4.1.2 Facilities Utilization Policy

The facilities used by the present Project is the 3,500 sq.m space in the existing CMD laboratory building of ITDI including the approximately 2,500 sq.m of expansion. Additional modifications are needed as follows:

- Rearrangement of the electric feeders
- Modification of the city water supply system
- Improvement of the waste water system

As conventional research is to be conducted, there is no problem in terms of facilities. Attention is however called to the installation of the dust pretreatment room and the securing of a passage for the moving in of raw materials and auxiliary materials.

The present room assignments at ITDI are shown in Figs. 4-1 and 4-2.

4.1.3 Equipment Selection Policy

With respect to the design and selection of equipment, important factors such as balancing with the existing equipment, running costs such as lighting and heating, repairs, and spare parts shall be considered. The policies are as follows:

(1) Relation to Existing Equipment

a) With respect to complicated equipment such as electronic analyzers, consideration shall be given to balancing with the equipment existing at ITDI and maintenance shall be emphasized. (Examples: gas chromatography, ion chromatography).

b) As the general testing equipment is largely obsolete, deteriorated, defective, or unrepairable, the affected equipment shall be replaced and renovated.

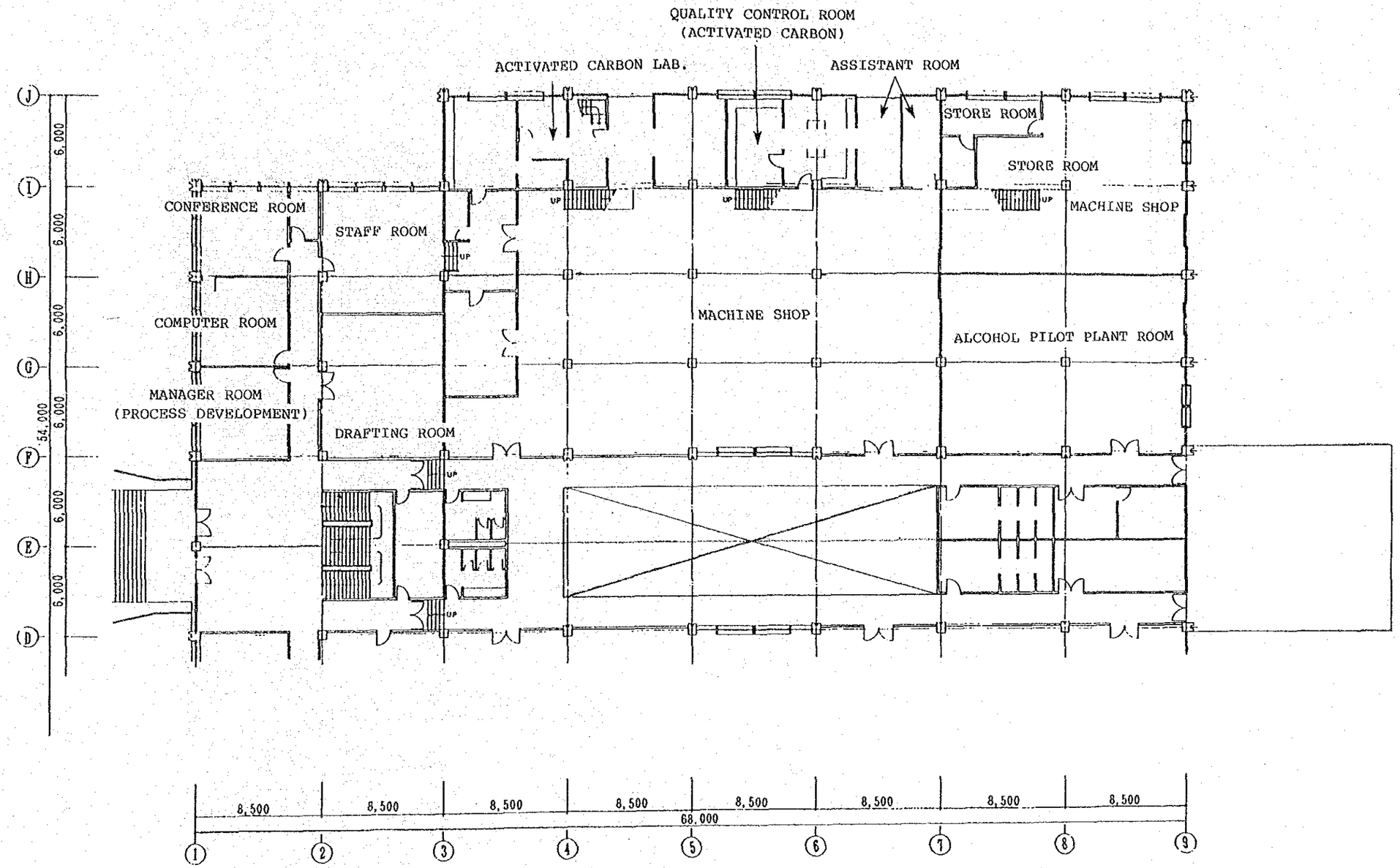


Fig. 4-1

ITDI(CMD)

1ST FLOOR PLAN

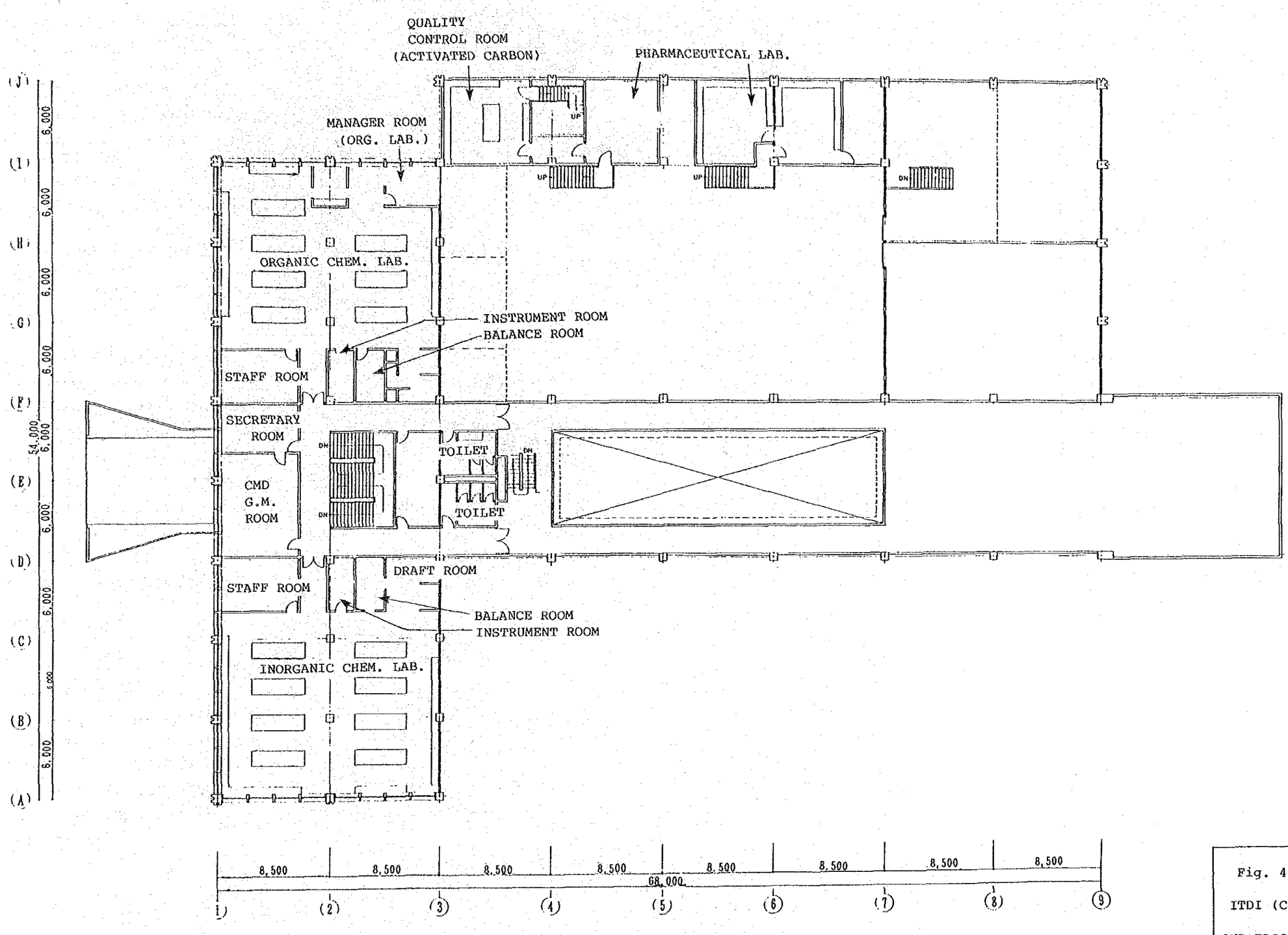


Fig. 4-2
ITDI (CMD)
2ND FLOOR PLAN

c) As the pilot plant equipment is to be used after the table scale tests, it shall be new equipment.

d) As the existing basic test equipment is narrow in range and few in number, it shall be improved.

e) As the existing training equipment is not appropriate, consideration shall be given to enable the acquirement of unit operations and job training skills.

(2) Laboratory Expenses (particularly, lighting and heating)

The 300 kg/hr boiler that ITDI has now is hardly used because it is excessively large for laboratory use.

Consequently, since the items to be considered in the laboratory are fresh coconut test equipment, soap test equipment, slow release fertilizer test equipment, and electronic analyzers, the design shall be carried out to minimize the lighting and heating costs for these items. With respect to boilers, consideration shall be given to installation of two units based on requirements so as to operate two units at maximum capacity and one of the two at regular capacity. As to type, one is to operate on kerosene and one on electricity.

(3) Repair Measures

As ITDI conducts process development, there is no problem with the repairs on vessels and piping because there are welders, but the maintenance of electronic equipment and instruments is an important problem that has to be resolved. Therefore, for this equipment, there is need to provide repair tools for electronic equipment as well as selecting equipment that can be serviced at service centers located in the Philippines.

(4) Spare Parts

With regard to spare parts related to the maintenance mentioned above, particular importance will be placed on electronic equipment and instruments. On this equipment, the policy shall be to stop the selection of equipment of complicated functions since adoption of complex options will obstruct the research activities.

4.1.4 Utilities

The city water used at ITDI is well water, which is not suitable for research on soap and silica gel because of the high hardness of 3,000 ppm. Therefore, installation of water softening apparatus is necessary.

With respect to electricity, consideration shall be given to measures against voltage fluctuations for electronic analyzers and fractionation columns.

4.1.5 Waste Water Treatment

As the waste water and waste solids discharged by the laboratory contains oil, acid/alkali, BOD/COD, rice bran, coconut husks, and inorganic solids, etc. simple measures shall be taken for the treatment systems such as API system and/or filtration.

4.2 Design Conditions

Equipment shall be designed according to the following conditions.

(1) Seismic force

The following formula shall be used for calculating the base shear to the structure independent to the building.

$$V = 0.094\ W$$

where, V: Base shear
W: Total dead load

(2) Bearing capacity of floor

Bearing capacity of the floor shall be based in consideration of safety design.

- for 1st floor slab : 1 ton/m^2
- for 1st and 2nd floor : 300 kg/m^2

(3) Climatic conditions

- temperature (°C)	Max.:	43
	Min.:	27
- for mechanical design (°C)	Max.:	50
	Min.:	27
- Water temperature (°C)	:	25 - 35
- Relative humidity (%)	:	85

(4) Utility

- Electric power	:	220 Volt, Single and 3-phase
Frequency (Hz)	:	60
Fluctuation (Volt, %)	:	±20
- LPG	:	50 kg bomb
- Fuel oil	:	Equivalent to diesel oil
- Steam (pressure)	:	Min. 10.0 kg/cm^2g at saturated condition
- Well water (pressure)	:	1 kg/cm2g (refer to Table 4-1)

- Compressed air	:	shall be designed for each system
- Instrument air	:	Shall be designed for each system

Table 4-1 Water Analysis Table

(Average value of August 8, 1988 and July 15, 1982)

Colour	Nil	P-Alkalinity	-
Odor	Nil	Total Alkalinity (as $CaCO_3$)	297
Taste	Normal	Acidity (as CO_2)	-
pH	8.4	Normal Carbonate (CO_3)	19.0
Total Solids	429	Sulfate (SO_4)	12
Total Dissolved Solids	-	Bicarbonate (as H CO_3)	330
Appearance on ignition	No change	Chloride (Cl)	17.0
Silica (SiO_2)	52.0	Arsenic (As)	Nil
Iron and Aluminum Oxide (Fe_2O_3 & Al_2O_3)	0.8	Total Hardness (as $CaCO_3$)	110
Iron (Fe)	0.05	Suspended Matter	-
Aluminum (Al)	2.5	Estimated Incrustants	-
Calcium (Ca)	33	Classifications:	
Magnesium (Mg)	71	For drinking	Good
Other constituents	-	For boiler	-
		For laundry	Fair

4.3 Study of the Basic Specifications

The results of the study of the basic specifications are given below.

4.3.1 Fresh Coconut Oil Development Test Equipment

(1) Design concept

The cottage type coconut processing plant for a remote rural area which has completed its table scale test at ITDI and the joint feasibility study of ITDI, PCA, and PCRDF and has the support of MICSMEC and DTI is described below.

