment. Complete addresses of suppliers are given in Appendix 3.

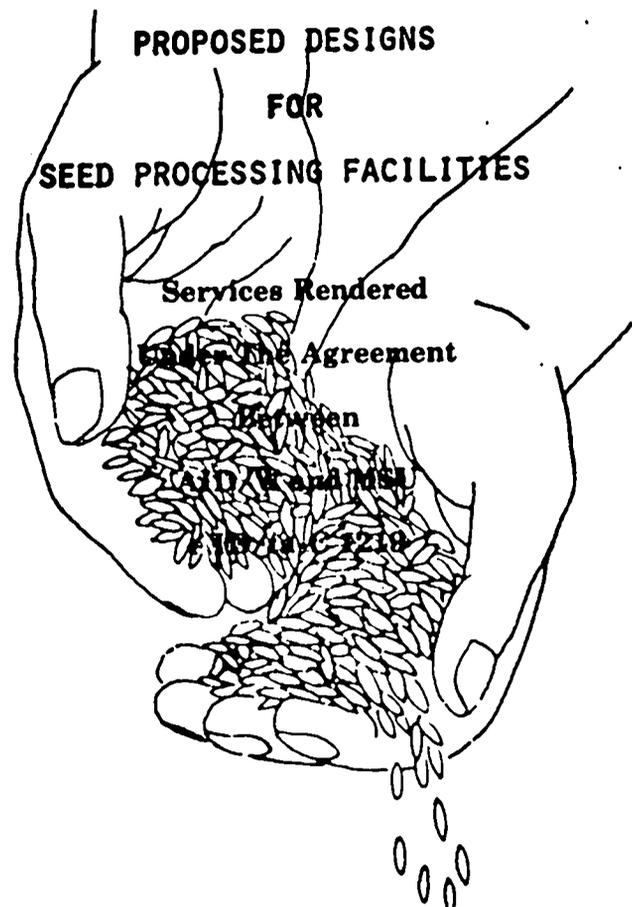
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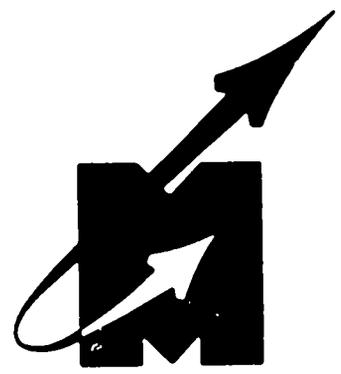
REPUBLIC OF BOLIVIA
SEED PROGRAM



PREPARED BY: 0
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JANUARY, 1978

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**Report to USAID/Bolivia
and
AID/W
on
Republic of Bolivia
Seed Program**

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

**Seed Technology Laboratory
Mississippi State University
Mississippi State, Mississippi**

January, 1978

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Report Summary

TITLE: Report to AID/W and USAID/Bolivia on Seed Facilities designed by Seed Technology Laboratory, Mississippi State University for Bolivia Seed Program.

REPORT NO. TA 78-1

AUTHOR: James M. Beck - Charles E. Vaughan

PERIOD OF REPORT: 24 October - 1 November, 1977

CONTRACTOR: Mississippi State University

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Summary

1. USAID/Bolivia requested the services of two consultants to review the recommendations for seed processing and storage equipment and facilities included in the USAID/Bolivia Agriculture Sector II Project.
2. As a part of the Agriculture Sector II Project, loan funds will be used to expand the seed processing and storage capacity of the Bolivia Seed Program.
3. The Seed Technology Laboratory, Mississippi State University will supply technical assistance needed in the design and equipment specifications for the two new facilities.

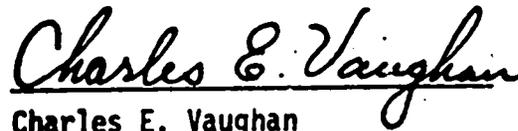
Acknowledgements

This report is based on the one week consultation assignment (24 October - 1 November, 1977) of the authors with the USAID Mission in Bolivia under provisions of Contract AID/csd 2976 "Seed Program and Industry Development."

The authors wish to acknowledge the excellent cooperation and support received from Richard Peters, USAID/LA PAZ and Ing. A. Guzman, Bolivia Seed Program during the period of this assignment.



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Report to USAID/Bolivia
and
AID/W
24 October - 1 November, 1977

Terms of Reference

USAID/Bolivia requested the services of two Mississippi State University staff for approximately one week to review the recommendations for Seed Processing/Storage Equipment and Facilities included in the USAID/Bolivia Agriculture Sector II Project.

Background

The Seed Technology Laboratory, Mississippi State University (STL/MSU) has on two previous occasions had a consultant visit Bolivia. After the visit in 1976, the consultant submitted a list of supplies and equipment needed in existing seed plants and also a design and equipment specifications for the Santa Cruz Seed Center, a new facility, to be located at Warnes. The details of these recommendations are incorporated in the Report submitted to USAID/Bolivia, TA 76-02.

Additional Seed Facilities included in USAID/Bolivia
Agriculture Sector II Project

As a part of the Agriculture Sector II Project, loan funds will be used to expand the seed processing and storage capability of the National Seed Program. Mississippi State University was asked to supply designs and equipment specifications for two additional seed processing/storage facilities. The Zudanes (Chuquisaca) plant will be equipped to handle seeds of cereal crops and forages. The facility for Yaciuba (Tarija) will be equipped to handle oilseeds, peanuts and soybeans, in addition to seeds of cereal crops and forages. Since it is the intent of the GOB to sharply increase oilseed production in the region, the Yacuiba facility will be designed so that it can be expanded in the future as the need arises.

Zudanes Processing Facility

The seed plant design recommended for Zudanes will have no drying facilities; therefore, the receiving section (uncleaned bagged seed), the processing area and the bagged seed storage section (after processing) will be located in the same building. (See drawings Appendix 5).

An area 15 meters by 10 meters will accommodate the processing equipment and provide sufficient space for the temporary storage of uncleaned bagged seed. Adjacent to this area space should be provided for storage of processed seed in bags. Also within this same building it may be desirable to provide office space, storerooms for supplies, etc. and perhaps restrooms. Local building design and needs should determine the style and overall size of the facility. No special construction considerations are required for the processing building except that there should be sufficient height under the roof to clear the elevators and the processing equipment. The taller elevators are located near the center line of the building to minimize the height. A vapor barrier should be placed between the soil and the reinforced concrete floor to assure dryness of the floor.

The cleaning (processing) line will consist of an air-screen cleaner, cylinder separator, gravity separator, treater and weigh-bagger with necessary elevators, conveyors, surge bins, holding bins and supporting frames. The cylinder separator and gravity separator can be by-passed when not required in the processing line. The air-screen cleaner and gravity separator will be in a fixed position; the cylinder separator, treater, and weigh-bagging equipment will be on moveable stands so that they can be positioned where needed.

The cleaning capacity will be about 1.5 MT/hour depending upon the

separation problems and the percent clean out.

Equipment specifications are given in Appendix I and reference is made to known suppliers of each item of equipment. Complete addresses of suppliers are given in Appendix 3, Trade Name Index.

Yacuiba Seed Processing Facility

The seed plant design recommended for Yacuiba will provide facilities for receiving, drying, processing and storing seeds of oil crops. Since the two principal oil crops, soybeans and peanuts, cannot be handled in the same manner, two separate processing lines are utilized. These two processing lines will be located in the same building, having receiving facilities on opposite ends of the building. Common holding bins and bagging/treating equipment will be located near the center of the building. (See drawings Appendix 5). This arrangement will maximize the use of equipment and personnel by centralizing the processing operations.

An area 15 meters by 35 meters will accommodate the two processing lines and provide room for expansion. An adjacent area 20 meters by 20 meters will provide space for storage of bagged cleaned seed. Within this warehouse will be two conditioned storage rooms to provide longer safe storage for approximately 160 metric tons. It is recommended that this section of the building be of masonry construction with particular attention given to vapor proofing these conditioned storage rooms. (Equipment needed to control the temperature, relative humidity and some of the construction materials are included in Section III of the Equipment Specifications Lists).

Soybeans and other free flowing seed received in bags or bulk will be unloaded into a dump pit, then elevated either into the metal bins for drying and storage until processing or directly into processing. The

capacity of the drying/storage facility can be increased by adding additional bins in any of three directions; initially two 18 ft. diameter units are recommended.

