

3-3 Environmental Facilities in Lima

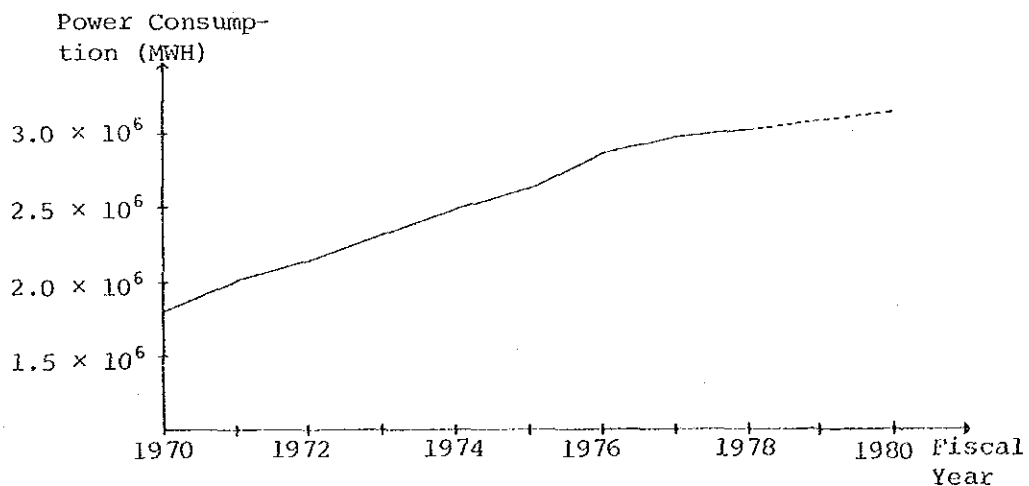
(1) Electric power

Electric power in Peru is supplied by ELECTRO PERU, ELECTRO LIMA, other local power corporations and individual generators owned by private firms. Record of power generation by each sector is shown below.

Unit: GWH

Year & Month	Public sector				Individual generators	TOTAL
	Electro Peru	Electro Lima	Other local power firms	TOTAL		
1977-1 ^o 6	1,108.1	814.6	577.8	2,500.5	1,281.5	3,782.0
" -7 ^o 12	1,218.4	797.6	597.3	2,613.3	1,329.1	3,942.4
1978-1 ^o 6	1,173.7	792.9	547.7	2,514.3	1,307.0	3,821.3
" -7 ^o 12	1,338.5	830.8	571.9	2,741.2	1,261.7	4,002.9
1979-1 ^o 6	1,403.5	804.5	580.6	2,788.6	1,272.1	4,060.7

Power in Lima is all supplied from hydraulic power stations. However, about 3% of total power is supplied by thermal power generator during an emergency. Record of power consumption in the district covered by Electro Lima is shown in figure below.



Annual mean rate of increase of power consumption is shown below.

5 years from 1960 to 1964:	10.93%
5 years from 1965 to 1969:	9.97%
5 years from 1970 to 1974:	8.30%
4 years from 1975 to 1978:	4.81%

Specification of power in city of Lima is shown below.

Transmission voltage	
Working voltage	220V \pm 2.5% 3 ϕ 3W
Frequency	60Hz \pm 5.0%

Power charges in Lima can be generally classified into residential, industrial, commercial and governmental charges, and power bill for proposed center will be calculated basing upon the governmental charge. An example of governmental charge as of October 1979 is shown below.

Basic charge	None
Charge	Up to 30 KWH/month: 240 Soles/month
	Exceeding 30 KWH: 8 Soles/KWH

Electric tax of 5% will be added to the power charges.

(2) Telephone

Telephone communication in Peru is controlled and managed by EMPRESA NACIONAL DE TELECOMUNICACIONES DEL PERU (ENTEL). And telephone in the City of Lima is controlled and managed by COMPANIA PERUANA DE TELEFONOS S.A. (CPT).

At present, CPT is offering the telephone services to about 250,000 automatic subscriber's telephone units.

Telephone service charge in Lima is shown below
(Monthly charge as of October, 1979).

Kind	Basic rate	Message rate	Remarks
Ordinary residential telephone	980 Soles	Greater than 150 messages: 4 Soles/message	Basic rate only for messages less than 150.
Occupational telephone	2,800 Soles	Greater than 150 messages: 4 Soles/message	Basic rate only for messages less than 150.
Commercial telephone	3,700 Soles	Greater than 150 messages: 4 Soles/message	Basic rate only for message less than 150.
Governmental telephone	850 Soles	Greater than 150 messages: 4 Soles/message	Basic rate only for message less than 150.

Telephone facility charge in Lima is shown below
(as of October, 1979).

Kind	Lead-in charge	Dibenture	Remarks
Ordinary residential telephone	30,000 Soles/unit	35,000 Soles/unit	Only at the time of installation
Occupational telephone	30,000 Soles/unit	45,000 Soles/unit	Only at the time of installation
Commercial telephone	30,000 Soles/unit	60,000 Soles/unit	Only at the time of installation
Governmental telephone	30,000 Soles/unit	60,000 Soles/unit	Only at the time of installation

(3) Radio broadcasting

Radio broadcasting services in Peru are being performed by one national broadcasting corporation called EMPRESA NACIONAL DE TELECOMUNICACIONES DEL PERU (ENRAD), 11 semi-national broadcasting corporations, and about 200 commercial broadcasting companies.

Radio broadcasting has become one of the most important entertainment among citizens of Peru with a huge national land. The number of radio receivers owned by citizens will exceed 2 million units and, thus, every 8 persons now own one radio receiver. Types of transmitting radio waves are AM, FM and SM.

(4) Television broadcasting

Television broadcasting services in Peru are being performed by one national broadcasting corporation called ENRAD, two commercial broadcasting companies, COMPANIA PERUANA DE RADIODIFUSION S.A. and PANAMERICANA TELEVISION S.A., and all of these organizations have their own national networks.

Broadcasting hours are from 14:00 to 24:00 from Monday through Saturday, and from 11:00 to 24:00 on Sunday. Color television is also being broadcasted.

(5) City water supply services

City water supply system of Lima is complete. Since annual rainfall in this country is small as stated previously, rich groundwater of Los Andes is pumped up for supply. However, due to the population increase in the area near the proposed site for the center, insufficient capacity of water supply pipeline has become apparent.

Water is very hard in its quality and water treatment equipment will be necessary for supplying to boilers and washing machines. Results of water quality analysis of water taken at HOSPITAL GENERAL BASE CAYETANO HEREDIA and performed at ESAL are shown below.

	Water of Lima	Japanese water supply standard	Water of metropolitan Tokyo (March, 1976)
Temperature	21°C	—	5 to 20°C
PH	8.0	5.8 to 8.6	6.8
Residual after evaporation	648 mg/ℓ	500 mg/ℓ max.	130 mg/ℓ
Turbidity	0.5 degree	2 degrees max.	0
Chromaticity	—	4 degrees max.	1.0 mg/ℓ
Free chlorine	0.4 mg/ℓ	0.1 min.	0.6 mg/ℓ
Carbonic acid gas	6.0 mg/ℓ	—	—
Total alkalinity	130 mg/ℓ	—	30.8 mg/ℓ
Total hardness	412 mg/ℓ	300 max.	69.8 mg/ℓ
Mangan ion	—	0.3 max.	—
Sulfuric acid ion	193.9 mg/ℓ	—	6.5 mg/ℓ
Silicic acid ion	24 mg/ℓ	—	14.26 mg/ℓ
Calcium hardness	332.0 mg/ℓ	300 max.	—
Chlorine ion	41 mg/ℓ	200 max.	—

Charges for water use vary depending upon whether water is used for residential, commercial or industrial purposes, but industrial rate will be applied to the water supplied to the proposed mental health center.