The following product mixes are being studied as two model cases of industrialization based on the assumed plantation sizes of 5 ha or less and 5 - 10 ha.

1) Industrialization technology for scale less than 5 ha.

Model A	Model B
Edible oil	Chips
Soap	Coconut jam
Vinegar	
Charcoal	
Copra meal	

2) Industrialization technology for scale 5 - 10 ha.

Model A
Edible oil
Coconut powder
Soap
Vinegar
Charcoal
Coir fiber
Copra meal

The study gave the conclusion that, as a cottage coconut processing plant for a remote rural area, there is feasibility even at a scale of 5,000 coconuts per day.

Therefore, the development program now studied by ITDI is based on the provisional criteria of one-tenth of the above scale.

(2) Composition of the equipment

The following equipment shall be included for the test apparatus treating 500 pcs of coconuts per day.

(Equipment for Edible oil)

- Pretreatment equipment for coconuts
- Processing equipment of paling oil
- Expelling equipment
- Refining equipment
- Extraction equipment

(Equipment for Soap)

- Specification equipment
- Cooling and drying equipment
- Kneading and extruding equipment

(3) Basis of the capacity of equipment

1) Edible oil

The methodology of the test assumes a series of about ten tests per year, each consisting of a cycle comprising the preparation for testing in the first week, running of tests in the second week, analysis and data collection in the third week, and specific tests and review of the plan for the following test run in the fourth week.

Consequently, with respect to the capacity of the equipment, a capacity of 500 coconuts per day was considered for only the separation, drying, etc. which require engineering out of the equipment listed in Fig. 4-1, and consideration was given to ways to minimize the capacity of the others to save lighting and heating since these are easy to scale-up.

Following table is the time schedule of the tests.

Time Schedule of Test

Pre-treatment such as shelling and meat breaking	2 days
Centrifuge and expelling in the main stream	1 day
Purification of coconut oil and pale oil processing	1 day
Extraction and solvent stripping process	1 day
Total	5 days

2) Soap test equipment

In the soap test equipment, the factor that determines the capacity of the equipment are the saponification tank and the kneader. Therefore, the use of about 50 l per test of paling oil as the material was considered, assuming the weight of a soap to be 80 - 100 grams, because of the excessive lighting and heating required by a large saponification tank.

Also saponification is normally conducted for about 4 hours and then water washed and salted out, to be completed in a day (6 hours), and subjected to treatment the following day.

The flow of the test is shown on Fig. 4-4.

4.3.2 Test Equipment for Slow Release Type Fertilizer

(1) Basic concept

The subject test equipment is for use in the research to manufacture a product to be used as fertilizer for rice using indigenous dolomite as raw material, comprising the addition of ash of rice hulls to dolomite, the mixing-in of potash and molasses discharged as waste by the sugar refinery, the extrusion of the mixture, and the granulation of the extruded material.

The process can be used in many fields other than for a slow-release fertilizer, which are to be researched and developed, such as the manufacture of granulated fertilizer from agricultural wastes that are now disposed or partly used as fuel, by compressing and crushing the material which is then granulated or further by adding other agricultural and industrial wastes to the system.

Fig. 4-3 Coconut Extraction (Wet Method)

BASIS: 1 NUT WEIGHTS 1 KILO: 500 UNITS/DAY

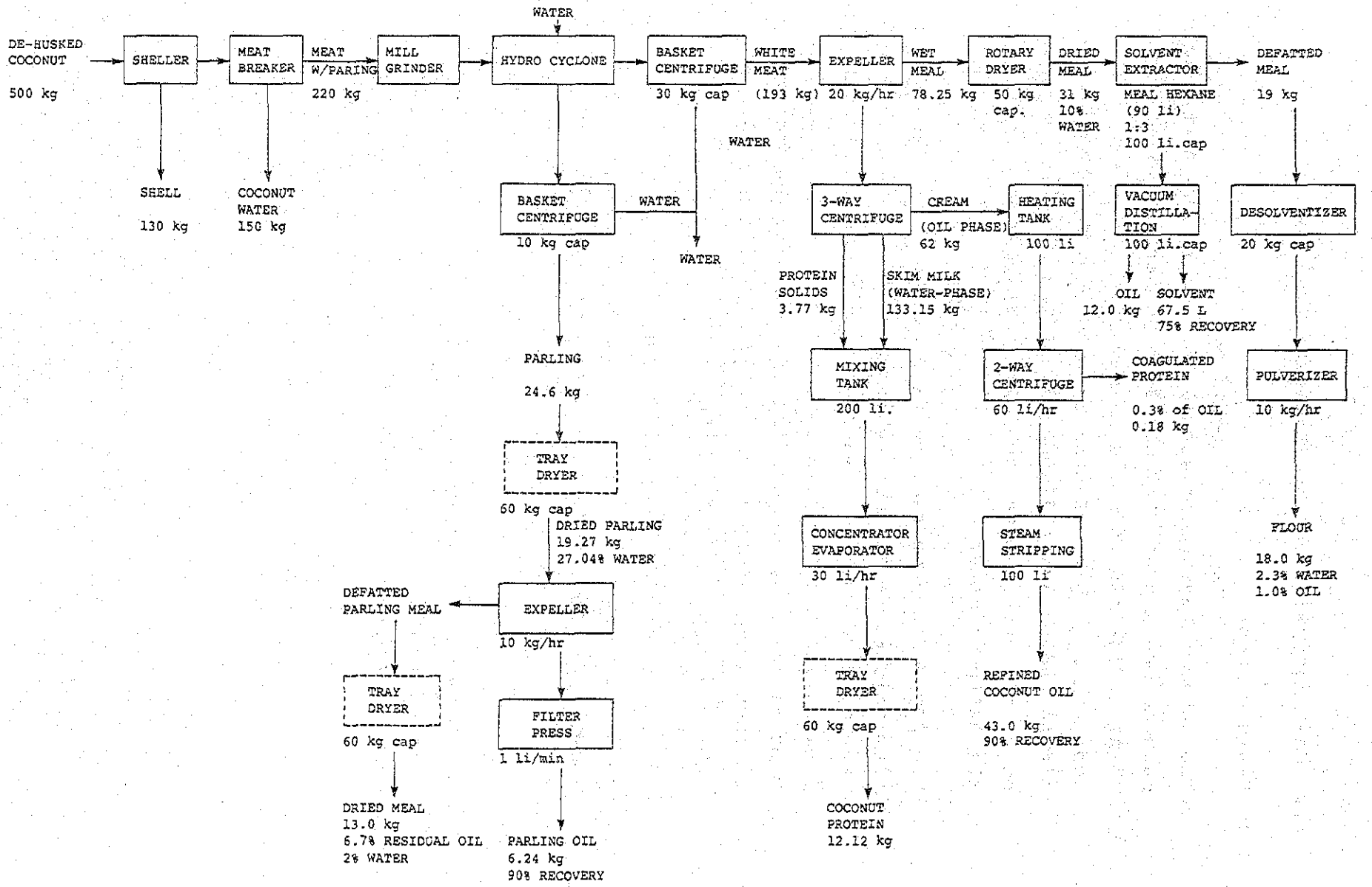
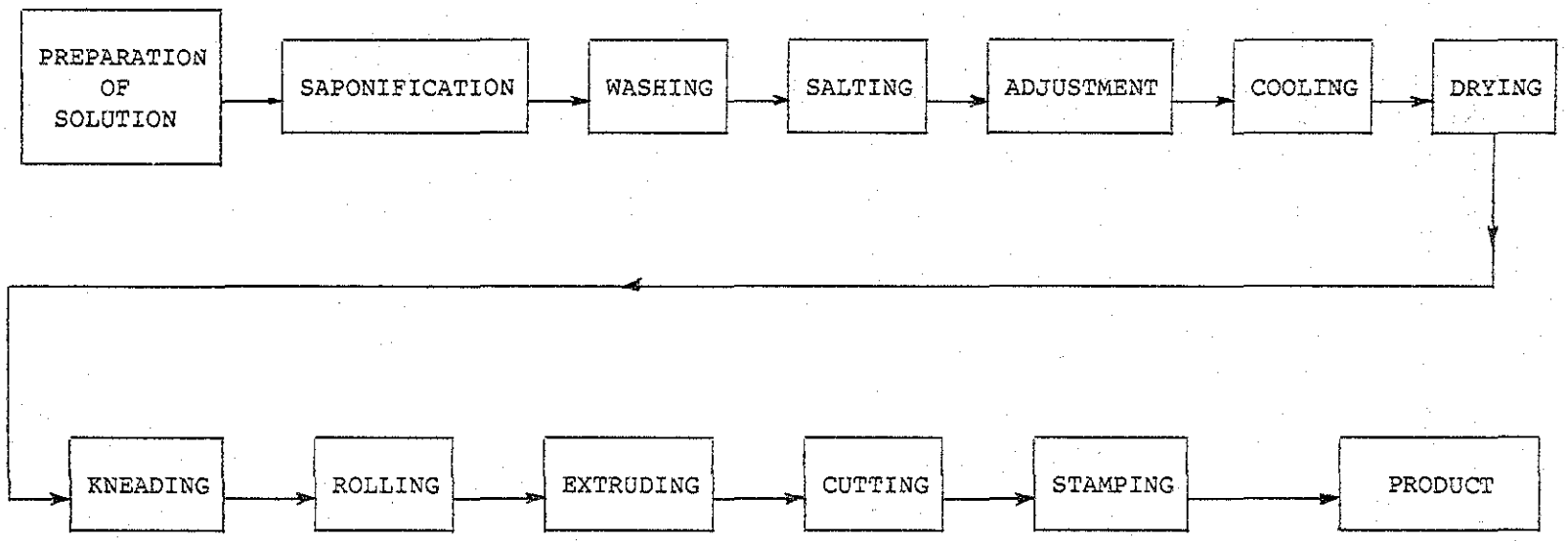


Fig. 4-4 Flow Sheet for Preparation of Soap



(2) Composition of the equipment

The plant is composed of the following equipment:

- Pretreatment equipment for rice husks
- Fluidized furnace for carbonization of the rice husks
- Equipment for mixing and granulating
- Equipment for calculation

The flow of the test of slow release type fertilizer is shown on Fig. 4-5.

(3) The basis of capability of the equipment

The fluidized furnace which ashes and calcines the rice hulls is the main element of the plant, and if it is large, lighting and heating costs are increased and if it is small the required performance is not reached because of the wall effect. In consideration of the above the dimensions of the fluidized furnace system was set to be 5B.

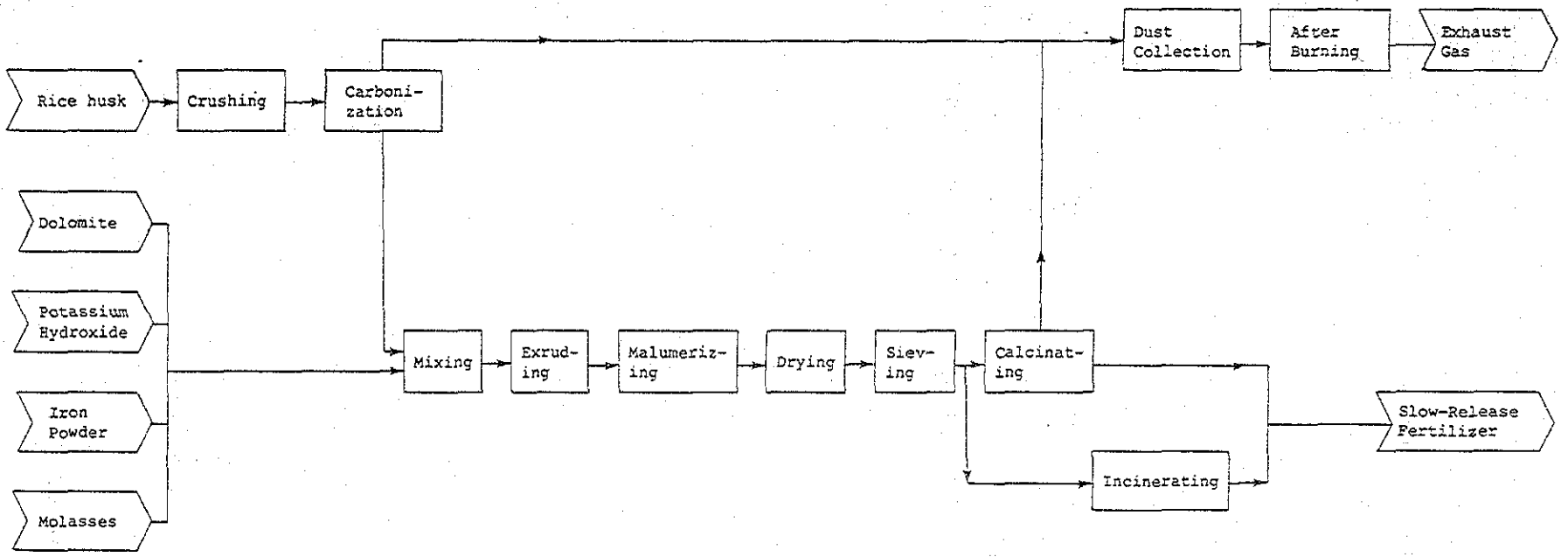
By this plan, a production of 15 kg/hr of fertilizer is possible.

4.3.3 Silica Derivatives Test Equipment

(1) Basic plan

The subject research and development project is for the production of silica gel by a process comprising the ashing of rice hulls, an agricultural waste, under certain conditions, the dissolution thereof in caustic soda, the concentration of the solution to obtain water glass, which is water washed and activated.