No provision has been made in the design and specifications for drying of peanuts. A separate wagon-type drying facility is recommended when mechanical harvest of peanuts makes artificial drying necessary. Dried peanuts will be received in bags or bulk and introduced into the peanut processing line. The peanut cleaning (processing) line will consist of a cleaner, a two cylinder sheller with one cylinder divided in half making a three-size shelling unit, a gravity separator, a complete dust control system, two (2) 2 ft. x 10 ft. picking tables and a dust type seed treater with all the necessary elevators, conveyors, surge bins, holding bins, spiral let-downs and EZ dump elevator for handling shelled peanuts; and any other equipment with supporting structures for the equipment and bins to make a complete seed peanut processing plant.

The peanut shelling/processing capacity will be approximately 1.5 to 2.0 metric tons per hour depending upon the type and quality of the peanuts being handled. General specifications are given for the peanut equipment in Appendix I, Section II. Since peanut shelling/processing equipment is not standardized, it is recommended that the supplier of the peanut sheller-separator be responsible for specifying and quoting the other equipment cleaner, dust control system, elevators, bins, etc.) necessary to complete the processing line. Complete addresses of peanut equipment suppliers are given in Appendix 3, Trade Name Index.

The soybean cleaning (processing) line will consist of an air-screen cleaner, a spiral separator unit (if required), seed treater and weight bagger with necessary elevators, conveyors, surge bins, holding bins and supporting frames. The spiral separator unit and the treater can be by-passed

when not required. The treater and weigh-bagging equipment will be on moveable stands so that they can be positioned where needed.

The soybean seed cleaning capacity will be approximately 3.5 MT/hr depending upon the separation problems and the percent clean out.

Equipment specifications are given in Appendix I and reference is made to known suppliers of each item of equipment. Complete addresses of suppliers are given in Appendix 3, Trade Name Index.

APPENDICES

APPENDIX 1

Equipment Specifications
for
Zudanes Seed Processing Facility

Item No.	Description	No. Req'd.
1	<p>Elevator, belt-bucket type, 6.8 motor (23 ft.) discharge height; 175 bushels (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent; complete with required belting, buckets, splicing, assembling hardware and following accessories:</p> <ul style="list-style-type: none"> a. dump hopper b. spacers (washer type) for insertion between belt and buckets c. C.I. adjustable elbow, 6-inch (15.2 cm) complete with clamp rings (transition included) d. two (2) 3.0 m (10 ft.) section 6-inch (15.2 cm) rigid spouting (12 gauge) flanged both ends. e. three (3) 6-inch clamp rings f. drive and ½ HP motor (TEBB) operable on 220 volt, 50 Hz., 1 phase g. start-stop push button control station h. replacement parts to be selected by manufacturer not to exceed \$50.00 <p style="text-align: right;">Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	1
2	<p>Holding bin; sheet metal (above seed cleaner); 1.5 x 1.5 x 1.5 meter, hopped-bottom. Supported from floor on steel frame (see equipment layout drawings).</p> <p style="text-align: center;">Local fabrication</p>	1
3	<p>Air-screen cleaner, three-screen, Crippen Model MW334 or equivalent. Cleaner to have independent upper and lower air systems; synchronized brush type screen wipers; adjustable speed shake; screen frame size 34 x 44 inches. Overall cleaner dimensions: 44 inch width x 118 width length x 75 inch height (1.12 m x 2.99 m x 1.9 m). Average capacity (seed) 75 bushels (1.9 MT) per hour. Complete with:</p> <ul style="list-style-type: none"> a. roll-feed hopper b. fans mounted 45° angle to rear c. square to round adaptor on fan outlets d. waste product discharge outlets on <u>left</u> side; clean seed vibrating conveyor 	1

Item No.	Description	No. Req'd.
	<p>discharge outlet on right side.</p> <p>e. waste product bag holders.</p> <p>f. base support frame 36 inches (.91 m) high with roll out platform with steps.</p> <p>g. screens as follows: <u>Round hole:</u> 6,8,10,12,14,16,18,20, 22,24,26,28 <u>Slotted:</u> 1/16 x 1/2, 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 5 x 3/4, 6 x 3/4, 7 x 3/4, 8 x 3/4, 9 x 3/4, 10 x 3/4, 11 x 3/4, 13 x 3/4.</p> <p>h. drive and motor of required horsepower, operable on 220 volts, 50 hz., 3 phase.</p> <p>i. start-stop push button control for motor</p> <p>j. replacement parts to be selected by manufacturer not to exceed \$200.00 Suppliers: Crippen Mercator Corporation</p>	
4	<p>Elevator, belt-bucket type, 8.2 meter (27 ft.) discharge height; 175 bushel (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4 1/2-inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent; complete with required belting, buckets, splicing, assembling hardware and following accessories:</p> <p>a. dump hopper</p> <p>b. spacers (washer type) for insertion between belt and buckets.</p> <p>c. one(1) C.I. adjustable elbow, 6-inch (15.2 cm) complete with clamp rings (transitions included)</p> <p>d. one(1) 3 ft. section 6-inch diameter flexible spouting, flanged on both ends.</p> <p>e. two(2) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends.</p> <p>f. three(3) 6-inch clamp rings</p> <p>g. drive and 1/2 HP motor (TEBB) operable on 220 volt, 50 Hz., 1 phase.</p> <p>h. start-stop push button control station</p> <p>i. replacement parts to be selected by manufacturer not to exceed \$50.00 Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	1

Item No.	Description	No. Req'd.
5	Holding bin, sheet metal (above length grader); 1.5 x 1.5 x .6 meter, hopped-bottom, discharge to center side. Supported in steel framework from floor. (See equipment layout drawings). Local fabrication.	1
6	Holding bin, sheet metal (above gravity separator); 1.5 x 1.5 x 1.0 meter, hopped-bottom, center discharge. Supported in steel framework from floor. (See equipment layout drawings). Local fabrication.	1
7	Holding bins, sheet metal (above seed treater); 1.5 x 1.5 x 1.0 meter, hopper-bottom, center discharge. Supported in steel framework from floor. (See equipment layout drawings). Local fabrication.	1
8	Holding bin, sheet metal (above weigh-bagger); 1.5 x 1.5 x 1.0 meter, hopped-bottom, center discharge. Supported in steel framework from floor. (See equipment layout drawings). Local fabrication.	1
9	Length separator, Carter-Day Uni-flow Cylinder Separator No. 2 or equivalent. Complete with following: a. required drive and motor operable on 220 volt, 50 Hz., 1 phase current. b. start-stop push button control for motor. c. Indent cylinder as follows: Cylinder Nos. 4,5,6 $\frac{1}{2}$,8 $\frac{1}{2}$,11,13 and 19. d. Roll feeder. e. discharge spouting f. replacement parts to be selected by manufacturer not to exceed \$50.00 Supplier: CEA Carter-Day	1
10	Elevator, belt-bucket type, 6.6 meter (22 ft.) discharge height; 175 bushel (3.5MT) per hour capacity at belt speed of 110-125 ft. per minute and 4 $\frac{1}{2}$ -inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent, complete with required belting, buckets, splicing, assembling hardware and following accessories: a. dump hopper b. spacers (washer type) for insertion between belt and buckets. c. one(1) C.I. adjustable elbow, 6-inch	1