Charges will be S/1,936 for monthly minimum payment rate up to 80 m³ (lead-in pipe size: 1" min.), and S/33.4/m³ will be applied if monthly amount of use exceeds 400 m³.

(6) City sewer services

Complete city sewer services are available. Installation of sewer treatment facilities is required by laws for factories and business establishments but hospitals are exempted from this requirement. (There is no public storm drain system.)

(7) Fuels

Use of either electric power, oil or propane gas can be considered as heat source for kitchens, laundries and domestic hot water supply in the City of Lima. However, heat source capable to offer low operating cost and stable supply must be used. Peru is producing and exporting petroleum products but supply of propane gas is unstable.

Charge per unit calorific capacity and running cost per unit hot water are shown below.

(as of October, 1979) S/ = Soles = yen

	Price of heat medium	Unit price of heat medium per 1000 K cal	Equipment	Efficiency of equipment	Running cost per 1000 K cal of hot water
Electric	S/8.0/KWH	S/ 9.3	Electric heater	1.0	S/ 9.3
Gasoline	200/G	5.2	Boiler	0.6	8.67
Diesel oil	98.5/G	2.57	"	"	4.28
Kerosene K	109/G	2.84	"	"	4.73
Heavy oil R-5	79.5/G	2.07	"	"	3.45
Heavy oil R-6	69.5/G	1.81	"	"	3.02
Propane LPG	75.0/G	0.94	"	"	1.57

3-4 Building Codes and Engineering Standards

Design and construction of buildings must be performed in accordance with REGLAMENTO NACIONAL DE CONSTRUCCION (RNC) in Peru. For obtaining building permits, documents must be submitted to MINISTERIO DE VIVIENDA for private buildings and to relevant authorities for government projects. Thus, application for this mental health center must be submitted to MINISTERIO DE SALUD for obtaining the approval.

(1) Architecture

Concerning architectural design for hospitals, architectural requirements as well as safety requirements prescribed in RNC must be met and, in addition, REGLAMENTO GENERAL DE HOSPITAL OF MINISTERIO DE SALUD has its own standards and regulations for construction of hospital which includes minimum space requirements are partially shown below.

For private hospitals:

Width of hospital corridor:	2.200 m minimum
Width of bedroom door:	1.200 m minimum
Width of door of consultation room:	1.000 m minimum
Width of door of treatment room:	1.200 m minimum
Width of door of pantry:	1.000 m minimum
Width of door of toilets and shower rooms:	0.800 m minimum
Floor area of consultation room:	12 m ² minimum
Floor area of treatment room:	16 m ² minimum
Floor area of pantry:	12 m ² minimum

Floor area of nurse station: 16 m² minimum

Floor area of bedroom (1 bed): 9 m² minimum

Floor area of bedroom (2 beds): 15 m² minimum

Floor area of bedroom (3 beds): 21 m² minimum

Floor area of bedroom (6 beds): 36 m² minimum

Floor area of kitchen: 2 m² × number of beds,
minimum

Floor area of laundry: 1.5 m² × number of beds,
minimum

Floor area of storage
space: 2 m² × number of beds,
minimum

(2) Structure

Structural requirements are indicated in RNC in detail but it is said that signature by one of members of COLEGIO DE INGENIEROS DEL PERU (CIP) is required on the structural drawings for submission. Also, various inspections at the job sites are performed by the engineers sent by CIP.

RNC shows detailed requirements for earthquake-resistant design of buildings and some of them are indicated hereinafter.

In calculating seismic force, the following formula will be used in consideration of degree of earthquake activities, degree of importance of building, properties of soil, ductile building, and degree of rigidity of building:

$$H = \frac{Z \times U \times S \times C \times P}{R_d}$$

- where, H: Total seismic force (shearing force at 1st floor)
- Z: Coefficient of seismic zone (3 zones are used as shown in Fig. 5.)
- U: Coefficient of use and degree of importance
- S: Coefficient of soil
- C: Seismic coefficient
- P: Weight of building
- R_d: Coefficient of ductility

Distribution of H in the height direction will be determined by the following formula:

$$F = f H \frac{P_i \cdot h_i}{\sum P_i \cdot h_i}$$

- where, f: Coefficient to be determined by aspect ratio of building; 0.85 to 1.0
- Remainder of H is to be applied to top portion of building.

Revision of building code of Japan currently undertaken is being made basing upon the same principles as above. For designing sections of members, two kinds are adopted; allowable stress method and ultimate strength design method. The former method is the same as that of Japan and the latter is the same as ACI's method in which load coefficient is introduced.