Fig. 4-5 Flow Sheet for Preparation of Slow-release Fertilizer



(2) Composition of the equipment

The subject equipment consists of the following:

- Sodium silicate test equipment
- Silica gel test equipment
- Equipment to test standards of sodium silicate and silica gel
- Other auxiliary equipment

The flow of the test is shown on Fig. 4-6.

(3) Basis of equipment capacity

As there is nothing to specify the capacity in the nature of the equipment, the capacity was determined on the basis of the required amount of product for evaluation tests. The equipment shall be of the size to produce 200 grams of silica gel.

4.3.4 Analyzers

Analyzers for the following purposes shall be installed in addition to the general purpose equipment:

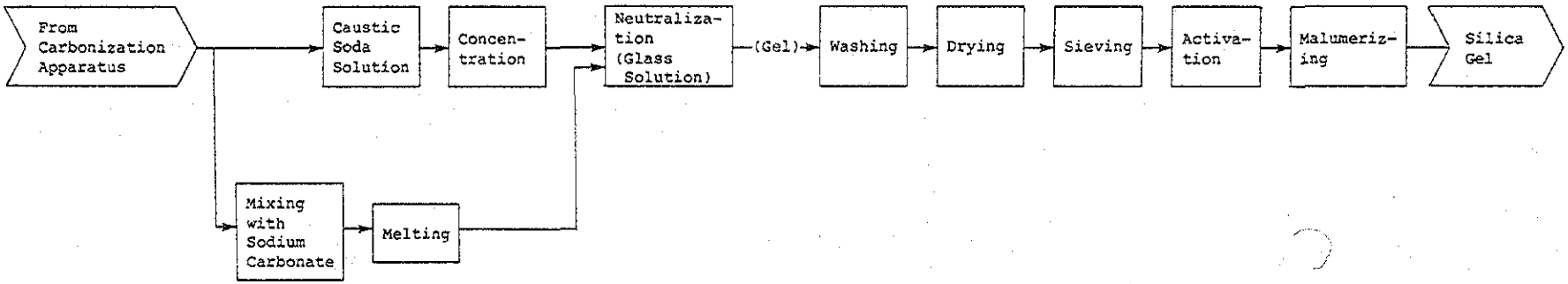
(Analyzer for organic chemistry Lab.)

- GC-MS Analyzer
- FT Infra-red spectrophotometer
- UV-VIS-NIR spectrometer

(Analyzer for inorganic chemistry Lab.)

- Atomic absorption flame emision spectrophotometer
- Flame emission spectrophotometer
- X-ray diffractometer
- X-ray fluoresence spectrometer
- Internal surface area analyzer
- Pore distribution analyzer
- Ion chromatograph
- Scanning electron microscope
- Thermogravimetric analyzer

Fig. 4-6 Flow Sheet for Preparation of Sodium Silicate and Silica Gel



- Thermomechanical analyzer
- Infra-red thermal analyzer

4.3.5 Technical Support Equipment

Technical support equipment includes equipment to modify the pilot plant for the improvement of research necessitated by the small and medium industries who seek consultancy, machine tools for maintenance, field survey equipment for diagnosis and analysis of plants, AV equipment for training, and vehicles to move raw materials or field survey equipment.

(1) Maintenance equipment

- Programmable Lathe
- Universal cylindrical grinder
- Surface grinder
- Radial drilling machine
- Spot welding machine
- AC-DC arc welding machine
- Hydraulic press
- Tool and cutter grinder
- Tester
- Stroboscope

(2) Field surveying equipment

- Hand refractometer
- Infra-red moisture balance
- Portable saccharimeter
- Portable digital temperature indicator
- Portable digital gravimeter
- Potable balance
- Tachometer
- Recorder
- Vibration measurement
- Watt meter
- Circulating
- Paging system

(3) Training equipment

- Overhead projector
- Educational transparency
- Facsimile
- Personal computer
- Copying machine

(4) Furniture and Vehicle

- Side table for electronic analyzer
- Passenger car
- Jeep
- Crane truck
- Forklift

4.3.6 Spare Parts

Spare parts shall be selected on the basis of the following criteria:

(1) The system equipment shall be handled as follows because they will require modification of the system incurred by the change in the test methods caused by the repairs after each test run, change of piping, etc.:

- For rotating machines: 200% for O-rings, packings, mechanical seals, and sleeves
- For valves : 200% for each type, when it numbers less than 1 piece and 2 pieces for each type, when it numbers more than 2
- For gasket for piping: 200% for each type
- For gaskets of equipment : 200% for each type

- For instruments : 100% for detecting element and 200% for sealing material

- For recording pen and paper : 300%

- For heater elements of electric heater : 100% for special types

(2) Analyzers

In principle, for those parts of analyzers which are replaced frequently, 300% spare parts should be included.

(3) General test equipment

200% of the manufacturer's standard shall be included.

4.3.7 The Selected Equipment

The equipment selected on the basis of the above criteria are listed in Table 4-2.

Table 4-2 (1) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
	1. BASIC EQUIPMENT FOR CHEMICAL PROCESSING							
1	Glass lined stirred reactors, complete complete system, laboratory scale	1	Edible Oil	Preparation of Esters, Amide	Organic Chem.	Organic Lab.	Table Scale, Training	New
2	Fluidized bed with complete system, lab. scale	1	Slow-Release Fertilizer	Carbonization & Heat Treatment	Inorganic Chem.	Fertilizer Lab.	Bench Scale	New
3	Hydrogenator, low pressure shaker type, 5L & 250ml	1	Edible Oil	Hydrogenation	Organic Chem.	High Pressure Lab.	Table Scale, Training	New
4	Evaporator, triple effect, vertical 5-50L/Hr	1	Edible Oil	Distillation	Organic Chem.	Organic Lab.	Table Scale	Replacement
5	Crystallizer/Evaporator, 5-50L/Hr	1	Fresh Coconut	Concentration, Crystallization	Organic Chem.	Oil Lab.	Table Scale	New
6	Raw material sample preparation system, complete set	1	Silica Gel, Slow-Release Fertilizer	Crushing, Sieving	Inorganic Chem.	Preparation Lab.	Bench Scale	Replacement
7	Rotary kiln, laboratory scale	1	Fresh Coconut	Drying	Organic Chem.	Oil Lab.	Bench Scale	New
8	Muffle furnace 1000°C, 1500°C, 2000°C	3	Silica Gel, Slow-Release Fertilizer	Heat Treatment	Inorganic Chem.	Inorganic Lab.	Bench & Table Scale	Replacement
9	Reverse osmosis filter	1	Edible Oil	Concentration	Organic Chem.	Oil Lab.	Bench Scale	New
10	Oil milling and extraction equipment, laboratory scale with complete system	1	Edible Oil	Expelling, Extraction etc.	Organic Chem.	Oil Lab.	Bench Scale	New
11	Oil refinery equipment (laboratory scale) with complete system	1	Edible Oil	Refining	Organic Chem.	Oil Lab.	Bench Scale	New
12	Vacuum distillation apparatus set	1	Edible Oil	Distillation	Organic Chem.	Organic Lab.	Table Scale, Training	Replacement
13	Fractional distillation apparatus set	1	Edible Oil	Critical Distillation	Organic Chem.	Organic Lab.	Table Scale, Trainihng	Replacement

Table 4-2 (2) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
14	Soapmaking equipment (laboratory scale) with complete system	1	Soap	Soap Making	Organic Chem.	Oil Lab.	Table Scale, Training	New
15	Mixing tanks 10L, 25L, 50L, 100L	4	Edible Oil	Mixing	Organic Chem.	Oil Lab.	Bench Scale	Replacement
16	Natural draft oven	2	Common	Drying	Organic & Inorganic Chem.	Organic & Inorganic Lab.	Table Scale	Replacement
17	Inert gas oven	2	Common	Drying	Organic & Inorganic Chem.	Organic & Inorganic Lab.	Table Scale	New
18	Air ventilation oven; large type oven (200L)	3	Common	Drying	Organic & Inorganic Chem.	Organic & Inorganic Lab.	Table Scale	New
19	Mixing & filtration system, complete set, silica comp.	1	Silica Gel	Reaction, Drying	Inorganic Chem.	Silica Lab.	Table Scale	New
20	Distillation apparatus	1	Common	Preparation of Distilled Water	Common	Passage	Common	Replacement
21	3-way centrifuge	1	Edible Oil	Separation	Organic Chem.	Oil Lab.	Bench Scale	Extention
22	High bead granulation machine	1	Silica Gel, Slow-Release Fertilizer	Molding	Inorganic Chem.	Pretreatment Lab.	Bench Scale	New
23	Pre-treatment and activation reactor, laboratory scale, complete system	1	Sodium Silicate	Reaction, Mixing	Inorganic Chem.	Silica Lab.	Table Scale	New
24	Autoclave, 50 kg/cm^2 , 1L, 2L, 5L	3	Silica & Edible Oil	Hydrolysis, Reaction	Inorganic & Organic Chem.	Auto Clave Lab.	Table Scale, Training	Extention
25	Counter-current classifier, laboratory scale	1	Fresh Coconut	Sedimentation Separation	Inorganic Chem.	Oil Lab.	Bench Scale	New
26	Gravity settler, cone type, and baffled type, laboratory scale	1	Process Development	Separation	Inorganic Chem.	Silica Lab.	Table Scale	New

Table 4-2 (3) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
27	Molecular distillation apparatus set	1	Edible Oil	Monoglyceride, MCG Distillation	Organic Chem.	Oil Lab.	Table Scale, Basic Research	New
28	Emulsion & dispersion settler, vertical, laboratory scale	1	Fresh Coconut	Separation of Dispersioned Liquid	Organic Chem.	Oil Lab.	Bench Scale	Replacement
29	Spray dryer, laboratory scale	1	Edible Oil	Drying	Organic Chem.	Organic Lab.	Bench Scale	Replacement
30	Vacuum dryer, laboratory scale	2	Edible Oil, Silica	Drying	Organic & Inorganic Chem.	Oil Lab.	Table Scale	Replacement
31	Rotary dryer, laboratory scale	1	Fresh Coconut	Drying	Organic Chem.	Oil Lab.	Bench Scale	New
32	Freeze dryer, laboratory scale	1	Edible Oil	Drying of Concentrate	Organic Chem.	Oil Lab.	Table	New
33	Tray dryer, 61W x 91L x 13D cm, laboratory scale	1	Slow-Release Fertilizer, Silica	Drying of Pellette, Precipitate	Inorganic Chem.	Fertilizer Lab.	Bench Scale	Replacement
34	Complete pelletizing system laboratory scale	1	Slow-Release Fertilizer	Pelletizing of Product	Inorganic Chem.	Fertilizer Lab.	Bench Scale	New
35	*Briquetting machine, 100kg/Hr*	1	*Slow-Release* Fertilizer	*Compression* Molding of Husk	*Inorganic Chem.*	*Fertilizer Lab.*	Bench Scale	New
36	Metering pump, flow range: 50-400m/min	2	Edible Oil, Silica	Feeding & Discharge	Inorganic & Organic Chem.	Organic & Inorganic Lab.	Table Scale	Replacement
37	High vacuum pump, 10^{-4} mm Hg	3	Edible Oil, Silica	Distillation, Degasing	Organic, Inorganic Chem.	Organic, Inorganic Lab.	Table Scale	Replacement
38	Stainless steel/teflon gear pump	1	Edible Oil	Discharge of Liquid	Organic Chem.	Oil Lab.	Bench Scale	New
39	Boiler	1	Common	Heating	Common	Oil Lab.	Bench Scale	Replacement

Table 4-2 (4) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
40	Weighing balance	1	Slow-Release Fertilizer	Weighing	Inorganic Chem.	Fertilizer Lab.	Bench Scale	Replacement
41	Coolnics circulator	3	Common	Cooling	Organic & Inorganic Chem.	Organic, Inorganic Lab.	Table Scale	Replacement
42	Ultrasonic pipet washer	3	Comon	Washing of Pipet	Organic & Inorganic Chem.	Organic, Inorganic, Silica Lab.	Table Scale	New
43	Centrifuge, instant freezing type and three-way	2	Fresh Coconut	Separation	Organic Chem.	Oil Lab.	Bench Scale	Extention
44	Rotary shaker	2	Common	Reaction, Extraction	Organic, Inorganic Chem.	Organic, Inorganic Lab.	Table Scale	Replacement
45	Voltage stabilizer (10KW;220V)	2	Common	Analyzer, Fractional Dist'n	Organic, Inorganic Chem.	Organic, Analyzer Lab.	Table Scale	New
46	Vacuum gauge	2	Common	Vacuum Distillation, Drying	Inorganic, Organic Chem.	Organic, Inorganic Lab.	Table Scale	Extention
47	Ultrasonic cleaner	1	Edible Oil Fertilizer, Silica	Washing	Organic, Inorganic Chem.	Organic, Inorganic Lab.	Table Scale	New
48	Air conditioner, window type	4	Common	Analyzer	Inorganic, Organic Chem.	Analyzer Lab.	Common	New
49	Micro encapsulating apparatus	1	Slow-Release Fertilizer, Silica	Micro-Capsulation	Inorganic Chem.	Silica Lab.	Table scale	New
50	Calciner	1	Slow-Release Fertilizer	Calcination	Inorganic Chem.	Fertilizer Lab.	Bench Scale	New