Item No.	Description	No. Req'd
	<p>(15.2 cm) complete with clamp rings (transitions included)</p> <p>d. one(1) 3 ft. section 6-inch diameter flexible spouting, flanged on both ends.</p> <p>e. two(2) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends.</p> <p>f. three (3) 6-inch clamp rings</p> <p>g. drive and ½ HP motor (TEBB) operable on 220 volt, 50 Hz., 1 phase</p> <p>h. start-stop push button motor control</p> <p>i. replacement parts to be selected by manufacturer not to exceed \$50.00.</p> <p style="text-align: right;">Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	
11	<p>Gravity separator, Oliver Model No. 50 or equivalent. Complete with the following:</p> <p>a. rectangular deck with left hand discharge and non-reciprocating discharge spouts.</p> <p>b. air-filter screens</p> <p>c. fine wire mesh cloth deck (Type B)</p> <p>d. drive and motor of required horsepower operable on 220 volt, 50 Hz., 3 phase.</p> <p>e. start-stop push button motor control.</p> <p style="text-align: right;">Suppliers: Oliver Mfg. Co. Mercator Corp.</p>	1
12	<p>Elevator, belt-bucket type, 6.1 meter (20 ft.) discharge height; 175 bushel (3.5MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent; complete with required belting, buckets, splicing, assembling hardware and following accessories:</p> <p>a. dump hopper</p> <p>b. spacers (washer type) for insertion between belt and buckets</p> <p>c. one(1) C.I. adjustable elbow, 6-inch (15.2 cm) complete with champ rings (transitions included)</p> <p>d. one(1) 3 ft. section 6-inch diameter flexible spouting, flanged on both ends</p> <p>e. one(1) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends</p> <p>f. two(2) 6-inch clamp rings</p> <p>g. drive and ½ HP motor (TEBB) operable on 220 volt, 50 Hz., 1 phase</p> <p>h. start-stop push button motor control</p>	1

Item No.	Description	No. Req'd
	<p>i. replacement parts to be selected by manufacturer not to exceed \$50.00</p> <p>Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	
13	<p>Seed treater, slurry type, to have 4.5 MT (150 BPH) per hour capacity and capability of applying both liquid and wetttable powder formulated products. Gustafson Model B or equivalent. Complete with drive and motor of required horsepower operational on 220 volt, 50 Hz., 1 phase current.</p> <p>Suppliers: Gustafson Mfg. Co. Burrows Seedburo Mercator Corporation</p>	1
14	Elevator (Same as item No. 12)	1
15	<p>Weigh-bagger, semi-automatic, Howe-Richardson Model G-17 or equivalent. Complete with bag tare device, flow control inlet gate, calibrated weighbeam, graduated over-under weight indicator, weight range 25-60 kgs., quick release and mounting attachment for bolting unit to metal bin equipped with 6-inch (15.2 cm) square flanged discharge outlet.</p> <p>Suppliers: Howe-Richardson Burrows Mercator Corporation</p>	1
16	<p>Bag closer, portable, single thread type for sewing paper and textile bags. Fischbein Model D or equivalent. Complete with Model 1-400 A suspension unit and one(1) carton (32 cones) 8 ounce thread and replacement parts for bag closer selected by manufacturer not to exceed \$50.00</p> <p>Suppliers: Fischbein Co. Seedburo</p>	1
17	<p>Platform scales, double beam, 0.5 MT capacity. Fairbanks-Morse Model 41-3132 A21 or equivalent. (Calibrated in metric units of measurement)</p> <p>Suppliers: Burrows Seedburo Mercator Corp.</p>	1
18	<p>Bag truck, 2-wheel, 8 inch wheels with roller bearings and rubber tires. Minneapolis Model No. 258 or equivalent.</p> <p>Suppliers: Seedburo Burrows</p>	2

Item No.	Description	No. Req'd
19	<p>Vacuum cleaner, heavy duty industrial type with external filter and by-pass motor for dry or wet pickup; interchangeable and removable motor unit. Tornado Model 98990 or equivalent</p> <p>Complete with:</p> <ul style="list-style-type: none"> a. 2-inch hose sleeve to connect hose to vacuum tank intake. b. 10 ft. length of 2-inch hose with swivel sleeve c. 10 ft. length of 2 inch extension hose d. nipple to connect extension to swivel hose e. curved handle for 2 inch hose f. 22 inch floor tool g. 15 inch crevice tool h. blowing nozzle i. hand tool gulper j. motor operable on 220 volt, 50 Hz., 1 phase current. <p>Suppliers: Burrows Seedburo</p>	1
20	<p>Hand screens, set of twenty-four (24) 22.8 cm. x 22.8 cm (9 x 9 inch) complete with screen rack.</p> <p>Screen sizes as follows:</p> <p><u>Round hole:</u> 6,8,10,12,14,16,18,20,22,24,26,28</p> <p><u>Slotted:</u> 1/16 x 1/2, 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 5 x 3/4, 6 x 3/4, 7 x 3/4, 8 x 3/4, 9 x 3/4, 10 x 3/4, 11 x 3/4, 13 x 3/4</p> <p>Suppliers: Seedburo Ferrell-Ross Burrows</p>	1

APPENDIX 2

**Equipment Specifications
for
Yaculba Seed Facility
Section I
Soybean Drying/Storage and Processing**

<u>Item No</u>	<u>Description</u>	<u>No. Req'd</u>
1	<p>Drying and storage bins, round type, made of corrugated metal; 18 ft. diameter, 5 standard (32") rings and 2 - 16" rings. To be supplied complete with:</p> <ul style="list-style-type: none"> a. all assembling hardware and caulking compound b. center-fill roof ventilator c. four(4) roof manholes with cover d. roof ladder e. outside wall ladder f. walk-in door (in 2nd and 3rd full rings) g. channelox drying floor with flashing & hardware and metal floor support standards h. tube-well bin unloading kit complete with auger and extension to discharge bin 27 ft. (6.7M) from center of bin i. powerhead with quick connection, complete with motor and drive sized to convey 20 MT per hour, motor operable on 220 volt, 50 Hz., 1 phase current j. inside ladder k. door boards for walk-in door l. assembling instructions m. fan transition inlet collar <p style="margin-left: 40px;">Note: Design calls for bin to be assembled as follows: 16" base ring w/fan transition 32' ring, perforated floor, 4-32" rings and 16" (top) ring. Supplier: Reed Joseph Reed Steel Products Columbian</p>	1
2	<p>Drying and storage bin, round type, made of corrugated metal; 18 ft. diameter, 5 standard (32") rings and 2 - 16" rings. To be supplied complete with:</p> <ul style="list-style-type: none"> a. all assembling hardware and caulking compound b. center-fill roof ventilator c. four(4) roof manholes with cover d. roof ladder e. outside wall ladder f. channelox drying floor with flashing & hardware and metal floor support standards 	1

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
	g. tube-well bin unloading kit less auger h. walk-in door (in 2nd & 3rd full rings) i. inside ladder j. door boards for walk-in door k. assembling instructions l. fan transition inlet collar Note: Design calls for bin to be assembled as follows: 16" base ring with fan transition, 32" ring, perforated floor, 4 - 32" rings and 16" (top) ring. Supplier: Reed Joseph Reed Steel Products Columbian	
3	Heater-blower unit, for drying seed & grain. American Drying Systems Model No. 1220 (modified) or equivalent. Heater to be diesel oil burner modified to deliver 500,000 BTU/hr; fan to be centrifugal type capable of delivering 20,000 CFM at 3.00 inches static pressure. Unit to be complete with standard controls and safety devices, all necessary electrical controls and drive motor sized for fan requirement (probably 15 HP) and operable on 220 volt, 50 Hz., 3 phase current. Spare parts as selected by supplier not to exceed \$200/unit. Supplier: American Drying Systems Reed Joseph Reed Steel Products Columbian	2
4	Elevator, belt-bucket type, 20 meters (66 ft) discharge height, 20 MT (1000 BPH) per hour capacity at 132 FPM belt speed. Universal Model D-1000 "Easy Dump" or equivalent, complete with belting, buckets, assembling hardware and following accessories: a. one(1) three-way valve, 8-inch, with transition to fit discharge of elevator b. four(4) 8-inch adjustable elbows with clamp rings c. ten(10) 10 ft. sections, rigid 8-inch metal spouting (12 gauge) flanged both ends d. twenty(20) 8-inch clamp rings e. ten(10) 8-inch loose flanges f. service ladder (42 ft). g. safety cage (42 ft). h. service platform i. weather and dust sealing.	1