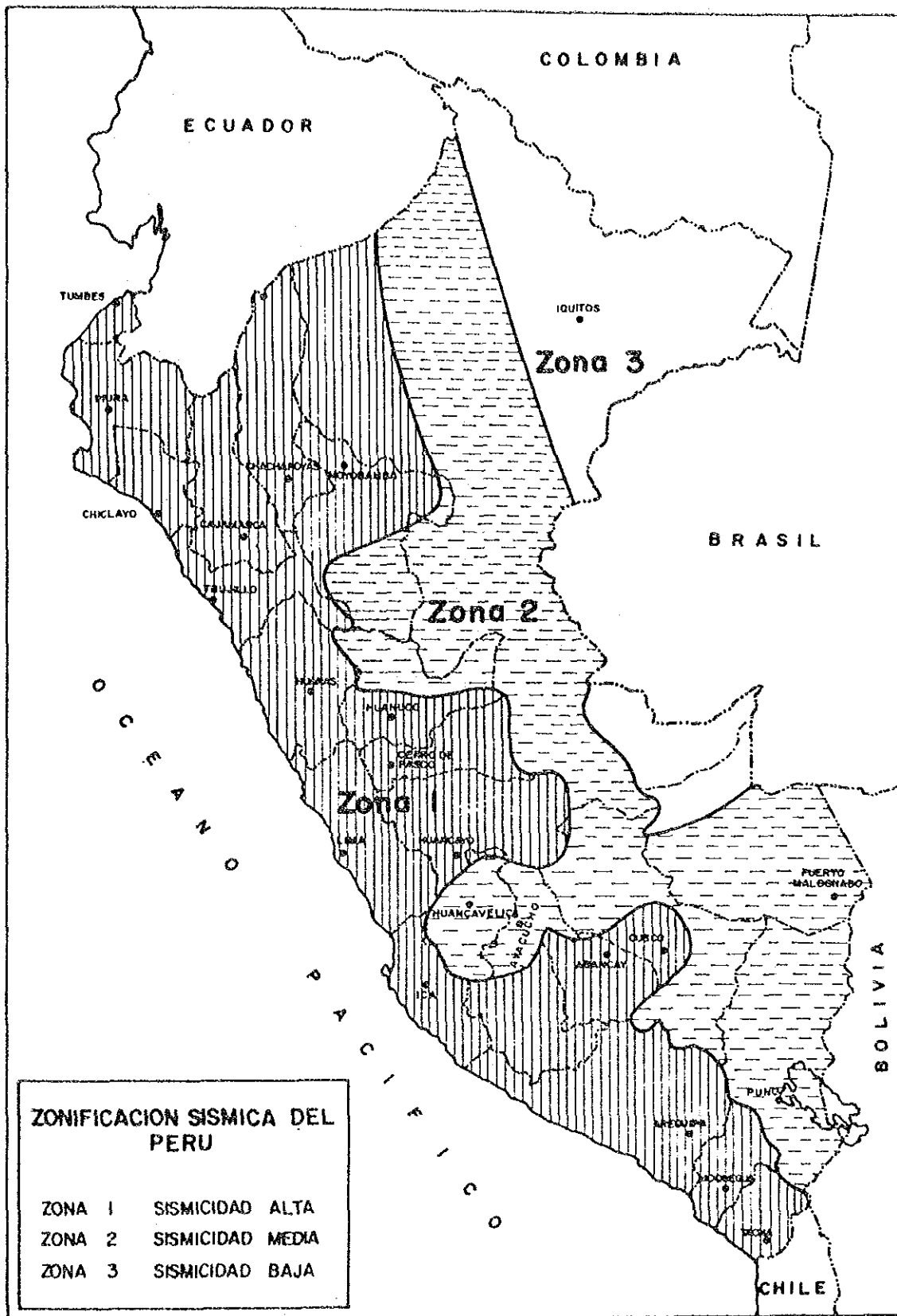


Fig. 5 Seismic Zones in Peru

(3) Electric equipment

As partially prescribed in RNC, Peru has adapted U.S.A. Standards such as NEMA and UL as Peruvian industrial standards and safety standards, and Peru is a member of INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC).

In designing the mental health center, it is considered that no special problems would be encountered by applying Japanese engineering standards as long as Peruvian laws are met.

(4) Water supply, drainage and fire fighting facilities

Engineering regulations and standards for water supply, drainage and fire fighting facilities are prescribed in details in RNC. And, as engineering standards, European and American Standards have been adapted. In addition, MINISTERIO DE SALUD has already established specifications for hospital buildings. Engineers of MINISTERIO DE SALUD have requested the following design precautions to the team:

- Size of lead-in water supply pipe is to be sufficiently large for taking necessary water within 4 hours during night.
- Capacity of receiving water tank is to be sufficient for consumption of at least one day. And suction pressure of lift pump shall not create negative pressure.
- Pipe material is to be galvanized steel for cold water supply; copper for domestic hot water supply; and cast iron for interior sewer and vent pipe, and concrete for exterior sewer.

- Vent pipe is to be provided for each sanitary fixture.
- Piping is not to be embedded in building structure whenever possible.

3-5 Survey on Construction Costs

(1) Rate of price rise of commodities

Consumer's price index in Lima has risen drastically. Price index in 1973 was 100 but it rose to 770% for foods, 600% for clothing, and 470% for furnitures in 1979 within 6.5 years. Mean rate of price rise is 675%. Annual mean rate is 104%, but it is 154% during one year between 1977 to 1978 and 194% between 1978 to 1979, a tremendous inflation. This is indicated in graph of Fig. 6. According to this graph, a sign of inflation is seen between 1975 and 1977 and, as stated above, the slope of graph suddenly becomes steep after 1977. However, rise between April and May in 1979 becomes slightly lower and this tendency is more apparent from May to June.

It is said that this tendency will continue until the power is transferred to civilian government in 1980 but there is no optimistic forecast for inflation even after the start of such civilian government. Progress of consumer's price index is shown in Table 3.

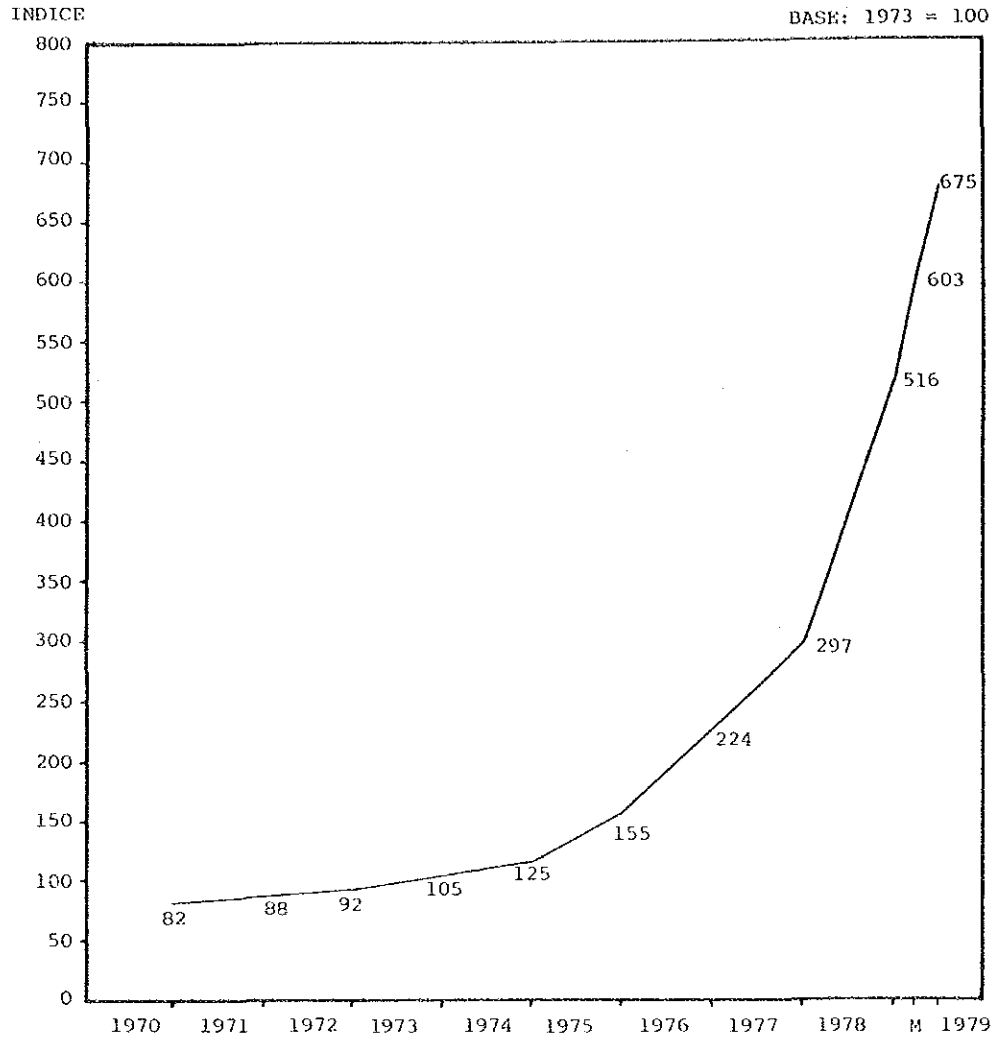


Fig. 6 Graph of General Consumer's Price Index in Lima

Table 3 Consumer's Price Indexes in Metropolitan Lima

(Base 1973 = 100)