Table 4-2 (5) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
	2. ANALYTICAL/SCIENCE LABORATORY EQUIPMENT							
51	FT Infra-red spectrophotometer	1	Common	Identification of Molecular Structure	Common	Analyzer Lab.	Common	New
52	Atomic absorption flame emision spectrophotometer	1	Common	Identification of Atom	Common	Analyzer Lab.	Common	Extention
53	Flame emission spectrophotometer	1	Common	Identification of Atom	Common	Analyzer Lab.	Common	New
54	Ion chromatograph	1	Slow-Release Fertilizer, Silica	Analysis of Inorganic Ion	Inorganic Chem.	Analyzer Lab.	Common	New
55	Gas chromatograph, w/data processor	1	Edible Oil	Quantitative Analysis of Fatty Acid	Inorganic, Organic Chem.	Organic Lab.	Common	Extention
56	GC-MS system w/data index system w/data processor	1	Common	Identification of Compounds	Common	Analyzer Lab.	Common	New
57	High pressure liquid chromatograph w/data processor	1	Edible Oil	Quantitative Analysis of Derivatives	Organic, Inorganic Chem.	Organic Lab.	Common	Replacement
58	Thermogravimetric analyzer	1	Slow-Release Fertilizer, Silica	Analysis of Heat Characteristics	Inorganic Chem.	Analyzer Lab.	Common	New
59	Thermomechanical analyzer, large type	1	Slow-Release Fertilizer, Silica	Analysis of Heat Properties	Inorganic Chem.	Analyzer Lab.	Common	New
60	X-ray diffractometer	1	Slow-Release Fertilizer, Silica	Identification of Compounds	Inorganic Chem.	Analyzer Lab.	Common	New
61	X-ray Fluoresence spectrometer	1	Common	Identification of Atom	Common	Analyzer Lab.	Common	New

Table 4-2 (6) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
62	Inductively coupled plasma emission spectrometer	1	Common	Identification of Atom	Common	Analyzer Lab.	Common	New
63	Proximate analysis system	1	Slow-Release Fertilizer, Silica	Measurement of Physical Properties	Inorganic Chem.	Inorganic Lab.	Table, Bench Scale	Extention
64	JIS SiO_2 testing, complete set	1	Slow-Release Fertilizer, Silica	Evaluation Test	Inorganic Chem.	Inorganic Lab.	Common	Extention
65	Soxhlet extracion apparatus, complete system	1	Edible Oil	Quantitative Analysis of Fat	Organic Chem.	Organic Lab.	Common	Replacement
66	Thin layer chromatograph	1	Edible Oil	Separation/ Analysis of Component	Inorganic & Organic Chem.	Organic Lab.	Common	New
67	Ozonolysis apparatus	1	Rice Bran Oil	Generation of Ozon	Organic Chem.	Organic Lab.	Common	New
68	Dehumidifier	4	Common	Dehumidification of Analyzer Lab.	Common	Analyzer Lab.	Common	New
69	Water softerner/water distillation apparatus	2	Common	Preparation of Soft Water/ Distill'ed Water	Common	2nd Floor Passage	Common	Replacement
70	Direct reading balance	4	Common	Weighing	Inorganic, Organic Chem.	Inorganic, Organic Lab.	Common	Replacement
71	pH meter	2	Common	Measurement pH	Inorganic, Organic Chem.	Inorganic, Organic Lab.	Common	Replacement
72	Homogenizer, laboratory scale	2	Edible Oil, Silica	Dispersion	Inorganic, Organic Chem.	Inorganic, Organic Lab.	Common	Replacement
73	Moisture meter (Karl Fischer)	1	Fresh Coconut, Rice Bran Oil, Soap	Measurement of Moisture	Organic Chem.	Organic Lab.	Common	Replacement

Table 4-2 (7) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
74	Potentiometric automatic titrator	1	Fresh Coconut, Rice Bran Oil	Quantitative Analysis of Component	Organic Chem.	Organic Lab.	Common	New
75	Surface tensiometer (Wilhelmy)	1	Edible Oil	Measurement of Surface Tention	Organic Chem.	Organic Lab.	Common	New
76	Detergency test apparatus	1	Soap	Test for Soap, Detergent	Organic Chem.	Organic Lab.	Common	New
77	Dual-wavelength TLC scanner	1	Inorganic Fine Chemical Edible Oil	Quantitative Analysis of Component	Inorganic, Organic Chem.	Analyzer Lab.	Common	New
78	UV-Lamp	1	Edible Oil	Detection of Component	Organic Chem.	Organic Lab.	Common	New
79	FT-NMR spectrometer, high resolution	1						
80	Internal surface area analyzer	1	Slow-Release Fertilizer, Silica	Measurement of Surface Area	Inorganic Chem.	Analyzer Lab.	Table, Bench Scale	New
81	Low temperature palsma ashing apparatus	2	Slow-Release Fertilizer, Silica	Carbonization	Inorganic Chem.	Silica Lab.	Table Scale	New
82	Scanning electron microscope	1	Slow-Release Fertilizer, Silica	Measurement of Micro-Pore Structure	Inorganic Chem.	Analyzer Lab.	Table, Bench Scale	New
83	UV-VIS-NIR spectrometer	1	Edible Oil	Quantitative/ Qualitative Analysis	Organic Chem.	Analyzer Lab.	Common	Extention
84	Pore distribution analyzer	1	Slow-Release Fertilizer, Silica	Analysis of Micro-Pore	Inorganic Chem.	Analyzer Lab.	Common	Replacement
85	Infra-red thermal analyzer	1	Slow-Release Fertilizer, Silica	Analysis of Melting Phenomena	Inorganic Chem.	Analyzer Lab.	Common	New

Table 4-2 (8) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
86	Loviband tintometer	1	Edible Oil	Measurement of Colour	Organic Chem.	Organic Lab.	Common	New
87	Stirrer for laboratory, different types	2	Common	Reaction, Mixing	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale & Basic	Extention
88	Rotary evaporator with water pump & water water bath, 5L	2	Edible Oil	Stripping of Solvent	Organic Chem.	Organic Lab.	Table Scale & Basic	Replacement
89	Automatic pipet dispenser	2	Common	Quantitative Analysis	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale & Basic	Replacement
90	Spectrophotometer	1	Slow-Release Fertilizer, Silica	Identification of Substances	Inorganic Chem.	Inorganic Lab.	Common	Extention
91	Analytical balance	2	Common	Weighing	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	Replacement
92	Saccarimeter	1	Fresh Coconut	Analysis of Succrose	Organic Chem.	Organic Lab.	Table Scale & Basic	New
93	Constant temperature chamber	1	Edible Oil	Reaction, Analysis	Organic Chem.	Organic Lab.	Table Scale & Basic	Replacement
94	Gas flow meter, complete system	1	Common	For Unit Operations	Organic & Inorganic Chem.	Inorganic & Organic Lab.	Table Scale & Bench	Replacement
95	Hot plates with magnetic stirrer	6	Common	Reaction and Other	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	Replacement
96	Heating block	1	Common	Reaction & Other	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	Extention
97	Elemental analyzer	1	Common	Elementary Analysis	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	New
98	Microbalance (Microgram)	1	Common	Weighing	Inorganic & Organic Chem.	Analyzer Lab.	Common	Replacement

Table 4-2 (9) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
99	Viscosimete (Stormer)	1	Edible Oil	Measurement of Viscosity	Organic Chem.	Organic Lab.	Common	New
100	Tristimulus color analyzer	1	Edible Oil	Measurement of Colour	Organic Chem.	Organic Lab.	Table & Bench Scale	New
101	Recording sedimeter	1	Common	Measurement of Particle Size Distribution	Inorganic Chem.	Inorganic Lab.	Table & Bench Scale	New
102	Incubator (water bath, shaking type & oil bath)	2	Fresh Coconut	Detection of Micro-Organisms	Organic Chem.	Organic Lab.	Common	New
103	Ice machine	1	Common	Cooling	Common	2nd Floor Passage	Common	New
	3. FURNITURE/AUXILIARIES/FACILITIES							
104	Passenger car	1	Common	MICSMEC Activities	(Administration)	(Administration)	Bench Scale	Replacement
105	Field work car jeep 4WD	1	Fresh Coconut, Slow-Release Fertilizer	Field Survey	(Administration)	(Administration)	Bench Scale	New
106	Lorry (pick-up type)	1	Fresh Coconut Slow-Release Fertilizer	Transportation of Raw-Submaterial	(Administration)	(Administration)	Bench Scale	New
107	Copying machine	1	Common	Copying	(Administration)	(Administration)	Common	New
108	Personal computer (32 bits) PC-9801	2	Common	Analysis of Experiment Data	Common	General Manager Room	Common	New
109	Personal computer w/software of word process	1	Common	Outside Activities & Training	Common	Conference Rm.	Bench Scale	Extention

Table 4-2 (10) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
110	Laboratory center table (360cmL)	5	Common	Table Experiment	Organic & Inorganic Chem.	Inorganic & Organic Lab.	Table Scale	Extention
111	Laboratory side table (180cmL)	4	Common	Analysis	Inorganic & Organic Chem.	Organic Lab. & Analyzer Lab.	Common	Extention
112	Laboratory side table (120cmL)	3	Common	Analysis	Inorganic & Organic Chem.	Analyzer Lab. & Silica Lab.	Common	Extention
113	Laboratory sink unit (10cmL)	3	Common	Analysis	Inorganic & Organic Chem.	Analyzer Lab. & Silica Lab.	Common	Extention
114	Balance table	2	Common	Table for Balance	Inorganic & Organic Chem.	Analyzer Lab.	Common	Extention
115	Working table (240cmL)	5	Common	Working table	Inorganic & Organic Chem.	Fertilizer, Silica, Soap, Oil Lab.	Common	Extention
116	Airconditioners, 2 Hp	2	Common	For Analyzer	Inorganic & Organic Chem.	Analyzer Lab.	Common	New
117	Refrigerator	2	Common	Stock of Sample	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	Replacement
118	Storage cabinet (120cmW)	2	Common	Stock of Sample	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	Extention
119	Fume hood (150cmW)	3	Common	Reaction and Other	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	Extention
	4. PILOT PLANT EQUIPMENT (SCALE-UP)							
120	Air compressor	2	Maintenance	Pressure Test and Other	Process Dev.	Workshop	Common	New

Table 4-2 (11) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
121	Calibrator for process controllers	1						
122	Filter press, type F2	1	Process Developmemt	Filtration	Process Dev.	Oil Lab.	Technical Transfer	New
123	Densitometer	1	Common	Evaluation of Product	Process Dev.	Process Lab.	Technical Transfer	New
124	Hand refractometer	2	Common	Analysis of Component	Process Dev.	Process Lab.	Technical Transfer	New
125	Programmable liquid processor	1	Edible Oil	Unit Operation	Organic Chem.	Organic Lab.	Table Scale	New
126	Programmable liquid dispenser	1	Edible Oil	Unit Operation	Organic Chem.	Organic Lab.	Table Scale	New
127	Infra-red moisture balance	2	Fresh Coconut	Moisture Analysis	Organic Chem.	Organic Lab.	Bench Scale	New
128	Vibrating screen separator	1	Slow-Release Fertilizer	Separation	Inorganic Chem.	Fertilizer Lab.	Bench Scale	Replacement
129	Willey's pulverizer	1	Common	Crushing	Process Dev.	Oil Lab.	Bench Scale	New
130	Standby generator, 110KVA	1	Common	Emergency Light & Safety Devices	Process Dev.	Preparation Rm.	Common	New
131	Programmable Lathe	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
132	Universal milling machine	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
133	Universal cylindrical grinder	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
134	Surface grinder	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
135	Radial drilling machine	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement

Table 4-2 (12) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
136	Shaper machine	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
137	Spot welding machine	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
138	AC-DC arc welding machine	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
139	Hydraulic press, 50 tons	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
140	Tool and cutter grinder	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
141	Indexing table	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
142	Height gauge	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
143	Vernier caliper	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
144	Band saw	1	Process Development	Maintenance	Process Dev.	Workshop	Common	New
145	Oxy-ketylene gas welding cutting equipment	1	Process Development	Maintenance	Process Dev.	Workshop	Common	Replacement
146	Facsimile	2	Common	MICSMEC Activities	(Administration)	Secretary Rm.	Common	New
147	Thin-Layer chromatography	1	Edible Oil Derivatives	Separation Analysis	Organic Chem.	Organic Lab.	Common	New
148	Portable saccharimeter	1	Common	Quantitative Analysis	Organic Chem.	Organic Lab.	Technical Transfer	New
149	Portable digital thermometer, digital pyrometer	2	Common	Temperature Measurement	Organic Chem.	Organic Lab.	Technical Transfer	New
150	Portable hydrometer (for heavy liquids)	1	Common	Measurement of Specific Gravity	Organic Chem.	Organic Lab.	Technical Transfer	New