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
j.	200 ft. 5/16 in. galvanized preformed aircraft cable and 10 - 5/16 in. clamps	
k.	No. 1 drive with 3 HP motor complete with magnetic starter and push button station, operable on 220 volt, 50 hz., 3 phase current.	
l.	replacement parts i.e, belting, buckets, etc. to be selected by supplier not to exceed \$300.00	
Supplier: Universal Industries Seedburo Burrows Mercator Corporation		
5	Holding bin, metal construction, (above air-screen cleaner), 6 ft. x 6 ft. x 4 ft. deep (2M x 2M x 1.5M) bin sidewalls, center discharge, hoppers bottom with rack and pinion slide gate. Discharge opening to fit feed hopper of cleaner. Bin support from floor in steel frame. Local fabrication	1
6	Air-screen cleaner, four screen, Crippen Model H-442 or equivalent. Cleaner to have independent upper and lower air systems, synchronized brush type screen wipers, adjustable speed shake; screen frame size 42 inch x 60 inch. Overall cleaner dimensions 75 inch width x 155 inch length x 102 inch height. Average capacity (soybean seed) 175 bushels (3.5 MT) per hour. Complete with: a. roll-feed hopper b. fans mounted 45° angle to rear c. square to round adapter on fan outlets d. waste product discharge outlets on right side; clean seed vibrating conveyor discharge outlet on left side. e. waste product bagholders f. base support frame 36 inches (.91m.) high with rollout platform with steps g. screens as follows: <u>Round hole:</u> 6,8,10,12,14,16,18,20,22, 24,26,28 <u>Slotted:</u> 1/16 x 1/2, 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 5 x 3/4, 6 x 3/4, 7 x 3/4, 8 x 3/4, 9 x 3/4, 10 x 3/4, 11 x 3/4, 13 x 3/4, h. drive and motor of required horsepower, operable on 200 volt, 50 Hz., 3 phase current. i. start-stop push button control for motor j. replacement parts to be selected by manufacturer not to exceed \$200.00.	1
Supplier: Crippen Mercator Corporation		

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
7	<p>Elevator, belt-bucket type, 10 meters (33 ft.) discharge height; 175 bushels (3.5MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent; complete with required belting, buckets, splicing, assembling hardware and following accessories:</p> <ul style="list-style-type: none"> a. dump hopper b. spacers (washer type) for insertion between belt and buckets c. one(1) two-way valve, 6-inch, complete with adapter to fit elevator discharge d. two(2) adjustable elbow, 6-inch, complete with clamp rings. e. two(2) 3 ft. section 6-inch diameter flexible spouting, flanged on both ends f. four(4) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends g. four(4) 6-inch clamp rings h. drive and ½ HP motor (TEBB) operable on 220 volt, 50 Hz., 1 phase current i. start-stop push button control station j. replacement parts to be selected by manufacturer not to exceed \$50.00 	1
	<p>Supplier: Universal Industries Seedburo Burrows Mercator Corporation</p>	
8	<p>Spiral separator assembly, 125 bushel (3.4MT) per hour capacity (soybeans). Complete with:</p> <ul style="list-style-type: none"> a. five(5) heavy duty double spiral separators b. surge bin with leveling auger assembly c. steel support frame for spirals and surge bin d. two(2) belt conveyor (6-inch) to transport discharged products. Length approximately 8 ft. e. drives and motor operable on 220 volt, 50 Hz., 1 phase current f. one(1) start-stop push button control station to operate all drive motors g. replacement parts to be selected by supplier not to exceed \$100.00 	1
	<p>Note: Spiral assembly to be mounted on top of two(2) 6 ft. square, hoppers bottomed bins. (Bins not a part of this item) "Whole seed" will be discharged into one bin, "splits" into the other. Supplier: Hagen Mfg. Co.</p>	

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
	<p>NOTE: Item No. 8 may be considered "optional", for the future purchase; however, it will be required for handling special weed seed separation problems and is becoming standard equipment in soybean seed processing plants in the U.S.</p>	
9	<p>Holding bins, metal construction, 6 ft. x 6 ft. x 4 ft. (1.8M x 1.8M x 1.2M) bin sidewall; center discharge hoppers-bottom bin, 3 MT capacity. Discharge openings 6-inch square, equipped with rack and pinion type slide gate. Note: Both bins should be mounted in a single support frame. Frame must support weight of bins, seed load and spiral assembly. Local fabrication.</p>	2
10	<p>Elevator, belt-bucket type, 8.5 meter (28 ft.) discharge height; 175 bushels (3.5MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing. Universal Model C2-175 "Easy Dump" or equivalent, complete with required belting, buckets, splicing, assembling hardware and following accessories:</p> <ol style="list-style-type: none"> a. dump hopper b. spacers (washer type) for insertion between belt and buckets c. one(1) C.I. adjustable elbow, 6-inch, complete with clamp ring and adapter to fit elevator discharge d. one(1) 3 ft. section 6-inch diameter flexible spouting, flanged on both ends. e. three (3) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends f. four(4) 6-inch clamp rings g. drive and ½ HP motor (TEBB) operable on 220 volts, 50 hz., 1 phase current. h. start-stop push button control station i. replacement parts to be selected by manufacturers not to exceed \$50.00 <p style="text-align: right;">Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	1
11	<p>Holding bin, metal construction, 6 ft. x 6 ft. x 4 ft. (1.8M x 1.8M x 1.2M) bin sidewall; center discharge hoppers-bottom bin, 3 MT capacity. Discharge openings 6-inch square, equipped with rack and pinion type slide gate. Both bins should be mounted in a single frame to support them from the floor. Local fabrication.</p>	2

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
12	<p>Weigh-bagger, semi-automatic, Howe-Richardson Model G-17 or equivalent. Complete with bag tare device, flow control inlet gate, calibrated weigh beams, graduated over-under weight indicator, weight range 25-60 kgs, quick release and mounting attachment for bolting unit to metal bin equipped with 6-inch square flanged discharge outlet.</p> <p>Suppliers: Howe-Richardson Burrows Mercator Corporation</p>	1
13	<p>Bag closer, portable, single thread type for sewing paper and textile bags. Fishbein Model D or equivalent. Complete with Model 1-400 A suspension unit and one(1) carton (32 cones) 8 ounce thread and replacement parts for bag closer selected by manufacturer not to exceed \$50.00</p> <p>Suppliers: Fischbein Co. Seedburo</p>	1
14	<p>Platform scales, portable, double beam, 0.5 MT capacity. Fairbanks-Moore Model 41-3132A21 or equivalent. (Calibrated in metric units of measurement).</p> <p>Suppliers: Burrows Seedburo Mercator Corporation</p>	2
15	<p>Bag truck, 2-wheel, 8 inch wheels with roller bearings and rubber tires. Minneapolis Model No. 25B or equivalent.</p> <p>Suppliers: Seedburo Burrows</p>	2
16	<p>Vacuum cleaner, heavy duty industrial type, with external filter and by-pass motor for dry or wet pickup; interchangeable and removable motor unit. Tornado Model 98990 or equivalent. Complete with:</p> <ul style="list-style-type: none"> a. 2-inch hose sleeve to connect hose to vacuum tank intake; b. 10 ft. length of 2-inch hose with swivel sleeve c. 10 ft. length of 2 inch extension hose d. nipple to connect extension to swivel hose e. curved handle for 2 inch hose f. 22 inch floor tool g. 15 inch crevice tool h. blowing nozzle i. hand tool gulper j. motor operable on 220 volt, 50 Hz., 1 phase current. <p>Suppliers: Burrows Seedburo</p>	1

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
17	<p>Hand screens, set of twenty-four (24) 9 x 9 inch (22.8 x 22.8 cm) complete with screen rack. Screen sizes as follows:</p> <p><u>Round hole:</u> 6,8,10,12,14,16,18,20,22,24,26,28</p> <p><u>Slotted:</u> 1/16 x 1/2, 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 5 x 3/4, 6 x 3/4, 7 x 3/4, 8 x 3/4, 9 x 3/4, 10 x 3/4, 11 x 3/4, 13 x 3/4,</p> <p>Suppliers: Seedburo Ferrel-Ross Burrows</p>	1