Año y Mes	Indice de Precios al Consumidor de Lima Metropolitana Base: Año 1973 = 100.0				
	Indice General	Grupos			
		Alimentos y Bebidas	Vivienda y Mobiliario	Indumentaria	Diversos
<u>Ponderación</u>	<u>100.00</u>	<u>43.25</u>	<u>22.60</u>	<u>9.13</u>	<u>25.02</u>
<u>1973</u>	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>
<u>1974</u>	<u>116.87</u>	<u>118.78</u>	<u>117.55</u>	<u>116.72</u>	<u>109.60</u>
Enero	106.89	106.56	110.13	106.78	103.30
Febrero	109.31	109.30	112.12	109.05	205.44
Marzo	110.96	111.44	113.46	110.62	105.99
Abril	112.66	112.84	116.45	111.86	107.07
Mayo	115.48	116.25	117.42	116.33	109.34
Junio	118.10	120.91	117.73	117.31	109.87
Julio	119.07	122.08	118.14	118.97	110.45
Agosto	119.51	122.10	118.93	119.98	111.30
Setiembre	120.97	124.22	119.74	121.00	111.86
Octubre	121.08	124.03	120.05	121.94	112.00
Noviembre	123.38	127.58	120.54	122.77	114.02
Diciembre	125.08	128.10	125.87	124.08	114.52
<u>1975</u>	<u>144.50</u>	<u>157.76</u>	<u>136.75</u>	<u>138.30</u>	<u>128.92</u>
Enero	128.59	134.68	126.79	125.86	115.40
Febrero	133.20	144.18	127.55	126.87	115.90
Marzo	135.07	147.56	127.98	128.49	116.44
Abril	137.78	151.50	128.67	133.36	117.75
Mayo	139.82	155.91	130.78	135.92	121.58
Junio	142.20	157.30	136.79	137.40	122.74
Julio	149.15	164.46	139.48	141.78	134.14
Agosto	151.27	165.92	140.80	143.57	138.21
Setiembre	152.74	167.10	142.38	145.27	139.90
Octubre	154.24	168.40	145.03	146.10	141.03
Noviembre	154.78	167.94	147.12	147.25	141.69
Diciembre	155.11	168.05	147.64	147.72	142.20
<u>1976</u>	<u>192.89</u>	<u>208.43</u>	<u>169.36</u>	<u>173.93</u>	<u>194.23</u>
Enero	165.87	180.69	151.99	151.35	158.08
Febrero	169.31	185.79	154.67	153.53	159.79
Marzo	172.03	187.11	156.71	158.14	164.86
Abril	173.21	187.38	157.89	161.31	166.89
Mayo	174.21	187.47	159.02	166.31	167.88
Junio	175.23	187.45	160.28	170.63	169.30
Julio	199.26	216.53	167.18	174.97	207.24
Agosto	207.02	222.23	174.62	181.55	219.31

(Continua)

Año y Mes	Indice de Precios al Consumidor de Lima Metropolitana				
	Base: Año 1973 = 100,0				
	Indice General	Grupos			
Alimentos y Bebidas		Vivienda y Mobiliario	Indumentaria	Diversos	
Setiembre	214.13	230.46	180.52	186.35	226.41
Octubre	218.99	235.78	187.35	190.55	228.94
Noviembre	221.05	237.41	190.23	194.52	230.29
Diciembre	224.42	242.81	191.81	197.91	231.75
<u>1977</u>	<u>266.28</u>	<u>292.33</u>	<u>213.42</u>	<u>229.02</u>	<u>282.58</u>
Enero	232.36	255.81	193.95	203.65	236.98
Febrero	235.90	259.16	196.53	206.77	241.87
Marzo	240.92	265.35	199.21	212.90	246.59
Abril	244.69	268.25	202.64	217.13	252.00
Mayo	249.08	274.18	204.21	220.06	256.81
Junio	267.22	290.60	210.47	225.01	293.45
Julio	274.88	299.35	214.64	232.00	302.64
Agosto	282.48	313.36	217.05	235.08	305.50
Setiembre	286.75	317.72	221.50	241.34	308.74
Octubre	289.77	318.58	228.16	246.92	311.28
Noviembre	294.02	322.74	233.57	251.11	314.63
Diciembre	297.23	322.83	239.09	256.32	320.42
<u>1978</u>	<u>420.32</u>	<u>466.75</u>	<u>320.59</u>	<u>340.35</u>	<u>456.27</u>
Enero	319.41	355.05	252.67	265.24	337.85
Febrero	335.35	378.51	260.11	272.46	351.63
Marzo	343.69	382.92	266.54	286.17	366.56
Abril	351.99	388.66	273.84	296.24	379.56
Mayo	398.77	443.65	300.70	312.98	441.08
Junio	417.18	459.72	317.40	337.26	462.94
Julio	433.39	472.67	337.55	260.26	478.74
Agosto	452.54	499.68	346.71	376.77	494.31
Setiembre	475.42	536.31	359.26	390.79	505.97
Octubre	494.26	550.35	370.92	413.17	538.31
Noviembre	505.57	559.74	376.85	430.80	555.49
Diciembre	516.22	573.77	384.57	442.04	562.75
<u>1979</u>	<u>614.41</u>				
Enero	545.91	615.47	392.31	462.29	594.91
Febrero	574.51	659.81	412.25	491.16	504.04
Marzo	603.00	703.13	420.86	518.71	625.19
Abril	632.65	731.64	435.95	539.65	673.16
Mayo	655.32	744.48	457.75	573.69	709.44
Junio	675.04	769.17	472.56	603.22	721.43

(2) Changes in prices of construction materials

As same as the cases for other industries, construction material market in Peru was attacked by the severe inflation. Price indexes for construction materials based on 100% of 1960 are shown in Table 4. According to this table, mean rate of price rise for all construction materials for 10 years from 1960 to 1970 was 230%, but the annual rate of price rise increased to 240% for 1972, 277% for 1974, 318% for 1975, 520% for 1976, 750% for 1977, 1,225% for 1978, and 2,227% for January to June of 1979, which means that the rate of price rise has increased more drastically in recent years. Particularly in the area of reinforced concrete, its cost has risen incredibly. For instance, its cost increased 1.44 times compared to previous year in 1977, 1.76 times compared to previous year in 1978, and 1.89 times compared to previous year in 1979.

Under such circumstances, it is extremely difficult to determine the construction costs. In order to cope with such inflation, The Government of Peru has established a committee for correcting construction unit prices within legal audit department, and the committee has announced a formula for calculating the correction rate of construction costs derived by utilizing price indexes announced by the government each month.

Construction costs for progress payment to be made monthly to the contractors will be calculated by multiplying the correction rate K by contract sum. It is said that this correction rate K is currently increasing by 6% to 8% each month. Formula for calculating this correction rate K is as follows:

$$K = 0.17 \frac{GUr}{GUo} + 0.3 \frac{Jr}{Jo} + 0.07 \frac{Er}{Eo} + 0.123 \frac{MEr}{MEo} \\ + 0.124 \frac{MAr}{MAo} + 0.123 \frac{MIR}{MIO} + 0.05 \frac{Cr}{Co}$$

where, $\frac{GUr}{GUo}$: Consumer's price index

$\frac{Jr}{Jo}$: Mean daily wages including basic daily wages, allowance, earnings and social insurance.

$\frac{Er}{Eo}$: Index for construction machinery

Concrete mixer:	75%
Winch (150 PS):	8%
Excavator (58 PS):	7%
Damp car (190 PS):	10%

$\frac{MEr}{MEo}$: Index for structural materials

Portland cement type I:	45%
Fine aggregates:	13%
Coarse aggregates:	12%
Reinforcing bars:	30%

$\frac{MAr}{MAo}$: Index for finishing materials

PVC tile:	40%
Terrazzo block:	20%
Concrete block & brick block:	15%
Domestically produced clear glass:	10%
Resin type paint:	15%

$\frac{MIR}{MIO}$:	Index for building equipment	
		Black steel pipe, Galvanized iron pipe:	20%
		Steel pipe:	10%
		C.S.N. pipe:	15%
		Vinyl chloride pipe for water:	10%
		Vinyl chloride pipe for wiring:	
		S.A.P. :	10%
		S.E.L. :	10%
		Electric distribution panel (cabinet, door & lock included) 20KA Westinghouse or equal:	25%
$\frac{Cr}{Co}$:	Index for combustible lubricating oil 84 octane value gasoline:	70%
		Diesel gasoline No.2 (for operating construction heavy machinery):	30%

Graph of price indexes for construction materials based upon the index of 100 in 1973 is shown in Fig. 7.