Table 4-2 (13) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
151	Portable weighing scale&stainless steel weighint pans	1	Common	Weighing	Process Dev.	Process Lab.	Technical Transfer	New
152	Melting point apparatus (electrothermal)	1	Common	Viscosity Measurement	Inorganic Chem.	Inorganic Lab.	Technical Transfer	New
153	Alkalimeter	1	Common	Water Analysis	Inorganic Chem.	Inorganic Lab.	Technical Transfer	New
154	Tachometer	1	Process Development	Measurement of Rotation Number	Process Dev.	Process Lab.	Bench Scale	New
155	Recording temperature, pressure, humidity, volume, viscosity	1	Process Development	Field Survey	Process Dev.	Process Lab.	Technical Transfer	New
156	Vibration measurement	1	Process Development	Field Survey	Process Dev.	Process Lab.	Bench Scale	New
157	Caliper	1	Process Development	Maintenance	Process Dev.	Process Lab.	Bench Scale	New
158	Surface temperature indicator	1set	Process Development	Maintenance	Process Dev.	Process Lab.	Technical Consultation	New
159	Variable transformer; stepdown transformer	1	Process Development	Field Test	Process Dev.	Process Lab.	Technical Consultation	Replacement
160	Circulating pumps	4	Common	Unit Operation	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	Replacement
161	Heating Mantles	1set	Common	Heating	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	Replacement
162	Paging system	1set	Process Development	Field Survey	Process Dev.	Process Lab.	Technical Consultation	New
163	Multimeter electrical tester	1	Process Development	Maintenance	Process Dev.	Process Lab.	Common	New
164	Watt meter	1	Process Development	Maintenance	Process Dev.	Process Lab.	Common	New

Table 4-2 (14) Equipment List

No.	Description	Q'ty	1.Research Theme	2.Objectives	3.Division	4.Room installed	5.Type of Research	6.Remarks
165	Strobuscope	1	Process Development	Maintenance	Process Dev.	Process Lab.	Common	New
166	Immersion heaters	1	Common	Heating	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Common	Replacement
167	Wrap around drum heaters	1	Common	Heating	Organic Chem.	Organic Lab.	Table Scale	New
168	Stainless Steel Carts	1set	Common	Transportation of Material	Process Dev.	Pretreatment Lab.	Common	New
169	Fork lift; pallet truck	1	Common	Maintenance	Process Dev.	(Administration)	Bench Scale	New
170	Hoisting machine	1	Edible Oil, Soap, Fertilizer	Handling of Raw Material, Equip ment	Process Dev.	Oil Lab.	Bench Scale	New
171	Transfer pump	1set	Common	Unit Operation	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	New
172	Flexeframe	1set	Common	Unit Operation	Inorganic & Organic Chem.	Inorganic & Organic Lab.	Table Scale	New
173	Solvent extraction kit for ion chromatography	1	Edible Oil	Extraction	Organic Chem.	Organic Lab.	Table Scale	New
174	Dessicator Cabinet type	3	Common	Drying	Organic & Inorganic Chem.	Pretreatment Lab.	Table & Bench Scale	New
175	Overhead Projector	1set	Common	Training	Process Dev.	Conference Rm.	Common	New
176	Educational Transparency	1set	Common	Training	Process Dev.	Process Lab.	Technical Consultation	New

4.4 Study of Running Costs

The following equipment will constitute the basic running costs:

1) Fresh coconut processing test equipment
2) Soap manufacture test equipment
3) Slow release type fertilizer test equipment
4) Silica gel manufacture test equipment
5) Analytical equipment
6) Common utilities equipment
7) Air-conditioning equipment for the special analysis room
8) Others

In estimating the running costs including item 8) Others, the basis of one-fifth of the working hours of the remainder of the total annual working hours of the entire researchers of ITDI less the number of hours calculated by estimating the number of tests conducted for the items (1) - (7) above, was used.

The results of this calculation of the utilities used per run according to the research plan stated in the preceding pragraph are shown in Table 4-3.

The running costs outlines above were studied in particular. By using the unit cost of ITDI (CMD) as shown in Table 4-4 to calculate the other expenses, the cost of maintenance and administration of the facilities, the cost of operating the facilities, etc. of ITDI (CMD), the following amounts are estimated for the year.

Table 4-3 Consumption Amount of Electric Power, Steam, Well Water, and Soft Water

Test	Test Schedule	Electric Power		Steam		Well Water		Soft Water	
		Rated (kw)	Consumption (kwH/RUN)	Capacity (kg/HR)	Consumption (kg/RUN)	Capacity (L/HR)	Consumption (m^3/RUN)	Capacity (L/HR)	Consumption (L/RUN)
1. Test for preparation of Coconut/Rice bran Oil	5HRS/day X 2days/RUN 3days/RUN Related Exp't	42	40	95	200	5,000	2	-	-
2. Test for Preparation of Soap	5HRS/day X 2days/RUN 3days/RUN Related Exp't	30	15	60	220	1,000	2	200	200
3. Test for Preparation of Slow Release Type Fertilizer	5HRS/day X 2days/RUN 3days/RUN Related Exp't	49	120	10	20	1,000	1	100	200
4. Test for Preparation of Silica Delivatives	5HRS/day X 3days/RUN 2days/RUN Related Exp't	25	50	-	-	500	1	100	200
5. Other Works	2HRS/Week Running Ratio; 0.65	350	-	-	-	5,000	-	10	-

Table 4-4 Cost Data for Raw Material and Utilities

1.	Electric power	3.0/kWh (Meralco)
2.	Drinking water	17.69/m^3 (MWSS)
3.	LPG	87.50/11.5 kg
4.	Nitrogen gas	4.40/kg
5.	High grade nitrogen	500/kg
6.	Argon	39.16/kg
7.	Hydrogen gas	490.0/5.32 cu.m
8.	Benzene (reagent grade)	339.7/500 ml
9.	n-Hexane (ditto)	20.0/500 ml
10.	Hydrochloric acid	42.0/500 ml
11.	Copra	3.0/kg
12.	Rice husk	3.0/kg
13.	Coconut oil	12.0/kg
14.	Heavy oil	
	a. Diesel oil	5.5/liter
	b. Bunker oil	2.89974/liter
15.	City call	7.5/call
16.	Telex	71.57/min (Japan, US)
17.	Post card	5.75/rate
18.	Caustic soda	18.0/kg
19.	Rice bran	3.0/kg
20.	Diethanol amine (imported)	111.95/liter
21.	Sulfuric acid	44.0/500 ml
22.	Methanol	40.7/500 ml
23.	Nickel catalyst	1800.0/kg (imported)
24.	Liquid ammonia	355.0/2.5 liters
25.	Helium gas	5200.0/cylinder

(1)	Salaries and wages	3,329,580
(2)	Maintenance and administration	1,115,000
1)	Lighting and heating	110,000
2)	Purchase of raw materials and supplies	500,000
3)	Travelling expenses	30,000
4)	Communication	15,000
5)	Repair of facilities	200,000
6)	Maintenance	50,000
7)	Membership dues	50,000
8)	Printing costs	50,000
9)	Depreciation	50,000
10)	Miscellaneous	60,000
	Total	4,444,580 (peso)

(Approximately 31 million in Japanese Yen)

4.5 Equipment Arrangement

The layout plan for the equipment listed in Table 4-2 in the expanded ITDI rooms is shown in Figs. 4-7 to 4-12.

4.6 Estimate of the Project Costs

The construction of ITDI project shall be constituted of the work to be undertaken by the Japanese Government and the work to be undertaken by the Philippine Government.

By calculating the cost of the ITDI project according to the basic design stated in this chapter, the following approximate amounts are estimated:

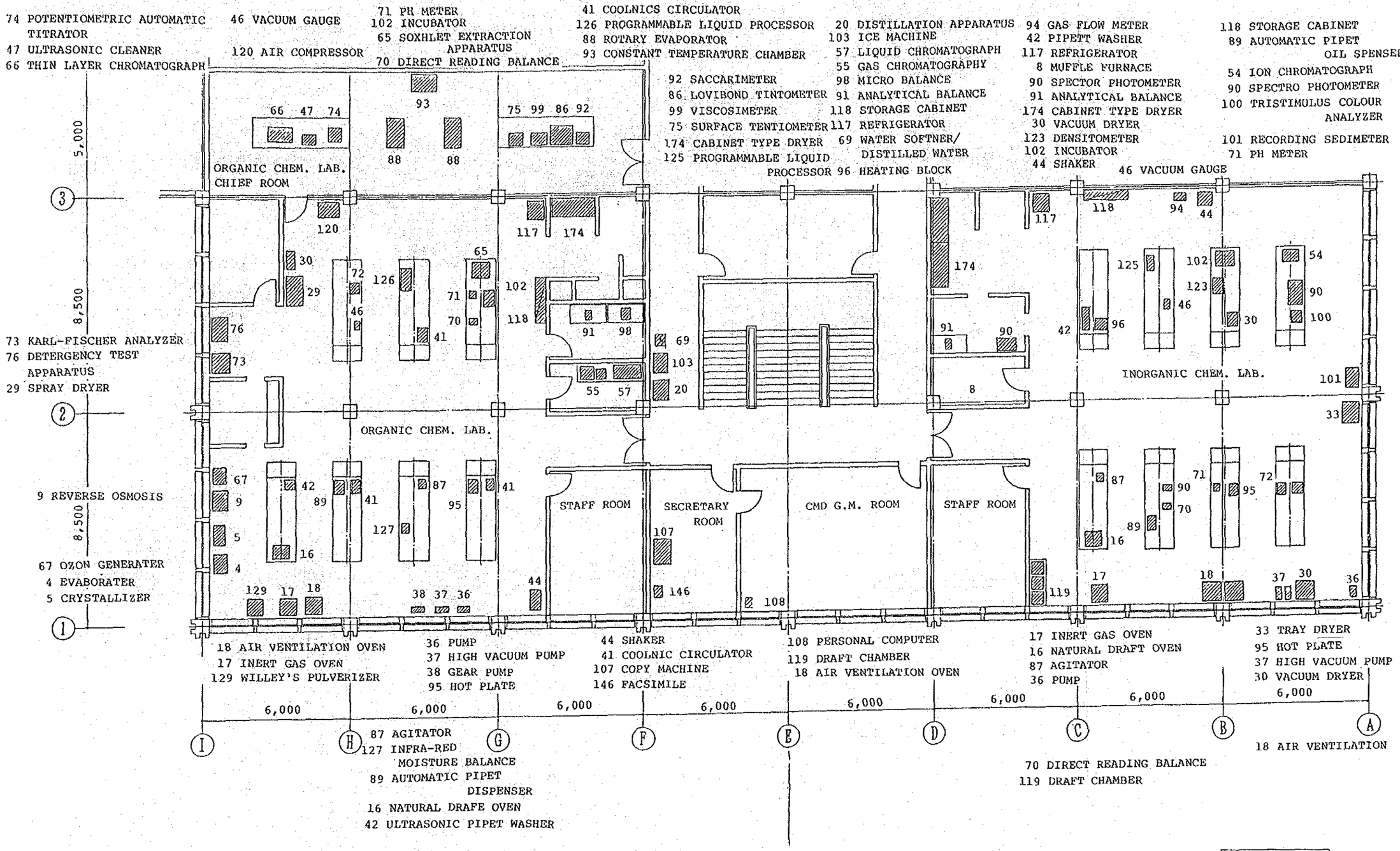


Fig. 4-7

ORGANIC LAB
INORGANIC LAB
LAYOUT PLAN

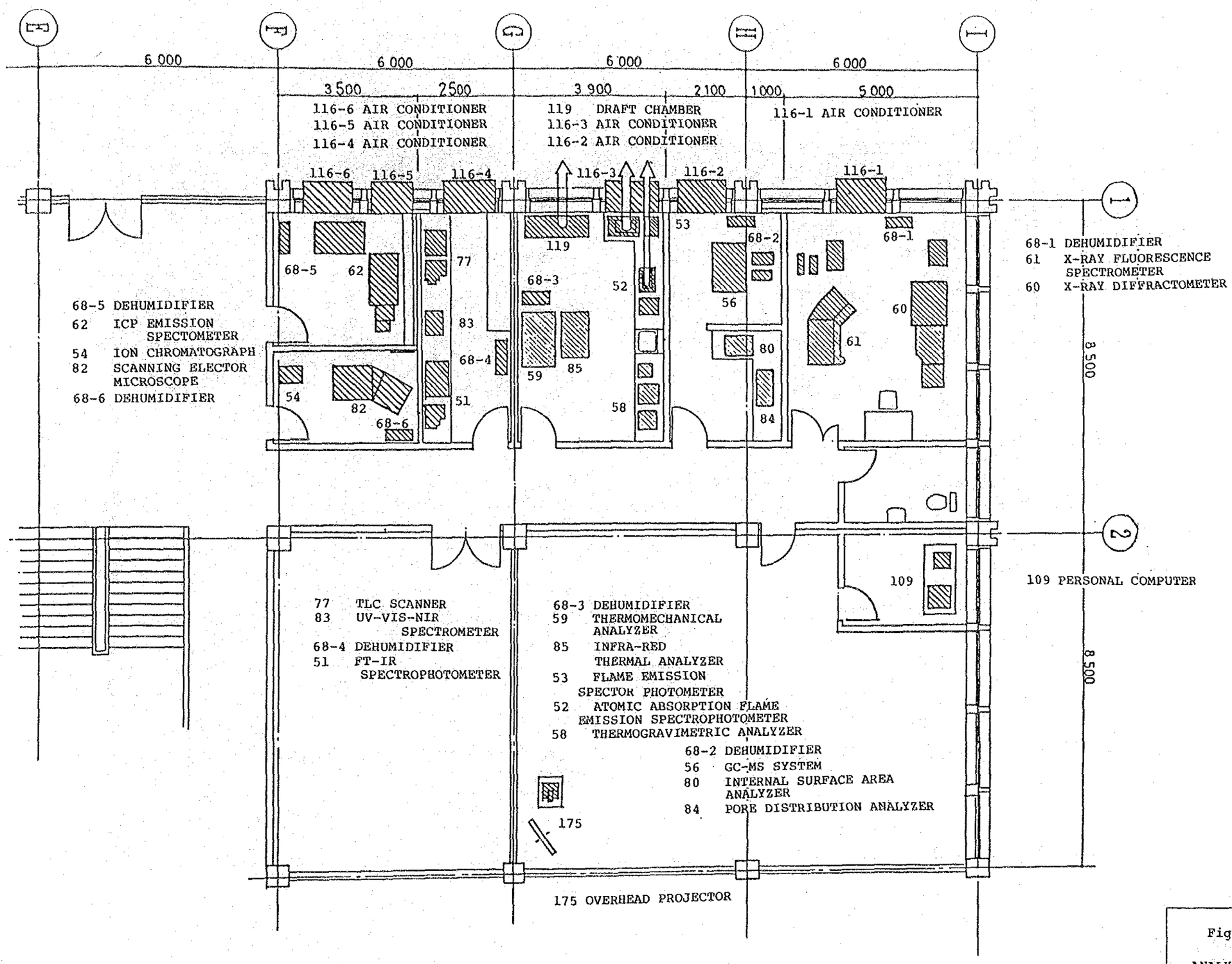


Fig. 4-8

ANALYZER LAB.
CONFERENCE ROOM
LAYOUT PLAN

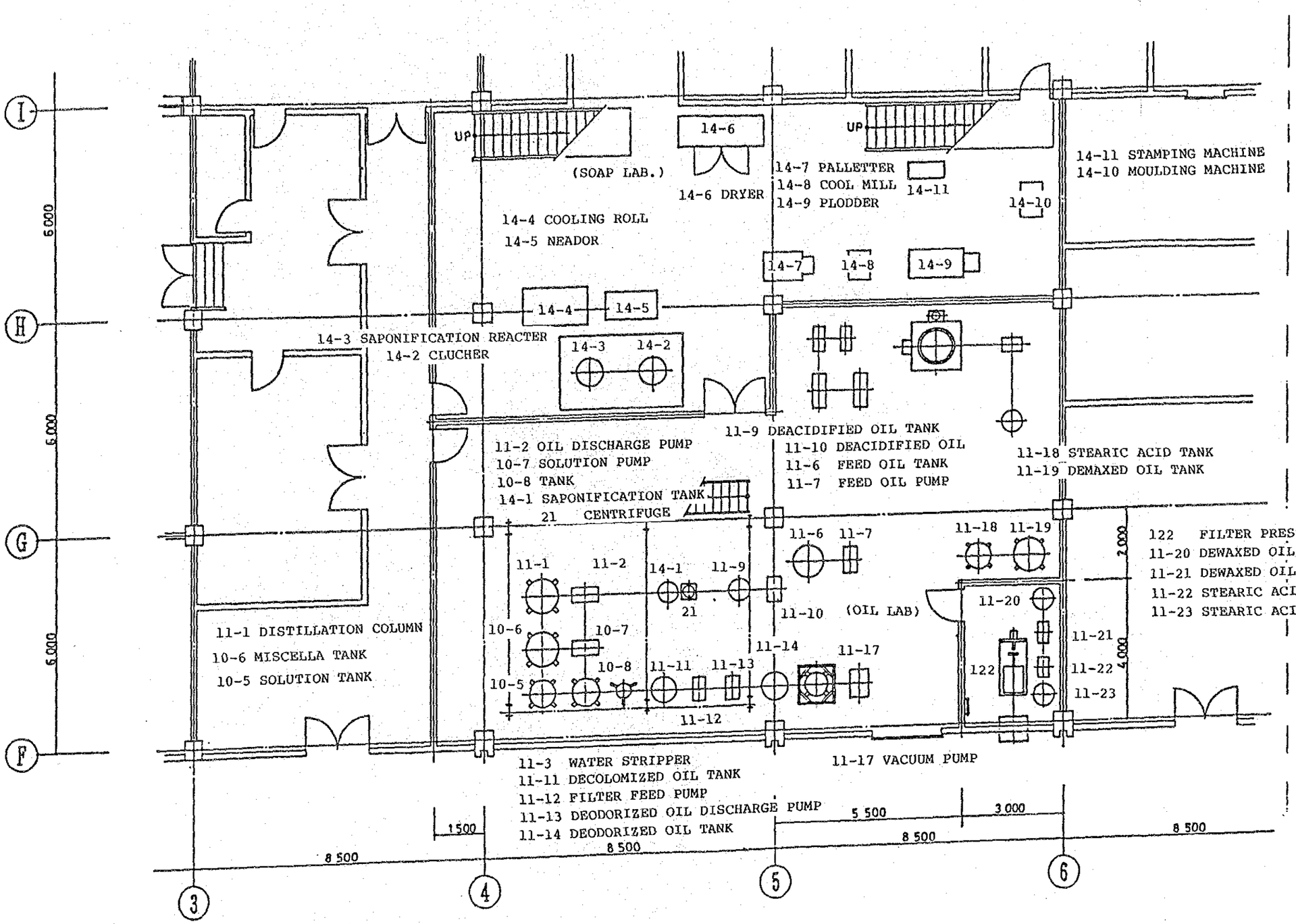
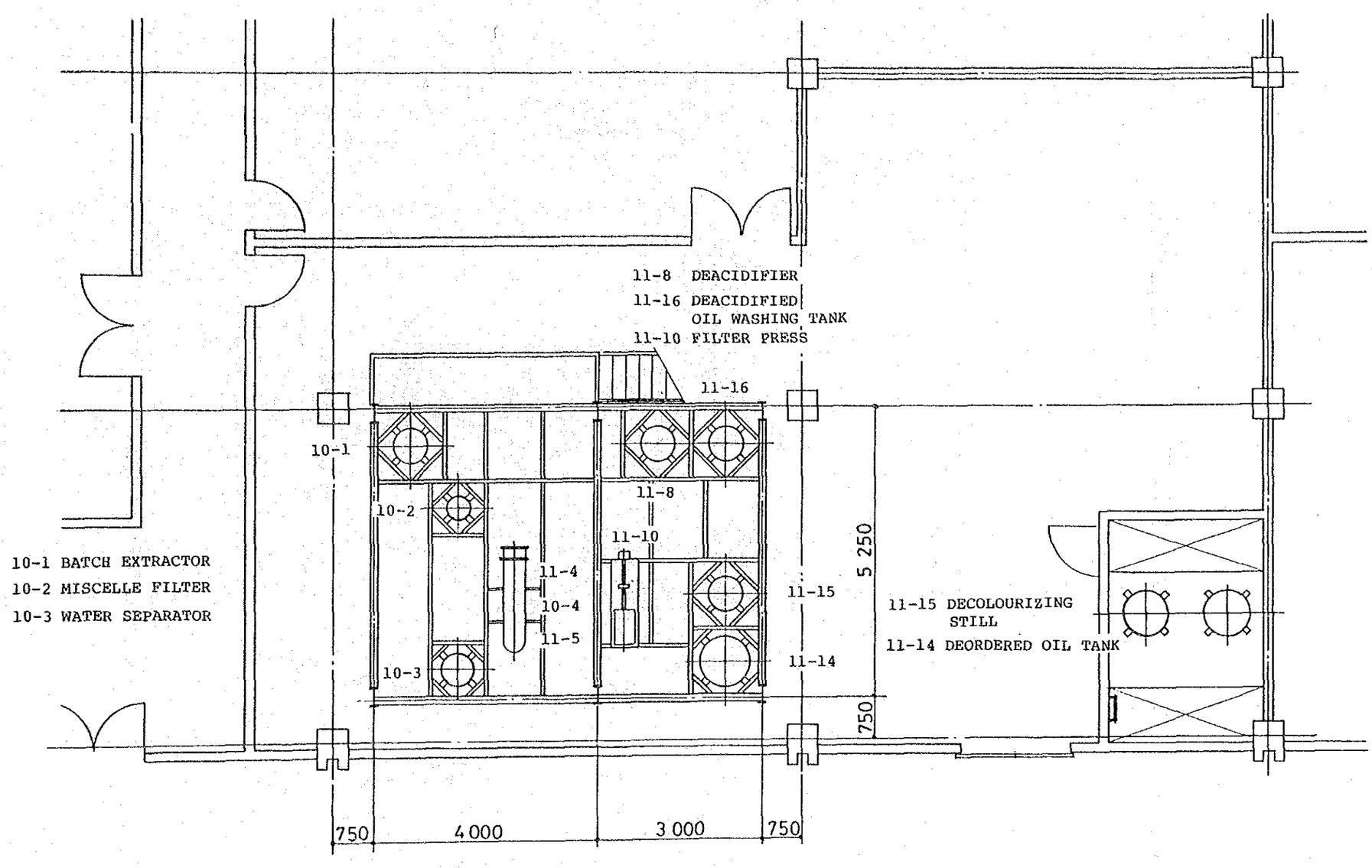


Fig. 4-9

OIL LAB., SOAP LAB.
LAYOUT PLAN



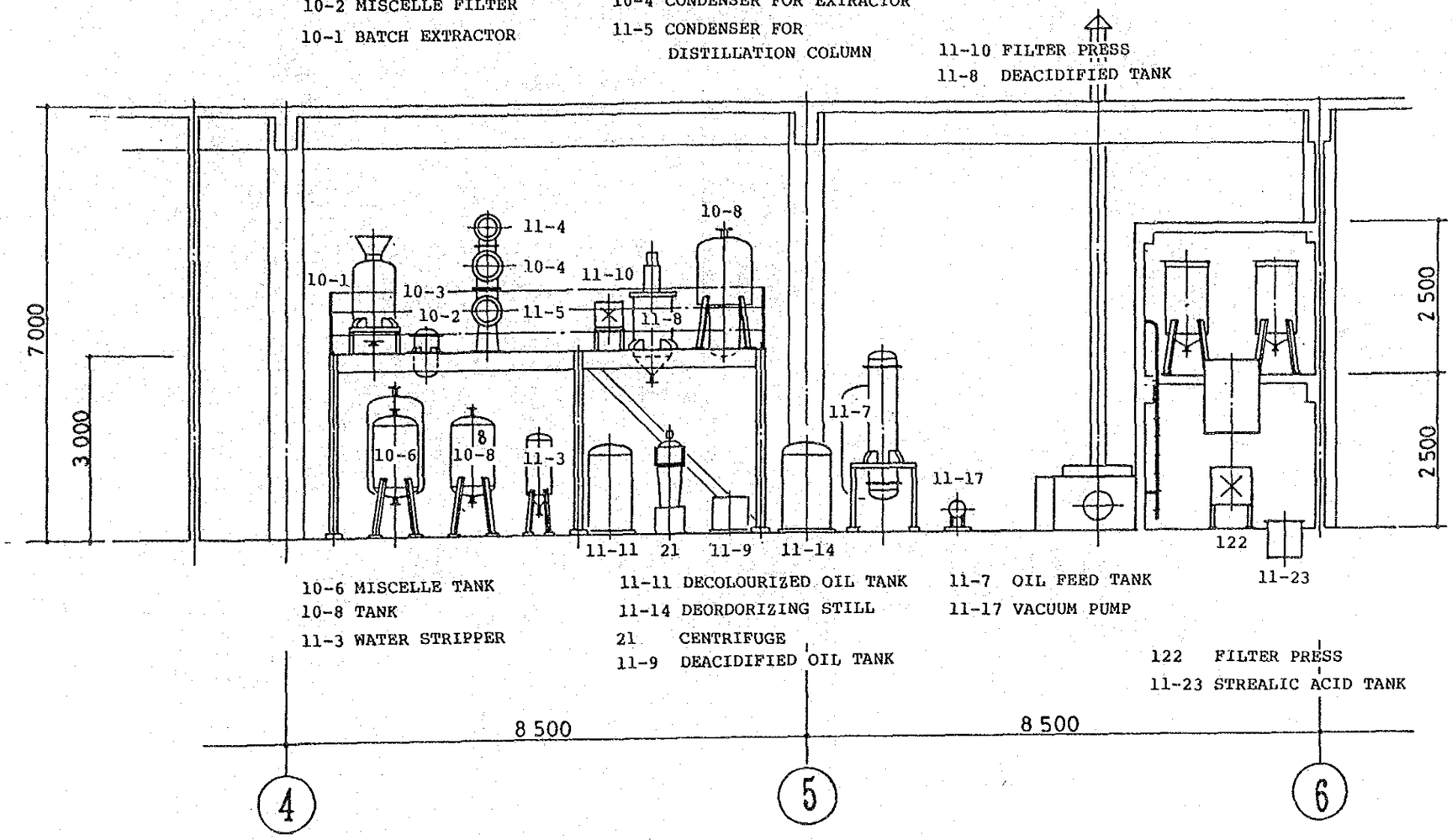
11-4 GAS CONDENSER
10-4 CONDENSER FOR EXTRACTOR
11-5 CONDENSER FOR DISTILLATION COLUMN