APPENDIX 2

Equipment Specifications
for
Yaculba Seed Facility
Section II
Peanut Processing

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
18	<p>Elevator, belt-bucket type, 12 meter (40 ft.) discharge height, 20 MT (100 BPH) per hour capacity at 132 FPM belt speed. Universal Model D-1000 "Easy Dump" or equivalent, complete with belting, buckets, assembling hardware and the following accessories:</p> <ul style="list-style-type: none"> a. one(1) two-way valve, 8-inch, with adaptor to fit discharge of elevator b. two(2) 8-inch adjustable elbows with clamp rings. c. four(4) 10 ft. sections rigid 8-inch metal spouting (12 gauge) flanged both ends. d. No. 1 drive with 2 HP motor complete with magnetic starter and push button station, operable on 220 volt, 50 Hz., 3 phase e. replacement parts, i.e., belting, buckets, drive belts, etc. to be selected by supplier not to exceed \$200.00 <p style="text-align: right;">Suppliers: Universal Industries Seedburo Burrows Mercator Corporation</p>	1
19	<p>Cleaner for peanuts, Hobbs No. 488 or equivalent. Complete with all accessories (elevator, feed control mechanism, conveyors, etc) necessary to clean peanuts and carry product and waste material away from machine. Electric motor(s) of required horsepower and magnetic starter(s) with push button station(s) operable on 220 volt, 50 HZ., 3 phase current to be included.</p> <p style="text-align: right;">Suppliers: Paul Hataway Co. Turner Sales Lawerence Pearman Lewis Carter</p>	1
20	<p>Sheller and separator for peanuts, Medley Model M 108 Separator and Model AM22 Gravity Separator or equivalent. A two cylinder sheller with one cylinder divided in half making a three size shelling unit. Shelling capacity 1.5 to 2.0 metric tons per hour. Sheller and separator to be complete with all accessories (elevators, gravity separator, sizing equipment, air separation and conveying equipment including cyclones and air piping to convey by-products and control dust) necessary to shell <u>seed</u> peanuts and carry products and waste materials away from machine. Spiral type let-</p>	1

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
	let-downs in bins and EZ dump elevators to be used in conveying shelled peanuts. Drive and motor of required horsepower, magnetic starters with push button stations, operable on 220 volt, 50 Hz., 3 phase current to be included.	
	Supplier: Paul Hataway Co. Turner Sales Lawerence Pearman Lewis Carter	
21.	Picking table for hand picking of shelled peanuts. To consist of two(2) 2 ft. wide by 10 ft. long picking tables, complete with feed hoppers (that will receive shelled peanuts from two holding bins) belting, gear reducer and drive, cross conveyor and EZ dump elevator to convey sorted seed to bagging or treating bin. Motor(s) of required horsepower, starters with push button station, operable on 220 volt, 50 Hz., 3 phase current to be included.	1
	Suppliers: Paul Hataway Co. Turner Sales Lawerence Pearman Lewis Carter	
22	Seed treater, dust type, to have 4.5 to 5.0 MT (150-175 BPH) per hour capacity treating shelled peanuts. Gustafson Model XL100 or equivalent. Unit to be complete with drum type mixing chamber, dust and fume evacuator, two-way bagger and drive/motor(s) of required horsepower operable on 220 volt, 50 Hz., 1 phase current.	1
	Suppliers: Gustafson Mfg. Co. Paul Hataway Co. Turner Sales Lawerence Pearman Lewis Carter	

APPENDIX 2

**Equipment Specifications
for
Yacuiba Seed Facility
Section III
Conditioned Storage Rooms**

<u>Item No.</u>	<u>Description</u>	<u>No. Req'd</u>
23	<p>Dehumidifier, portable industrial type, Singer Model D20 or equivalent. Refrigeration type with capacity to remove 2 pints water per hour from room at 50°F (15.6°C) and 60% relative humidity. Operable on 220 volt, 50 Hz., 1 phase current.</p> <p style="padding-left: 40px;">Note: Two units required, third unit recommended as back up unit to lower humidity in room rapidly when seed are added.</p> <p style="padding-left: 40px;">Supplier: The Singer Company</p>	3
24	<p>Air conditioner, 24,000 BTU's, through-the-wall type, with high dehumidification capacity. Operable on 220 volt, 50 Hz., 1 phase current.</p> <p style="padding-left: 40px;">Supplier: Local</p>	4
25	<p>Refrigerator door, standard cooler and freezer type. Harry Alter "Butcher Boy" No. 95451 or equivalent. 3 ft. (0.9M) x 6½ ft. (1.95M) for door opening of 3 ft. 4 inches (1.01M) x 6 ft. 8½ inches (2.04M); 4 inch (10.1 cm) semi-rigid foam insulation; three hinges included with frame and other galvanized hardware.</p> <p style="padding-left: 40px;">Supplier: The Harry Alter Co.</p>	2
26	<p>Hygrothermograph, drum type with 7 day clock. Bendix No. 594 or equivalent. Complete with 500 weekly recording charts and special recording ink.</p> <p style="padding-left: 40px;">Suppliers: Seedburo Burrows</p>	2
27	<p>Sling psychrometer with case for field use. Complete with extra thermometer, extra wicks and slide rule for use with sling.</p> <p style="padding-left: 40px;">Supplier: Seedburo</p>	2

APPENDIX 3

Trade Name Index

Companies listed are potential suppliers of the items shown in the "Equipment Specification Lists".