Table 4 Price Indexes of Construction Materials

Año y Mes	Indice de Precios de Materiales de Construcción (base: Año 1960 = 100.00)							
	General	Metalicos	Aybnre - rantes	Maderas	Agregados	Mayolicas y Mosaicos	Ladrillos	Estructuras/ De Concreto
<u>1970</u>	230.31	202.44	219.92	238.20	182.67	303.42	198.81	290.54
<u>1972</u>	241.43	203.89	220.85	288.02	185.26	328.32	251.88	293.10
<u>1974</u>	277.27	253.71	225.65	345.12	185.26	408.51	283.70	358.56
<u>1975</u>	317.59	279.84	251.15	386.14	185.26	439.51	315.36	486.17
<u>1976</u>	520.61	408.53	376.20	581.85	264.77	647.17	178.19	1 089.80
<u>1977</u>	749.94	682.41	491.93	848.15	356.16	927.01	749.55	1 555.33
Enero	679.84	527.91	491.63	772.59	336.18	828.46	672.47	1 391.39
Febrero	692.45	560.45	491.63	772.59	336.18	828.46	672.47	1 447.64
Marzo	692.45	560.99	491.63	772.59	336.18	828.46	672.47	1 447.64
Abril	724.78	726.57	491.63	818.75	336.18	852.54	672.47	1 447.64
Mayo	742.22	726.57	491.63	818.75	336.18	852.54	672.47	1 581.70
Junio	761.16	726.57	491.63	888.94	336.18	990.53	672.47	1 596.62
Julio	778.87	726.57	491.63	888.94	336.18	990.53	826.62	1 496.62
Agosto	780.00	726.57	491.63	888.94	336.18	990.53	826.62	1 605.31
Setiembre	779.95	709.76	492.53	888.94	394.06	990.53	826.62	1 605.31
Octubre	779.95	709.76	492.53	888.94	394.06	990.53	826.62	1 605.31
Noviembre	779.95	709.76	492.53	888.84	394.06	990.53	826.62	1 605.31
Diciembre	807.70	776.85	492.53	888.44	402.25	990.53	826.62	1 733.52
	1 224.69	1 293.32	797.05	1 295.77	643.66	1 121.62	1 101.51	2 739.73

(Continua)

Año y Mes		Índice de Precios de Materiales de Construcción (base: Año 1960 = 100.00)									
		General	Sub Grupos								
		Metalicos	Agbme - rantes	Maderas	Agregados	Mayolicas y Mosaicos	Ladrillos	Estructuras/ De Concreto			
1978	Enero	836.38	776.85	1 040.30	402.25	1 013.98	856.44	1	815.37		
	Febrero	889.17	1 106.85	1 040.30	402.25	1 013.98	856.44	1	815.37		
	Marzo	889.17	1 106.85	1 040.30	402.25	1 013.98	856.44	1	815.37		
	Abril	889.17	1 106.85	1 040.30	402.25	1 013.98	856.44	1	815.37		
	Mayo	1 151.50	1 106.85	1 339.70	512.25	1 154.31	1 108.85	1	600.95		
	Junio	1 185.37	1 126.60	1 339.70	721.82	1 154.31	1 108.85	1	600.95		
	Julio	1 227.77	1 531.50	1 339.70	721.82	1 154.31	1 108.85	1	600.95		
	Agosto	1 337.25	1 531.50	1 339.70	721.82	1 154.31	1 108.85	1	600.95		
	Setiembre	1 521.16	1 531.50	1 495.78	721.82	1 196.56	1 178.34	1	2 726.72		
	Octubre	1 550.12	1 531.50	1 495.78	830.47	1 196.56	1 392.87	1	3 644.60		
	Noviembre	1 574.68	1 531.50	1 495.78	942.47	1 196.56	1 392.87	1	3 644.60		
	Diciembre	1 644.55	1 531.50	1 541.90	942.47	1 196.56	1 392.87	1	4 151.87		
1979	Enero	1 924.93	1 591.13	2 726.23	942.47	2 008.89	1 580.31	4	750.64		
	Febrero	2 115.39	1 887.58	3 019.55	1 005.47	2 178.87	1 580.31	4	794.03		
	Marzo	2 216.07	1 887.58	3 450.26	1 005.47	2 293.97	1 580.31	5	084.90		
	Abril	2 272.05	1 901.08	3 502.67	1 005.47	2 656.11	1 629.31	5	189.92		
	Mayo	2 304.51	2 082.26	3 523.67	1 005.47	2 676.96	1 629.31	5	189.92		
	Junio	2 530.86	2 082.26	3 947.65	1 087.51	2 777.02	1 629.31	6	045.77		