Fig. 4-10
OIL LAB.
LAYOUT PLAN

10-3 WATER SEPARATOR
10-2 MISCELLE FILTER
10-1 BATCH EXTRACTOR

11-4 GAS CONDENSER
10-4 CONDENSER FOR EXTRACTOR
11-5 CONDENSER FOR DISTILLATION COLUMN

11-10 FILTER PRESS
11-8 DEACIDIFIED TANK



10-6 MISCELLE TANK
10-8 TANK
11-3 WATER STRIPPER

11-11 DECOLOURIZED OIL TANK
11-14 DEORDORIZING STILL
21 CENTRIFUGE
11-9 DEACIDIFIED OIL TANK

11-7 OIL FEED TANK
11-17 VACUUM PUMP

122 FILTER PRESS
11-23 STREALIC ACID TANK

Fig. 4-11

OIL LAB.
SIDE VIEW
LAYOUT PLAN

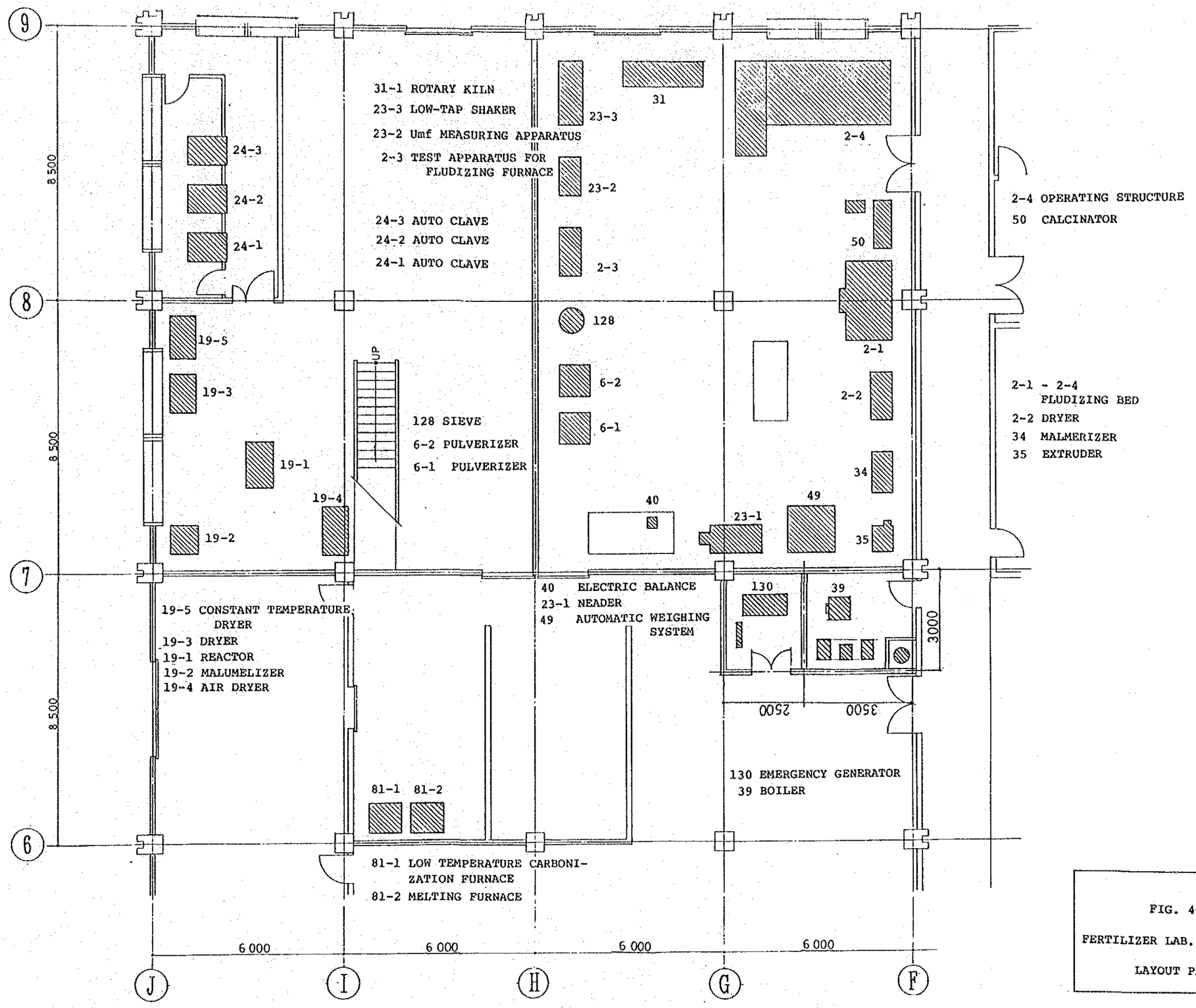


FIG. 4-12

FERTILIZER LAB., SILICA LAB.

LAYOUT PLAN

(1) Basis of Calculation:

1) Foreign exchange rates:

US$1.00 = 135 yen
US$1.00 = 20.30 pesos

2) Period of construction:

Approximately 12 months

3) Contractor: Japanese corporation

4) Others:

Includes the exemptions of customs duties imposed on imports of the construction materials to be used locally and the equipment necessary for the ITDI activity and the business tax imposed on the contractor who is to be a Japanese corporation within the scope of the grant aid cooperation of the Japanese Government.

(2) Cost of the Work to be borne by the Philippine Government

		(peso)
1)	Replacement of the roof	690,790
2)	Piping work	130,852
3)	Electrical work	321,800
4)	Wood work	220,000
5)	Masonry	6,161
6)	Painting	28,036
7)	Contingency (including furniture and appliances)	702,361
8)	Banking commission	43,000
9)	Tax exemptions, customs clearance	40,000
	Total	2,183,000

4.7 Technical Cooperation

Technology transfers to CMD of ITDI are being tried for the projects of the Institute for Transfer of Industrial Technology, with regard to the research and development methodology, analyzer technology, scale-up technology, etc. through the process for manufacture of high performance adsorbent from typical wood, the implementation of feasibility studies relating to the industrialization thereof, the industrialization test by installation of a midget plant locally, the conversion of urban wastes into a resource, the research on the manufacture of slow release fertilizer using rice hulls as a raw material, etc.

CHAPTER 5 PROJECT IMPLEMENTATION PLAN

CHAPTER 5 PROJECT IMPLEMENTATION PLAN

5.1 Implementation Organization

The competent agency of the Philippines for the implementation of the Project is DOST and the actual business will be carried out by its sub-organization, ITDI, and will be administered by the Executive Committee composed of six committee members with Dr. Rufino C. Lirag, Director of ITDI, as the chairman.

ITDI has been carrying out modification work on the laboratory building since the end of July, 1988, and this team is also composed of six members with Dr. R.C. Lirag as the leader.

5.2 Scope of the Work

The scope of the work relating to the ITDI Project to be undertaken by both countries is outlined below.

(1) Work to be undertaken by the Japanese Government

1) Equipment

- Pilot plant equipment
- Equipment for analysis and chemical experiments
- Machine tools
- Equipment for training and education

2) Procedural work

- Transportation procedures for the transportation of equipment from Japan to the Philippines
- Transportation procedures for the transportation of equipment in the Philippines from the port of unloading to the site of construction

(2) Work to be undertaken by the Philippine Government

1) Buildings and facilities

a) Replacement of the roof

- Replacement of corugated roof
- Installation of ventilation equipment in the laboratory
- Cleaning and rust-proofing of the eaves through and the fume hood

b) Plumbing

- Repair of the drainage system of the second floor
- Digging and replacement of the ditches and the waste water gutter
- Installation of supply water plumbing
- Repair and replacement of the waste water pipes including the lavatory facilities

c) Electrical

- Overhauling of the existing switch gears
- Removal of dormant circuits and repair of the wiring
- Replacement and installation of plug sockets
- Repair of lighting fixtures and switches

d) Wood work

- Repair and replacement of panels, doors, keys, and laboratory tables
- Masonry
- Painting

2) Equipment

- Removal of inoperable, defective and idle equipment
- Re-organization of the drawers and shelves of the central laboratory tables and the side tables
- Removal and disposal of defective glass tools
- Disposal of hoarded synthetic intermediates and defective reagents

3) Implements and fixtures

- Implements and fixtures which are outside of the scope of the work to be undertaken by the Japanese side

4) Procedural work, bearing of expenses, etc.

- Bank commissions
- Expenses accompanying the procedure for tax exemption
- Expediting measures for customs clearance and inland transportation
- Procedures for tax exemption from taxes and other fiscal dues of the Philippines imposed on Japanese personnel engaged in the implementation of the Project in accordance with the agreement that has been approved
- Privileges for the entry into and the stay in the Philippines by the Japanese to conduct the work in accordance with the agreement that has been approved
- Placement of the staff necessary for the administration and control of the Project under the precisely planned personnel placement plan

5.3 Plan for Supervision of the Implementation

The consultant shall organize a consistent project execution team regarding the implementation design and erection for the smooth implementation of the work. In the supervision of erection, the consultant shall send a permanent supervisor to be stationed at the site of the ITDI work for assistance during erection and liaison, and also specialists will be sent for short periods as required at stages in the progress of the erection to conduct inspections and observe the implementation of the work. (Refer to Fig. 5-1.)

In particular, as the present Project will utilize existing buildings and laboratory buildings, it is necessary to study and implement the erection schedule so as not to obstruct the ongoing research activities and to consider the safety aspect when timing the moving-in, erection, splitting of the adjustments, test run, and timing of initial supply of power, etc.

5.4 Procurement Plan for Supplies and Equipment

(1) Procurement of Philippine products

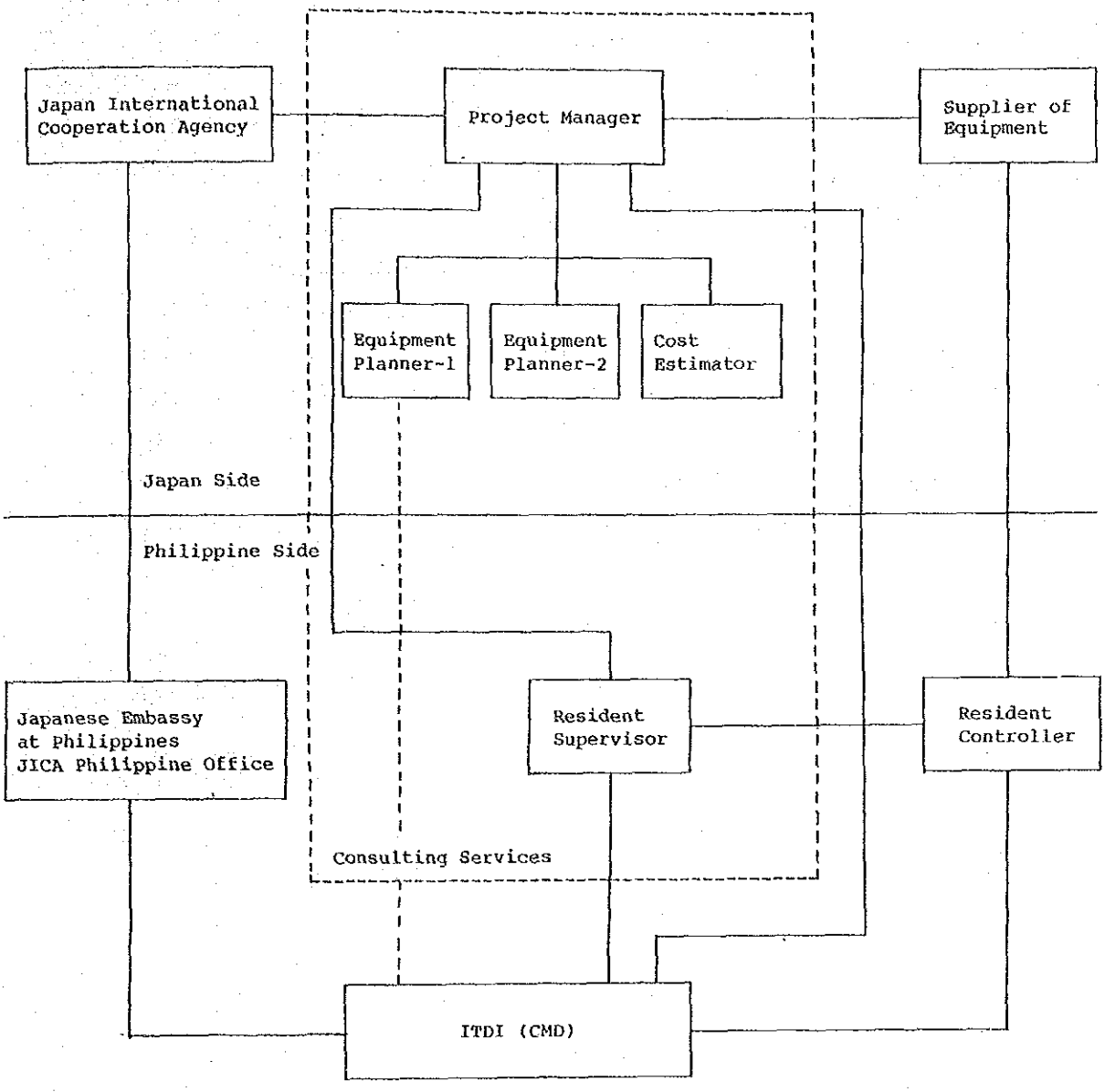
With respect to procurement, basically Japanese products shall be procured. However, the equipment for shelling, breaking, and milling of coconut palm shall be purchased in the Philippines considering the difficulty of reflecting the detailed specifications and/or special requirements of the equipment using only drawings, and of the difficulty of assuring of the equipment and its performance.

Also, there is a moisture meter which is approved by PCA, and since this may become an obstacle in the technical discussions with the party concerned, this item shall be procured in the Philippines.