The Harry Adler Company
2399 South Anchor Ave.
Chicago, IL 60616

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

Burrows Equipment Co.
1316 Sherman Avenue
Evanston, Illinois 60204

Campbell Industries
3121 Dean Avenue
Des Moines, Iowa 50317

Lewis Carter Manufacturing Co.
P.O. Box 683
Donaldsonville, GA 31745

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

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

Crippen Mfg. Company
P.O. Box 350
Alma, Michigan 48801

Ferrell-Ross
1621 Wheeler Street
Saginaw, MI 48601

Fischlein Company
1700 .. 30th Avenue South
Minneapolis, Minnesota 55405

Gustafson Manufacturing Co.
6600 S. County Road 18
Hopkins, Minnesota 55343

Paul Hataway Co.
P.O. Box 669
Cordele, GA 31015

Howe-Richardson Scale Co.
680 Van Houten Avenue
Clifton, NJ 0700

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

Lawrence Pearman Enterprises
P.O. Box 521
Tifton, GA 31794

Reed Joseph Company
Highway One North
Greenville, MS 38701

Seedburo Equipment Company
1022 West Jackson Blvd.
Chicago, IL 60607

The Singer Company
62 Columbus Street
Auburn, NY 13021

Turner Sales and Supply, Inc.
R.F.D. 1
Norman Park, GA 31771

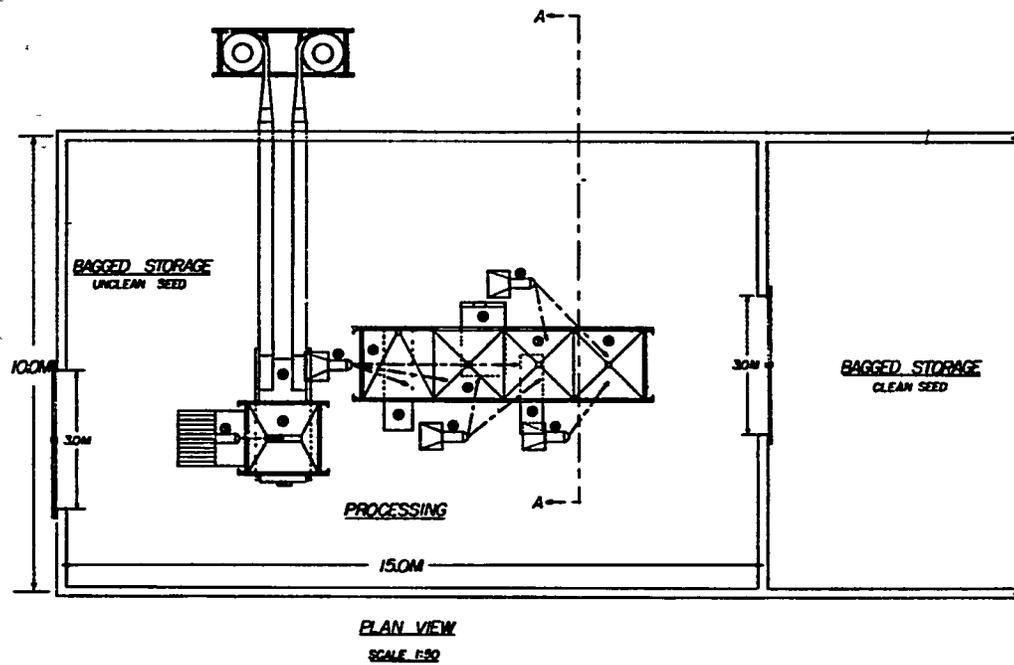
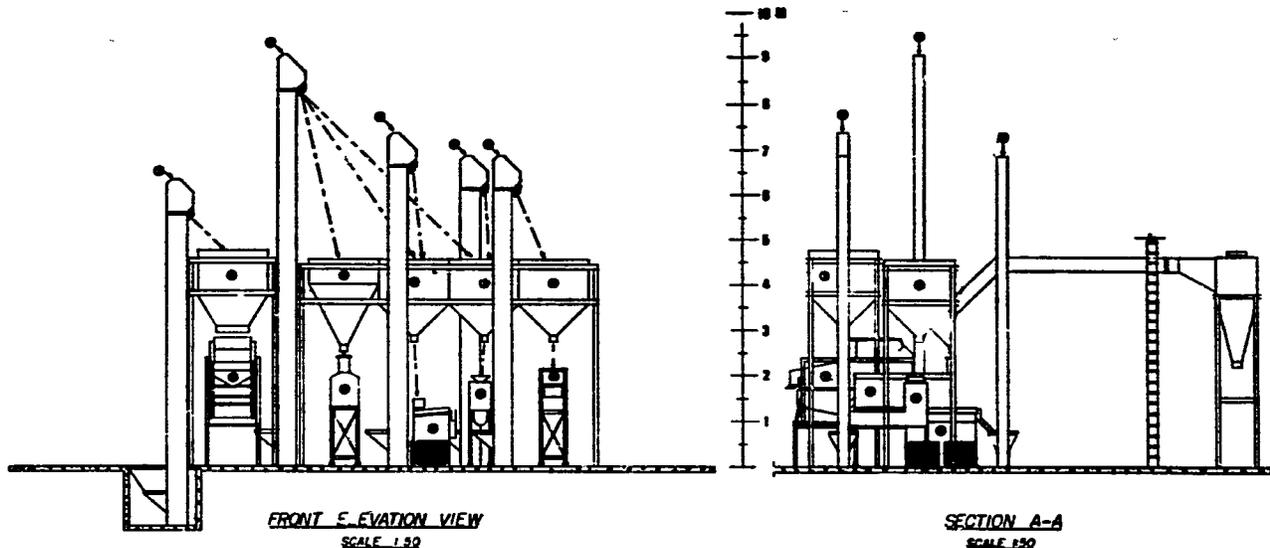
Universal Industries
516 Grand Blvd.
Cedar Falls, Iowa 50613

APPENDIX 4

Itinerary

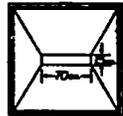
24 October **Departed Mississippi State, Mississippi 16:40 hrs.**
25 October **Arrived La Paz, Bolivia 10:25 hrs.**
26-27 October **(La Paz) Meetings with Richard Peters, USAID and
Ing. A. Guzman, Departamento de Semillas**
28 October **Departed La Paz 0930 hrs.
Arrived Cochabamba 1130 hrs.
Visited Cochabamba seed processing/testing facilities
Departed Cochabamba 1500 hrs.
Arrived La Paz 1700 hrs.**
29 October **(La Paz) Meeting with Ing. A. Guzman, collecting
meteorological data and other information on
Zudanes and Yacuiba**
30 October **(La Paz) Sunday**
31 October **(La Paz) Meetings with:
Richard Peters, USAID
B. Wennergren, CID
Ing. A. Guzman and officials representing
Bolivia contracting firm
Departed La Paz 2235 hrs.**
1 November **Arrival Miami 0800 hrs.
Departed Miami 0940 hrs.
Arrival Atlanta 1140 hrs.
Arrival GTR 1330 hrs.**

APPENDIX 5
SEED FACILITY DRAWINGS
ZUDANES
YACUIBA

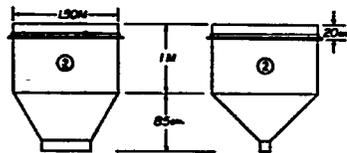


8	WEIGH-BAL. 30
14	ELEVATOR (RECEIVING) 5.50 M. HEIGHT 6.1M (20 FT)
13	SEED TREATER
12	ELEVATOR (GRAVITY SEPARATOR) DISCH. HEIGHT 6.1M (20 FT)
11	GRAVITY SEPARATOR
10	ELEVATOR (LENGTH S. SEPARATOR) DISCH. HEIGHT 6.1M (20 FT)
9	LENGTH SEPARATOR
8	HOLDING BIN (CENTER DISCHARGE) ABOVE TREATER/BAGGER
7	HOLDING BIN (CENTER DISCHARGE) ABOVE TREATER
6	HOLDING BIN (SIDE DISCHARGE) ABOVE LENGTH SEPARATOR
5	HOLDING BIN (SIDE DISCHARGE) ABOVE LENGTH SEPARATOR
4	ELEVATOR (CLEAN SEED) DISCHARGE HEIGHT 6.1M (20 FT)
3	AIR-SCREEN CLEANER
2	HOLDING BIN (UNCLEAN SEED) ABOVE CLEANER
1	ELEVATOR (RECEIVING) DISCHARGE HEIGHT 6.0 M (20 FT)

DESCRIPTION		
LEGEND		
MISSISSIPPI STATE UNIVERSITY		
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION		
SEED TECHNOLOGY LABORATORY		
STATE COLLEGE, MISSISSIPPI		
SEED PROCESSING FACILITY		
ZUDANES, BOLIVIA		
DESIGNED BY: J. M. BECK	DATE: JANUARY 1978	SHEET
DRAWN BY: E. R. C.		1 of 2
APPROVED BY: J. C. D.	FILE NO.	

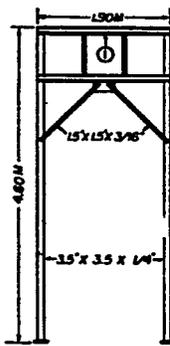
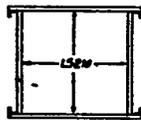