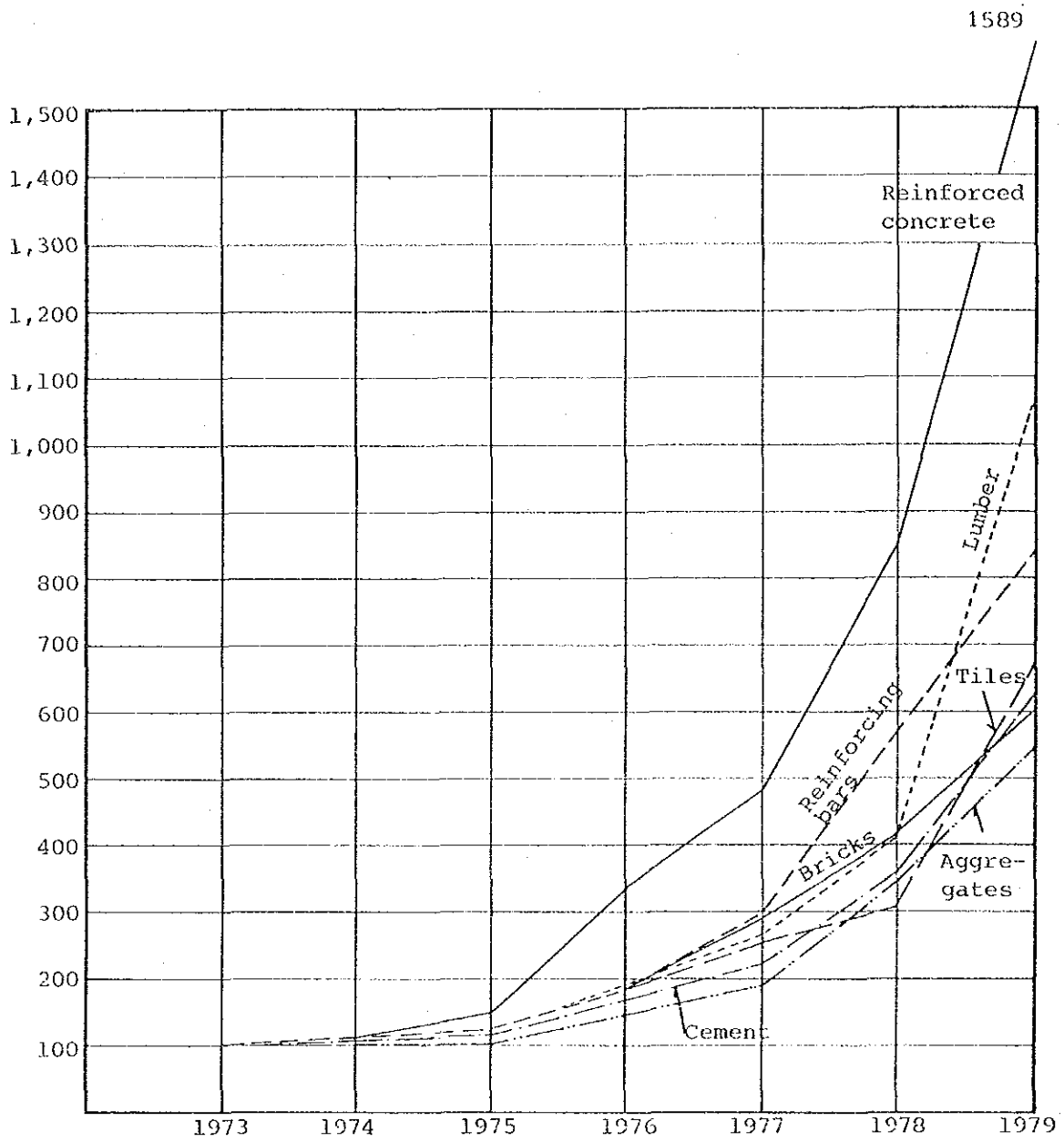


Fig. 7 Price Indexes of Construction Materials
(100 in 1973)

(3) Survey on labor costs

● Wages of construction workers

According to the statistics of The Government of Peru, mean nominal wages of construction workers increased by 2.44 times from 1973 to June of 1979, but mean nominal wages for other type such as manufacturing workers increased by 3.48 times during the same period, which is 1.43 times more compared to those of construction workers. In addition, actual wages based on 100% in 1973 are 38.5% for construction workers and 49.8% for manufacturing workers as of June, 1979 which means that actual wages have decreased.

Thus, increase in wages has been generally slowed down in recent years but it seems that this tendency is more severe in construction industry. This slowdown was partly caused by the decrease in demand for workers as a result of reduced construction investments due to inflation. This can be substantiated from the fact that demand for construction workers was reduced from 100% in 1976 to 63% in 1978 in Lima according to the statistics of the government previously stated. Change in mean nominal wages for each occupation is shown in Table 5, and change in actual wages indexes for each occupation is shown in Table 6.

The government has established standard salaries to be paid to construction workers in the age of such severe inflation. That is, the government ordinance prescribes that the wages must include allowance for commodity prices, special allowance for inflation, and allowance for rise in commutation expenses in addition to the basic wages. However, The Government

gives the different values for such allowances depending upon the local conditions. Such values are tabulated in Table 7. Daily wages of construction workers as of October, 1979 were calculated basing upon the contents of Table 7 and indicated in Table 8.

Table 5 Change in Mean Nominal Wages for Each Occupation

Año y Mes	General	Promedio de Sueldos Nominales por Ramas de Actividad (Soles)									
		Ramas de Actividad									
		Manufac- tura	Construc- ción	Comercio		Banca Seg. y Bienes Inmuebles	Transporte Almacenaje Comunicaciones	Servicios no Gubernamentales			
<u>1973</u>				Al Por Mayor	Al Por Menor						
Marzo	9 664	11 626	12 946	11 656	6 651	8 731	12 155	7 101			
Junio	9 987	11 870	13 495	11 947	6 615	8 094	12 503	7 432			
Setiembre	10 665	12 201	12 850	12 555	7 892	9 400	11 810	7 832			
Diciembre	11 061	12 645	12 732	13 065	8 873	9 660	11 778	8 045			
<u>1974</u>											
Marzo	11 557	13 189	12 950	13 121	8 981	9 850	11 973	8 240			
Junio	11 768	13 433	13 120	13 200	9 001	9 950	12 048	8 450			
<u>1975</u>											
Agosto	13 847	16 443	17 815	13 007	13 007	13 971	13 967	10 383			
Octubre	14 060	16 636	18 360	13 351	13 351	13 774	14 870	10 442			
<u>1976</u>											
Marzo	15 027	18 956	20 062	15 727	11 048	14 352	13 701	11 313			
Junio	15 843	19 455	20 336	17 131	11 252	15 173	14 141	11 855			
Setiembre	17 186	21 159	22 284	18 233	12 508	16 573	15 291	12 852			

(Continua)

Año y Mes	Promedio de Sueldos Nominales por Ramas de Actividad (Soles)									
	General	Ramas de Actividad					Transporte Almacenaje Comunicaciones	Servicios no Gubernamentales		
		Manufac- tura	Construc- ción	Comercio		Banca Seg. y Bienes Inmuebles				
				Al Por Mayor	Al Por Menor					
<u>1977</u>										
Marzo	17 876	21 654	20 456	18 755	14 068	20 275	16 783	18 642		
Junio	18 429	22 026	22 190	19 819	14 055	20 321	17 624	13 488		
Setiembre	20 022	22 745	20 300	21 286	15 739	22 607	18 999	15 717		
Diciembre	20 391	23 555	20 203	21 367	15 080	22 983	19 381	15 889		
<u>1978</u>										
Marzo	23 109	26 448	25 129	25 000	19 002	24 880	23 438	17 706		
Junio	24 716	28 070	26 458	26 654	20 522	26 208	25 984	19 202		
Setiembre	27 136	32 073	28 153	26 924	22 242	29 080	27 135	21 067		
Diciembre	28 994	34 024	28 027	29 188	23 708	32 296	28 831	21 935		
<u>1979</u>										
Marzo (E)		37 140	29 940	31 290	25 615	34 566	31 798	24 150		
Junio (E)		40 463	31 553	23 391	27 709	37 582	34 573	20 118		

FUENTE: MINISTERIO DE TRABAJO - Dirección General del Empleo

Table 6 Change in Actual Wages Indexes for Each Occupation

Año y Mes	Indice de Sueldos Reales Por Ramas de Actividad Económica (Base Dic. 1973 = 100.0) 1/										
	General	Ramadas de Actividad Económica						Transporte Almacenaje Comunicaciones	Servicios no Gubernamentales		
		Manufac- tura	Construc- ción	Comercio		Banca	Seguros Inmuebles				
				Al Por Mayor	Al Por Menor	Seguros Inmuebles					
<u>1973</u>											
Marzo	98.6	100.6	111.2	97.6	82.0	98.9	112.9	96.6			
Junio	94.5	98.3	111.0	95.8	78.1	87.7	111.2	96.7			
Setiembre	97.8	97.8	102.3	97.4	90.1	98.6	101.6	98.9			
Diciembre	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			
<u>1974</u>											
Marzo	98.9	98.7	96.2	95.0	95.8	96.5	96.2	96.9			
Junio	94.6	94.4	91.6	89.8	90.2	91.6	90.9	93.4			
<u>1975</u>											
Agosto	86.9	90.2	97.1	69.1	101.7	100.4	82.3	89.6			
Octubre	86.5	89.6	98.2	69.6	102.4	97.1	85.9	88.4			
<u>1976</u>											
Marzo	82.9	91.5	96.1	73.4	76.0	90.7	71.0	85.8			
Junio	85.8	92.2	95.7	78.6	76.0	94.1	71.9	88.3			
Setiembre	76.2	82.0	85.8	68.4	69.1	84.1	63.6	78.3			

(Continúa)