(2) Procurement of third country products

Furthermore, with respect to procurement in third countries, since most of the existing equipment are products of the manufacturers of Europe and the U.S.A., it is appropriate

Fig. 5-1 Project Implementation Organization



that a portion of the equipment involve procurement of the same products of the manufacturers of Europe and the U.S.A., considering the compatibility with the existing equipment and the incentive of maintenance service for the existing equipment by the manufacturers.

(3) Time for Design and Fabrication of the Equipment

Some equipment is related as a system, as with the test equipment for edible oil and soap manufacture, the test equipment for slow-release fertilizer manufacture and the test equipment for sodium silicate and silica gel, and these systems require adequate supervision for the engineering coordination at the time of detail design, inspection, erection assistance, and test runs. It is necessary that the time required for these activities be allowed for.

(4) Transportation Plan

The transportation plan from Japan is as follows:

First shipment : Test equipment for edible oils and soap manufacture
Test equipment for slow-release fertilizer manufacture
Test equipment for sodium silicate and silica gel
Electronic analyzer
Common equipment

Second shipment: Equipment other than above
Spare parts

5.5 Implementation Schedule

In the implementation of the ITDI Project through a grant aid cooperation of the Japanese Government, the project shall be executed in three stages after the signing of the Exchange Note by the two countries, comprising the preparation of the execution design documents, the tender and work contracts, and the erection. The competent agency of the Philippines to execute the Exchange Note is the Department of Science and Technology.

(1) Detail design

The tender documents are prepared according to the basic design and are composed of the detailed design drawings, specifications, calculations, estimations of budget, etc. In the detail design stage, after deliberate discussions with the organizations concerned of the Philippines, when necessary, the work relating to the tender is conducted with the approval of the final documents. The time required is estimated to be 2 months.

(2) Tender and evaluation

On completion of the work relating to the tender, the prequalification screening shall be done in Japan upon public announcement. Based on the results of the screening, the implementing agency shall invite the companies that participated in the tender, and conduct the bidding in the presence of the parties concerned. The bidder of the lowest price, when the contents of its bid is evaluated to be proper, shall be the successful bidder, and shall enter into a contract with the Philippine Government. The period from the tender to the execution of the contract is expected to be 1 month.

(3) Delivery of equipment

After the signing of the contract, the fabrication of the equipment shall be commenced and the time required for the work on the ITDI Equipment Upgrading Project is estimated to

be approximately 12 months judging from the size and the facilities of ITDI, assuming that the procurement of the equipment is carried out satisfactorily and the preparatory work within the scope of the Philippine side proceeds smoothly.

The overall schedule is conceived as indicated in Fig. 5-2.

5.6 Administration, Maintenance, and Control

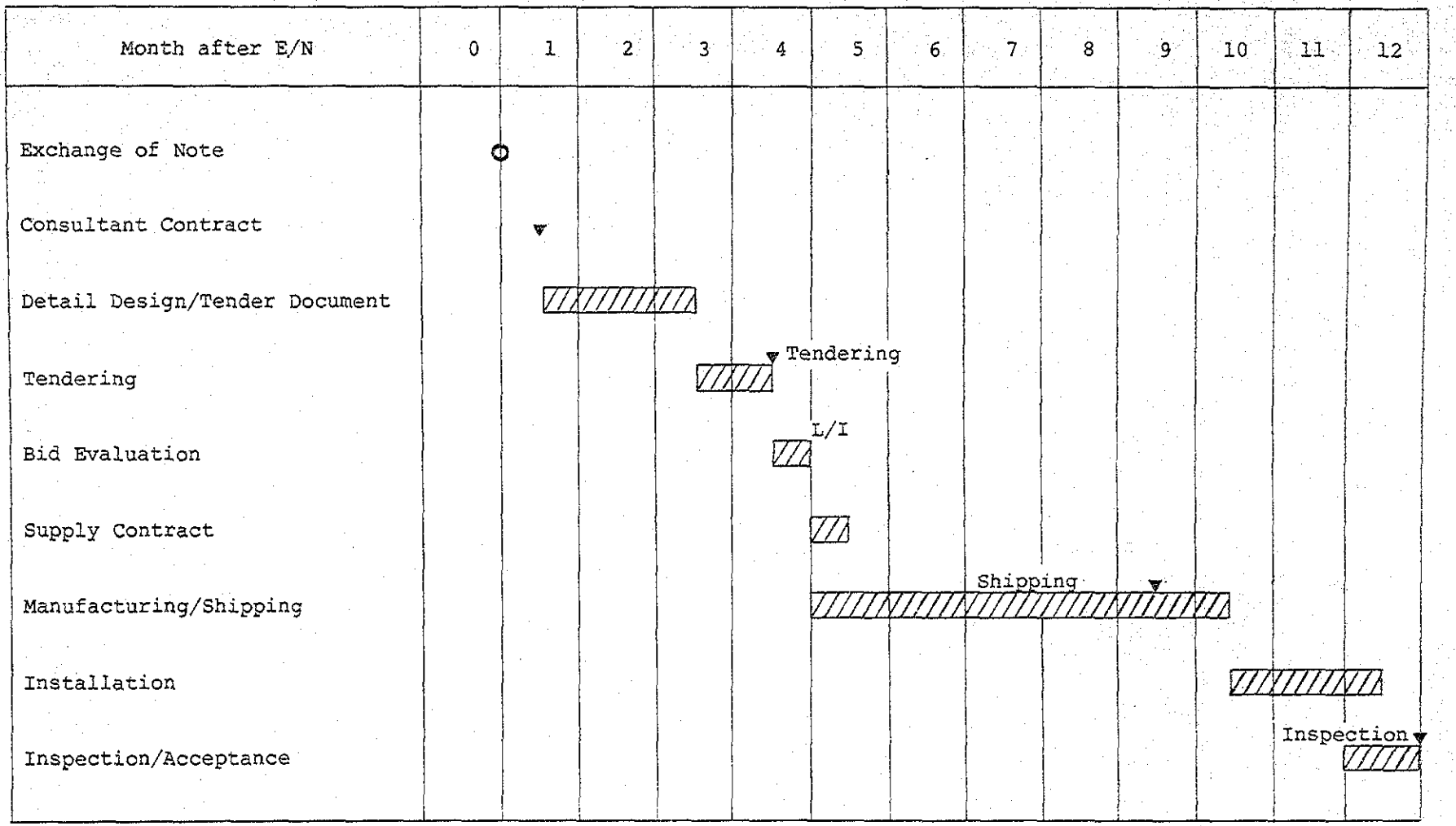
5.6.1 The Administration, Maintenance, and Control Systems

As indicated in Chapter 3, any matter to be decided on an inter-divisional basis shall be subject to the meeting of the heads of the divisions and shall be decided by the management composed of the Director and the Deputy Director.

Financial matters shall be handled by the Financial Management Division, which is the technical service sector. Contents of the maintenance are as follows:

(1)	Items relating to the ITDI buildings and facilities	Administrative Division
(2)	Items that incur modifications being based on consultancy for small and medium industry regarding pilot plant tests (replumbing, overhauling of rotating machines, etc.)	Process Development Division and external parties
(3)	Electronic and/or common analyzer	Agents in the Philippines
(4)	Electrical equipment and instruments	External parties and manufacturers of equipment and instruments

Fig. 5-2 Implementation Schedule



(5) Common equipment ..... External manufacturers of scientific equipment

5.6.2 Annual Expenses

As shown on Table 3-1, the planned budget after the implementation of the present Project, of ITDI (CMD) was compared with the annual expenses for 1986 ~ 1987, the budget for 1988. It is unofficially decided that the budget for the present Project will be approsed when it is submitted.

CHAPTER 6 PROJECT EVALUATION

CHAPTER 6 PROJECT EVALUATION

The main objectives of the present Project are the technological development of the processing and purification of agricultural resources for conversion to higher value-added industries utilizing those resources as their starting material, and technological development to establish industrialization that will encourage labor-intensive small and medium industries instead of capital-intensive industries, that will locate them in rural villages or adjacent areas instead of in the cities and that will return the benefits gained to the rural villages.

That is, specifically, the roles are:

(1) Strengthening of the support work including technical consultancy for SMEs relating to reinforcement of the productive capacity, enhancement of quality, reduction of the consumption of production input, and conversion of raw materials (charcoal, activated carbon, salt manufacturing, cosmetic, and fatty acid, etc.),

(2) Provision of technology for village industry projects initiated by the private sector or the government (manufacturing technology of activated carbon, manufacturing technology of starch delivertives, etc.),

(3) Execution of research and development and establishment of technology for ITDI's own projects and projects brought in by the private sector and the government (manufacturing technology of rice bran oil, manufacturing technology of slow release type fertilizer, etc.),

(4) Overall technical services related to the national projects for cottage type industrialization (cottage type manufacturing technology of edible oil and of soap, etc.), and

(5) Education and training services relating to manufacturing and analysis to enhance the productive activities of the SMEs (salt manufacturing, utilization of agricultural waste energy, electronic analyzer, etc.).

Consequently, the implementation of the present project may be expected to bring about the following results:

(1) Contribute to increased production, reduction of consumption of production input, increased sales, and expansion of markets, in the case of exports, strengthening of international competitiveness (salt, charcoal, active carbon, and starch industries, etc.)

(2) Contribute to the enhancement of income in the rural areas by utilization of agricultural wastes and upgrading the processing of agricultural products (charcoal, activated carbon industries, fuel substitute such as briquette, alcohol, soap, etc.), and consequently,

(3) Contribute to the enhancement of farmers' incomes and to the alleviation of poverty by making more work opportunities for those engaged in agriculture and by expanding the employment of those engaged in non-agricultural work (establishment of cottage type coconut processing industries in remote area, and rice bran oil, etc.)

(4) Stabilize commodities by increasing the value-added to agricultural crops and by producing industrial products, which will reduce the effects of the import restrictions on agricultural products in the import market, and contribute to the stabilization of agriculture (solution of the issue of aflatoxin of coconut palm, establishment of slow release type fertilizer industry, etc.)

(5) As a result of the stronger linkage between agriculture and industry, flexibility will be enhanced along with the increase of value-added agricultural products and furthermore self-sufficiency will be promoted because of the lesser dependence on imported industrial products (construction materials, industrial chemical products, solid fuel, activated carbon, etc.).

(6) Contribute to earning foreign exchange by increasing exports and reducing imports in the Philippines which is a country dependent on agriculture

(7) As a result of contributing to the reduction of materials needed for production in agriculture, enhancement of the income of the farmers can be promoted (solid fuel, liquid fuel, slow release type fertilizer, etc.).

(8) As a result of the promotion of the production of food and daily necessities in the rural areas, the related service industries may be expected to expand (edible oil, margarine, vinegar, cheese, high fructose syrup, etc.).

CHAPTER 7 CONCLUSION AND RECOMMENDATION

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7.1 Conclusion

As mentioned before, the Government of the Republic of the Philippines has set its target for the medium term covering 1987 through 1992 on alleviation of poverty in the rural areas, generation of employment, promotion of social justice and equity, and attainment of sustainable economic growth. As a manifestation of the government's policy, the proposed project, from the viewpoint of establishing technology in industries utilizing agricultural resources, has the objective of upgrading the research and development systems providing the technology for the activation of agriculture and qualitative conversion of industry. This is to be achieved through the promotion of cottage type industries which will return the benefits gained to the rural areas and through technological services to small and medium industries.

In addition, as regards industrial development in rural areas, the supportive systems for the traditional local industries such as textile processing, wood work, bamboo work, rattan work, and technology for food processing are being established. However, the technological supportive systems for non-traditional products using industrial technology are not yet evident.

From the above standpoint, the present Project is judged to be appropriate as a grant aid project, on the grounds of the expected contribution to the economic development of the Republic of the Philippines, and the positive impact Japanese aid would have by the granting of equipment to ITDI.

7.2 Recommendations

In order to make effective use of the equipment granted to ITDI and fully reap the results of ITDI research, the following points regarding the grant aid of the Japanese Government and efforts for self-reliance by the Philippine Government are essential;

(1) Systematically planned operations

If ITDI (CMD)'s equipment is to be systematically and efficiently utilized, it is necessary to secure the necessary budget from the higher government agencies concerned, secure the staff necessary to the manpower assignment plan and fully review its annual research and development plan including detail planning for individual experiments.

(2) Cooperation and assistance of the related organizations

This research activity aims to place prime importance on the activities of the council centering on the MICSMEC, and it is necessary to exert efforts to achieve a balance between the long term government policy for each product and the program for the development of agriculture and industry, and to plan and execute specific measures for this balance. Also, project management in the broad sense will seek to include data on the conditions external to ITDI, such as the cooperative relationship with the large enterprises subsector, resources input to establish industries in the rural areas, improvement of environmental and location conditions, and the improvement of the market conditions.

As can be seen from the background of the project described in detail in Chapter 2, the present project already has and maintains a close relationship with DTI, BSMBD, TLRC, NFA, and PCA. In consideration of the nature of this project, it is indispensable that these contacts be maintained in order to further the concrete realisation of the cooperative system.

As stated above, the implementation of this equipment upgrading project under the grant aid of the Japanese Government and self-reliance efforts of the Philippine Government are considered essential for ITDI to realize its intended functions and make its contribution to the socio-economic development of the Philippines by the establishment of industrial projects utilizing agricultural resources, and by the enhancement of technical support given to the SMEs.