TOP VIEW

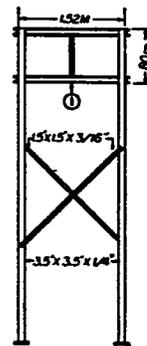


FRONT VIEW
SCALE 1:33 1/3

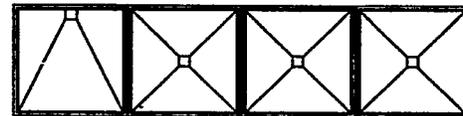
SIDE VIEW
SCALE 1:33 1/3



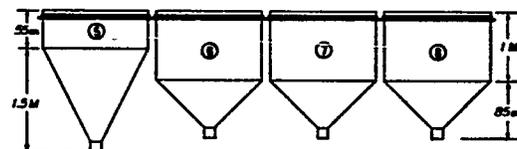
FRONT VIEW
SCALE 1:33 1/3



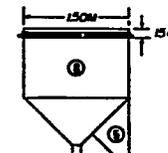
SIDE VIEW
SCALE 1:33 1/3



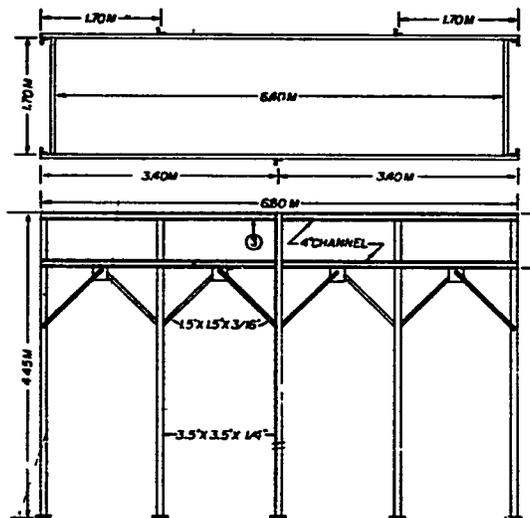
TOP VIEW



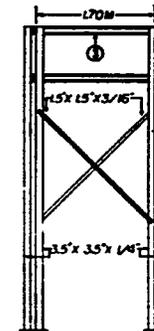
FRONT VIEW
SCALE 1:33 1/3



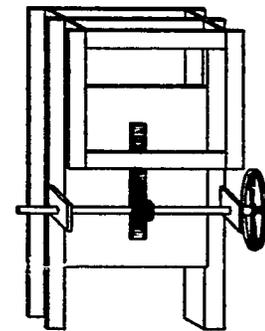
SIDE VIEW
SCALE 1:33 1/3



FRONT VIEW
SCALE 1:33 1/3



SIDE VIEW
SCALE 1:33 1/3



BACK AND FINISH SHUT-OFF VALVE
NO SCALE

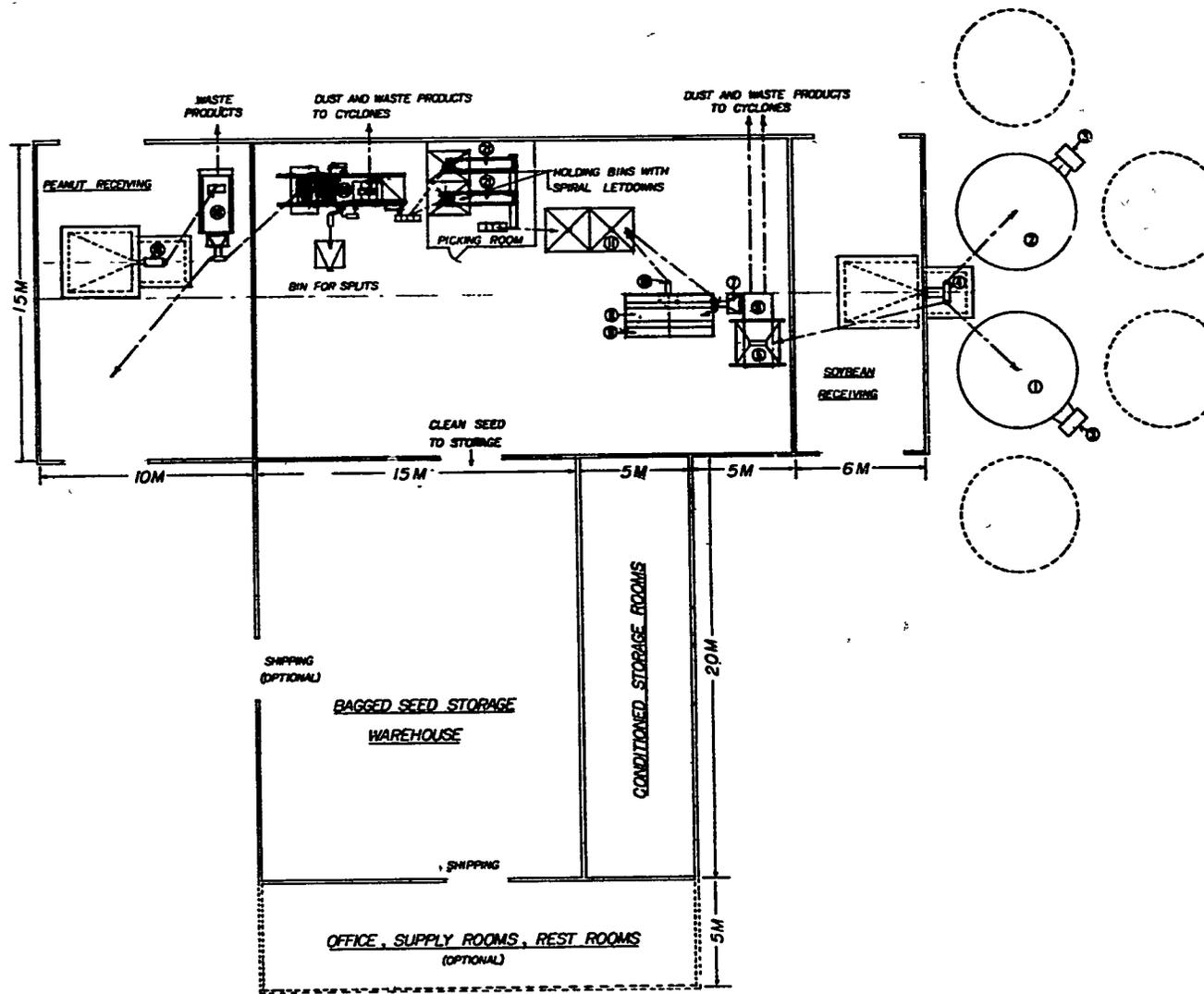
ITEM	DESCRIPTION
1	SUPPORT FRAME FOR BIN #1'S, 2'S, 3'S, 4'S AND 5'S
2	HOLDING BIN UNCLE TOM'S SEED ABOVE CLEANER
3	SUPPORT FRAME FOR BIN #1'S

LEGEND

MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION
SEED TECHNOLOGY LABORATORY
STATE COLLEGE, MISSISSIPPI

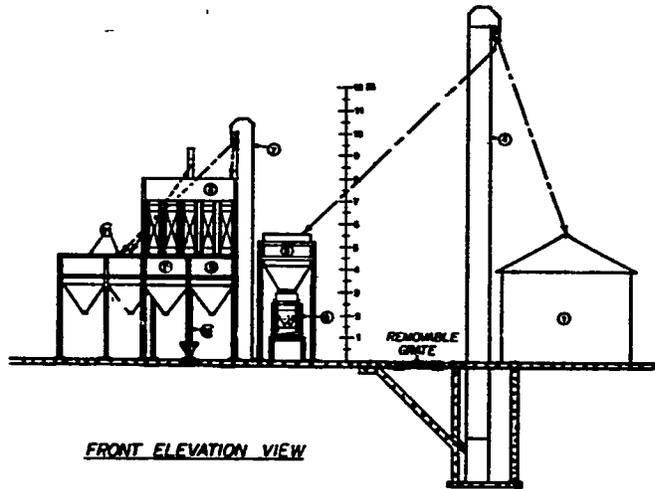
SEED PROCESSING FACILITY
ZUDANES, BOLIVIA

DESIGNED BY: J. M. BECK	DATE: JANUARY 1978	SHEET
DRAWN BY: E. R. C.	FILE NO.	2 of 2
APPROVED BY: J. C. D.		

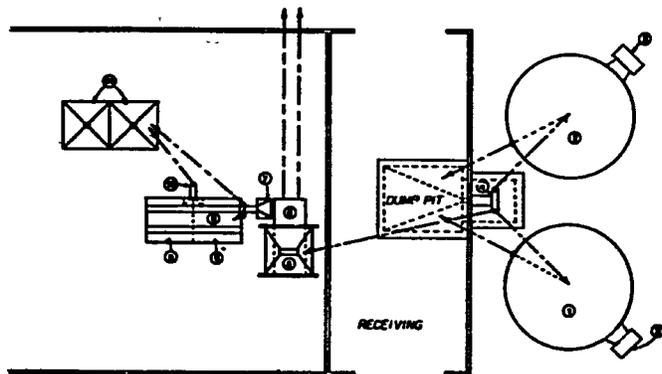


GENERAL LAYOUT
SCALE 1:100

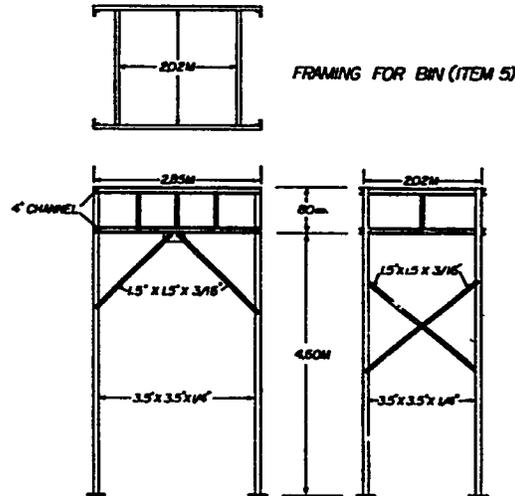
21	PICKING TABLE, SHELLED PEANUTS	
20	SHELLER AND SEPARATOR (PEANUTS)	
19	CLEANER, UNCLEAN PEANUTS	
18	ELEVATOR, UNCLEAN SEED (PEANUTS)	
ITEMS 12-17 NOT SHOWN ON DRAWINGS		
11	WEIGHING BINNING BINS, TWO, 6.56X4 FT (1.99X1.22 M)	
10	ELEVATOR, DISCHARGE BIN, DISCHARGE HT. 0.5 M (1.64 FT)	
9	HOLDING BINS, TWO, 6.56X4 FT (1.99X1.22 M)	
8	SPIRAL SEPARATOR ASSEMBLY	
7	ELEVATOR, CLEAN SEED, DISCHARGE HT. 1.00 M (3.28 FT)	
6	AIR SCREEN CLEANER	
5	HOLDING BIN, UNCLEAN SEED, ABOVE CLEANER	
4	ELEVATOR, RECEIVING, DISCHARGE HT. 5.00 M (16.4 FT)	
3	HEATER-DRYER, DRUM, RUBBER ONE UNIT EACH BIN	
1 & 2	DIPPING/STORAGE BIN, 18 FT DIA, 60 TON CAPACITY EACH	
ITEM	DESCRIPTION	
LEGEND		
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED PROCESSING FACILITY YACUIBA, BOLIVIA		
DESIGNED BY: J. M. BECK	DATE: JANUARY 1978	SHEET
DRAWN BY: L. R. C.	FILE NO.	1 OF 3
APPROVED BY: J. C. D.		