Año y Mes	Índice de Sueldos Reales Por Ramas de Actividad Económica (Base Dic. 1973 = 100.0) 1/									
	General	Ramas de Actividad Económica								
		Manufac- tura	Construc- ción	Comercio		Banca	Transporte	Servicios no Gubernamentales		
			Al Por Mayor	Al Por Menor	Seguros Inmuebles	Almacenaje Comunicaciones				
<u>1977</u>										
Marzo	70.4	74.6	70.0	62.5	69.1	91.4	62.1	70.6		
Junio	65.5	68.4	68.5	59.6	66.2	82.7	58.8	65.9		
Setiembre	66.3	65.9	58.4	59.7	64.9	85.7	59.1	71.5		
Diciembre	65.1	65.8	56.0	57.8	64.0	84.0	58.0	69.8		
<u>1978</u>										
Marzo	63.8	63.8	60.3	58.4	65.4	78.6	60.8	67.2		
Junio	56.2	55.8	52.3	51.3	58.2	68.3	55.5	60.1		
Setiembre	54.2	56.0	48.8	45.5	55.4	66.5	50.9	57.8		
Diciembre	53.3	54.7	44.8	45.4	54.3	68.0	49.4	55.5		
<u>1979</u>										
Marzo (E)	51.1	40.9	41.7	50.3	62.3	47.0	52.3		
Junio (E)	49.8	38.5	39.8	48.6	60.5	45.7	50.5		

1/ Deflactado con el Índice de Precios al Consumidor de Lima Metropolitana, de base Dic. = 100.0

Table 7 Table for Wages of National Construction Workers (Effective after Ictiber km k979) Unit in Soles (S/.) Per Day

Kinds	Basic wages effective after Oct. 1, 1979			Special allowance for commodity price rises by Government Ordinances Nos. 22408, 22462, 22593 & 22699			Special allowance for changes in commodity prices (due to Inflation) by Government Ordinance No. 22188			Bonus (Bonificaciones)					
	(1)			(2)			(3)			(4)					
	DIARIO	DIARIO	DIARIO	Skilled worker	Helper	Laborer	Skilled worker	Helper	Laborer	Skilled worker	Helper	Laborer	Skilled worker	Helper	Laborer
- Amazonas	697.48	662.48	645.48	289.70	289.70	289.70	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Ancash															
d) Con excepción de la Prov. de Santa															
b) Prov. de Santa	669.52	636.52	609.52	270.20	270.20	270.20	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Apurimac	698.80	666.80	640.80	285.65	285.65	285.65	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Arequipa	667.64	638.64	619.64	271.85	271.85	271.85	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
a) Arequipa (con excepción de Prov. Arequipa)															
b) Prov. de Arequipa	688.76	652.76	630.76	290.15	290.15	290.15	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Ayacucho	718.40	684.40	666.40	313.85	313.85	313.85	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Cajamarca	672.44	643.44	624.44	278.30	278.30	278.30	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Cuzco	672.72	643.72	624.72	278.45	278.45	278.45	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Huancavelica	671.29	637.29	618.29	273.80	273.80	273.80	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Huánuco	677.00	643.00	624.00	279.20	279.20	279.20	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Ica	691.64	650.64	632.64	287.75	287.75	287.75	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Junín	685.76	651.76	632.76	290.15	290.15	290.15	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- La Libertad	688.00	659.00	637.00	295.10	295.10	295.10	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Lambayeque	688.00	659.00	637.00	295.10	295.10	295.10	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Lima															
a) Lima (con excepción de la Prov. de Lima y Prov. Callao)															
Constituc. del															
b) Prov. Lima y Prov. Constituc. del Callao	712.84	669.84	639.84	281.30	281.30	281.30	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Callao															
- Callao	755.40	714.40	695.40	313.85	313.85	313.85	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Loreto	719.40	686.40	667.40	313.85	313.85	313.85	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Madre de Dios	700.16	667.16	648.16	309.50	309.50	309.50	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Moquegua	680.32	650.32	631.32	291.65	291.65	291.65	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Pisco	680.96	646.96	627.96	283.70	283.70	283.70	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Piura	692.52	663.52	641.52	301.10	301.10	301.10	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Puno	686.60	647.60	628.60	276.35	276.35	276.35	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- San Martín	682.20	653.20	631.20	289.10	289.10	289.10	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Tarma	680.32	650.32	631.32	291.65	291.65	291.65	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00
- Tumbes	684.32	655.32	633.32	291.65	291.65	291.65	50.00	50.00	50.00	9.00	7.00	6.00	5.00	5.00	2.00

INF. CAPECO No. 517

Table 8 Example of Calculations for Wages of Workers (Oct., 1979)

Unit: Soles (S/.)

	Area	Basic daily wages	Basic daily wages by social insurance	Special allowance by social insurance	Special allowance by social insurance	Allowance for prices by social insurance	Loss in clothing	Travel allowance	Others	Unit price/day	Unit price/hour
Foreman	Lima	1,200	936	50	22.33	314	16	--		2727.33	340.92
Skilled worker	"	755	588.82	50	22.33	314	16	--		1935.15	241.89
Helper	"	714	556.85	50	22.33	314	14	--		1860.18	232.52
Laborer	"	695	542.03	50	22.33	314	13	--		1825.36	228.17

Type of worker	Unit price/hour
Worker for soil	235.54
Worker for concrete	238.94
Worker for forms	244.71
Worker for reinforcing bars	244.71
Worker for brick laying & finishing	252.11
Worker for building equipment	241.71

• Work efficiencies

Minimum efficiencies of workers established by the government are shown below. They were determined in April, 1968 and it is said that they are slightly more favorable to workers but they are indicated herewith as references for reviewing the wages.

RENDIMIENTOS MINIMOS OFICIALES DE LA MANO DE OBRA EN LA INDUSTRIA
DE LA CONSTRUCCION CIVIL EN EL RAMO DE EDIFICACION PARA LAS
PROVINCIAS DE LIMA Y CALLAO

	Unidad	Para 8 Horas	Para 8 1/2 Horas	Para 5 1/2 Horas
(Nº 1) Partida: Excavación para cimientos corridos:- Unid. m3 o ml.	m3. m3. m3.	4.00 3.50 3.00	4.25 3.72 3.19	2.75 2.41 2.06
(Nº 2) Muros y tabiques Partida: ladrillo King Kong de arcilla o calcáreo.	Nº de ladrillos " " "	350 380 400	372 404 425	241 261 275
Para muros de cabeza.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de long.	" " "	280 320 350	298 340 372	193 220 241
Para muros de sogá.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de long.	" " "			
Nota.- Para acabado con junta limpia (caravista) los anteriores rendimientos se disminuirán en 15% por cara.				
(Nº 3) Partida: Ladrillo panderecta de arcilla o calcáreo.	Nº de ladrillos " " "	360 380 400	383 404 425	248 261 275
Para muros de cabeza.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de long.				