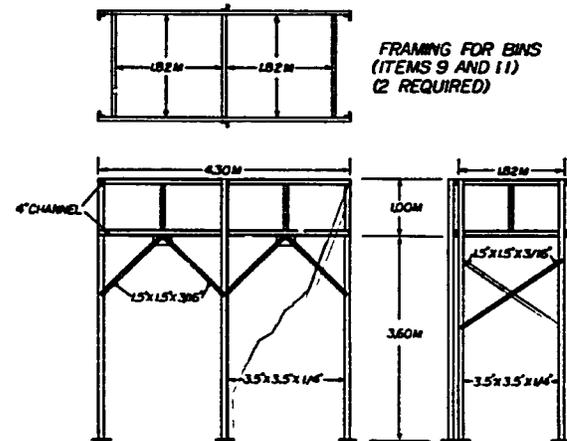
SOYBEAN PROCESSING
SCALE 1:100



PLAN VIEW



FRAMING FOR BIN (ITEM 5)



FRAMING FOR BINS
(ITEMS 9 AND 11)
(2 REQUIRED)

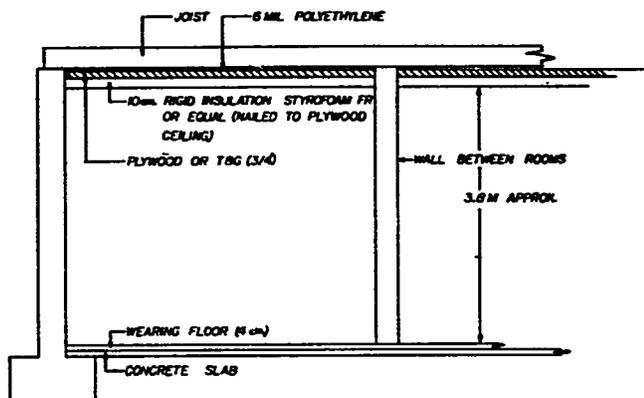
FRAMING FOR SURGE BINS
SCALE 1:40

11	TREATING/GRADING BINS, TWO, 6.61 x 4 FT. (2.01 x 1.21 M)
10	ELEVATOR, TREATING BINS, DISCHARGE HT. 0.5M (2.0 FT.)
9	HOLDING BINS, TWO, 6.61 x 4 FT. (2.01 x 1.21 M)
8	SPRINKLER ASSEMBLY
7	ELEVATOR, CLEAN SEED, DISCHARGE HT. 10.0M (33 FT.)
6	AIR SCREEN CLEANER
5	HOLDING BIN, UNCLEAN SEED, ABOVE CLEANER
4	ELEVATOR, RECEIVING, DISCHARGE HT. 2.0M (6.6 FT.)
3	HEATER-BLOWER, DIESEL BURNER, ONE UNIT EACH BIN
1, 2	DRYING/STORAGE BIN, 18 FT. DIA. 80 TON CAPACITY EACH
LEGEND	

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED PROCESSING FACILITY YACUIBA, BOLIVIA		
DESIGNED BY: J.M. BECK	DATE: JANUARY 1978	DRAWN BY: E.R.C.
APPROVED BY: J.C.D.	FILE NO.	SHEET 2 OF 3

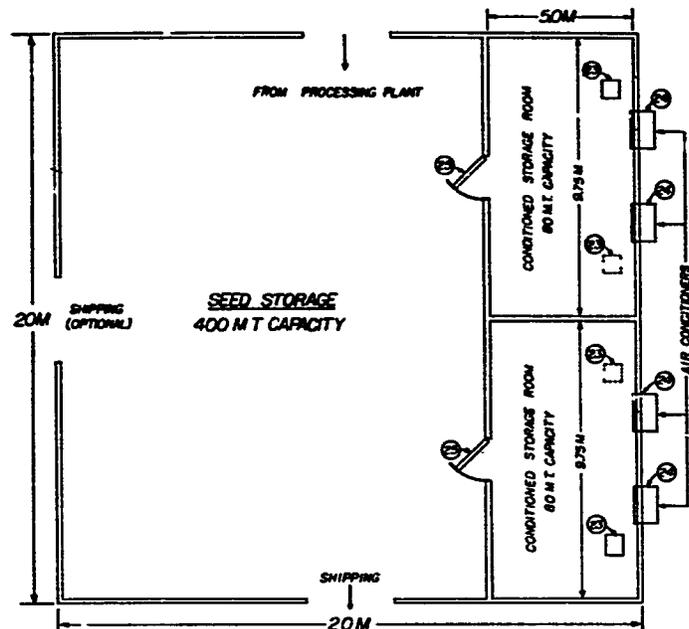
DETAILS CONDITIONED STORAGE ROOMS

NO SCALE



NOTE:

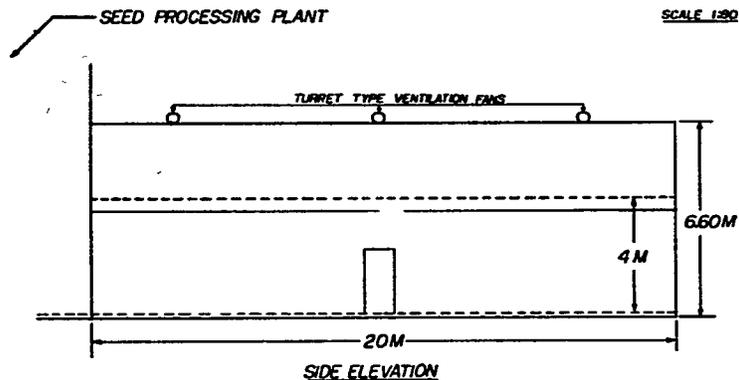
L-PAIN T INSIDE AND OUTSIDE WALL SURFACES WITH ASPHALT BASE (MOISTURE RETARDANT) PAINT



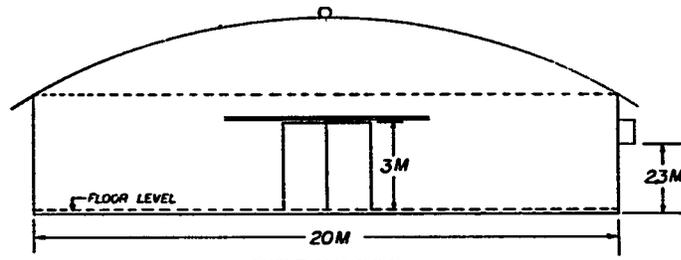
PLAN VIEW

BAGGED SEED STORAGE WAREHOUSE

SCALE 1:80



SIDE ELEVATION



FRONT ELEVATION

23	REFRIGERATOR DOOR, ONE UNIT PER ROOM
24	AIR CONDITIONER, TWO UNITS PER ROOM
23	DEMANDER, PORTABLE, 3 UNITS, ONE FIXED UNIT PER ROOM (TWO ELECTRICAL CONNECTIONS PER ROOM)
178	DESCRIPTION
LEGEND	
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY SEED COLLECT. DIVISION	
SEED PROCESSING FACILITY YACUIBA, BOLIVIA	
DESIGNED BY: J.M. NECK	DATE: JANUARY 1978
DRAWN BY: E.R.C.	FILE NO.
APPROVED BY: J.C.D.	
	SHEET 3 OF 3