(Continua)

		Unidad	Para 8 Horas	Para 8 1/2 Horas	Para 5 1/2 Horas
	Para muros de sogá.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de long.	" " "	280 320 360	298 340 383	193 220 248
(Nº 4) Partida: Ladrillo corriente de arcilla o calcáreo.	Para muros de cabeza.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de long. Para muros de sogá.- De menos de 2.00 ml. de long. De 2.00 a 4.00 ml. de longitud. De más de 4.00 ml. de longit. Nota.- Para acabado con junta limpia (caravista) los anteriores rendimientos se disminuirán en 20% por cara.	Nº de ladrillos " " " " " "	460 510 550 290 330 360	489 542 584 308 351 383	316 351 378 199 227 248
(Nº 5) Partida: Tarrajeo acabado sin pañeteo previo.	En muros de menos de 2 m. de longitud. En muros de 2 a 4 m. de longitud. En muros de más de 4 m. de longitud.	m2. m2. m2.	12 15 16	12.75 15.94 17.00	8.25 10.31 11.00

(Continua)

	Unidad	Para 8 Horas	Para 8 1/2 Horas	Para 5 1/2 Horas
(Nº 6) Partida: Tarrajeo acabado interior con paneteo previo.	Pañeteo.-			
	En muros de menos de 2 m. de longitud.	22	23.38	15.13
	En muros de 2 a 4 m. de longitud.	28	29.75	19.25
	En muros de más de 4 m. de longitud.	34	36.13	23.38
(Nº 7) Partida: Empastado con yeso en cieloraso sin cintas.	Tarrajeo.-			
	En muros de menos de 2.00 m. de longitud.	15	15.94	10.31
	En muros de 2 a 4 m. de longitud.	18	19.13	12.38
	En muros de más de 4 m. de longitud.	20	21.25	13.75
(Nº 8) Partida: Empastado con yeso en cieloraso con cintas.	En habitaciones menores de 10 m2. de superficie	13	13.81	2.91
	De 10 a 20 m2. de superficie	14	14.88	9.63
	Mayores de 20 m2. de superf.	17	18.06	11.69
(Nº 9) Partida: Piso de losetas de 0.20 x 0.20. m.	Habitaciones menores de 10 m2. de superficie	10	10.63	6.88
	De 10 a 20 m2. de superficie	12	12.75	8.25
	Mayores de 20 m2. de superf.	14	14.88	9.63
(Nº 9) Partida: Piso de losetas de 0.20 x 0.20. m.	Habitaciones menores de 10 m2. de superficie	7	7.44	6.81
	De 10 a 20 m2. de superficie	9	9.56	6.19
	Mayores de 20 m2. de superf.	12	12.75	8.25

(Continua)

		Unidad	Para 8 Horas	Para 8 1/2 Horas	Para 5 1/2 Horas
(Nº 10) Partida: Piso de losetas de 0.30 x 0.30 m.	Habitaciones menores de 10 m2. de superficie De 10 a 20 m2. de superficie Mayores de 20 m2. de superf.	m2. m2. m2.	8 10 12	8.50 10.63 12.75	5.50 6.88 8.25
	Nota.- Las losetas de 0.40 x 0.40 m. exagonales o de otras medidas, formas o acabados especiales, por ser de uso restringido serán materia de acuerdo previo.				

(4) Construction costs

As already described previously, Peruvian economy has suffered from growing inflation and increasing deficit in international balance of payment since 1975, which also caused reduced public investment and reduced construction work since 1977. Construction costs also have doubled each year.

As easily understood from Fig. 8, it is required to still take the rate of inflation into consideration even though this project is funded in dollars. Under such circumstances, it seems to be very difficult to make appropriate price estimation. Current unit prices for buildings are shown below.

Office building:	45,000 S/m ²
Hospital:	60,000 S/m ²
House:	50,000 S/m ²

The above unit prices do not include design fees, costs for lighting fixtures, sanitary fixtures, air conditioning and heating equipment work and furnitures, burden charge for leading-in, and real properties registration fee.

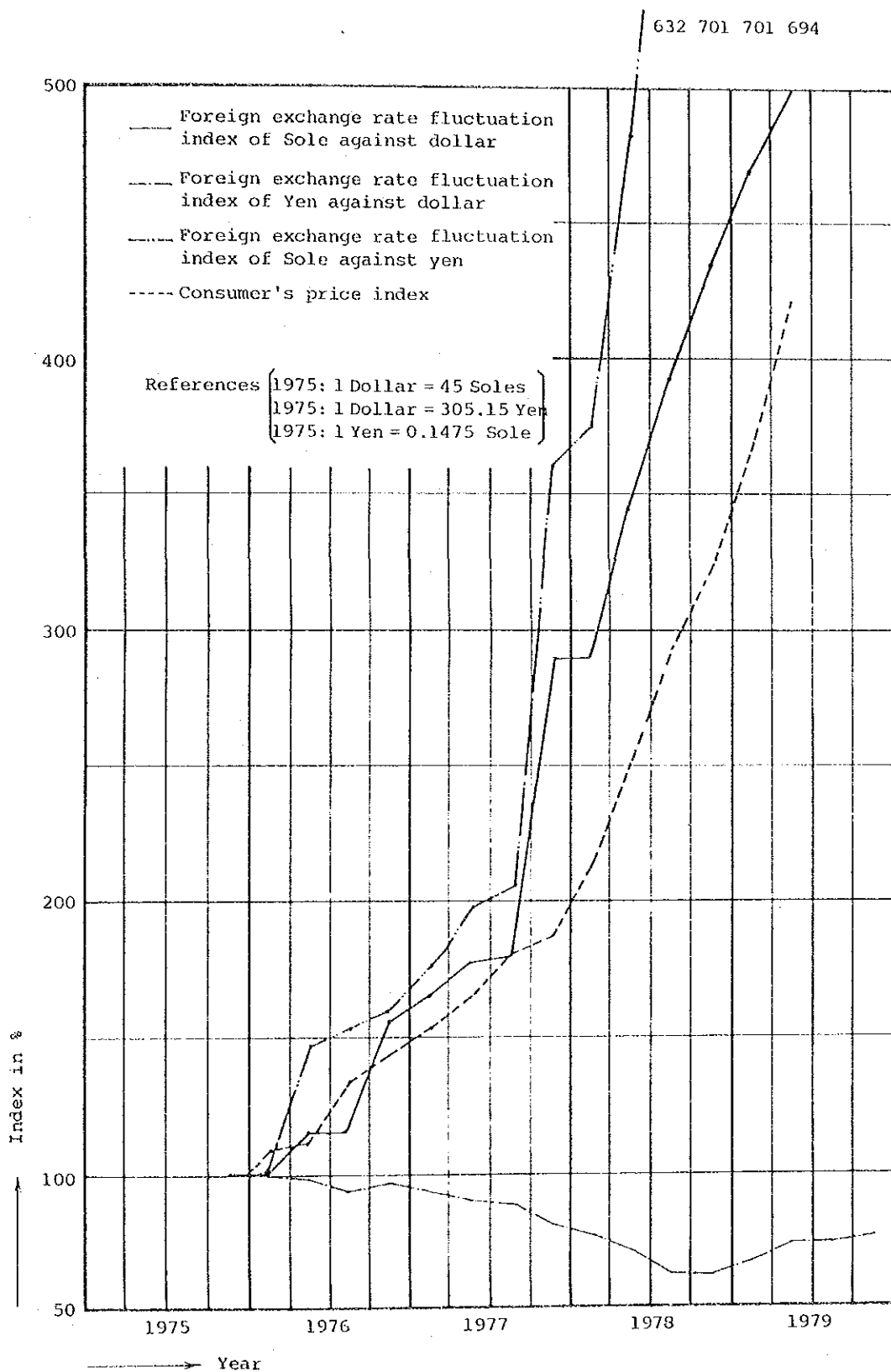


Fig. 8 Relation between Consumer's Price Indexes and Foreign Exchange Rate Fluctuation Indexes in Peru (100 in December, 1975)

3-6 Survey on Transport of Construction Materials

Construction materials are not only supplied from the areas surrounding City of Lima but also imported from foreign countries. In particular, the case when the construction materials are transported from Japan will be explained here.

(1) Route and method of transport

Generally, transportation by ships is more frequently utilized (transport by airplanes is very expensive). Materials will be shipped from Port of Yokohama, a major port of Japan, to Port of Callao that is a port of discharge of Peru for imported goods after marine transport, then materials will be discharged and shipped by trucks to the construction job site.

(2) Time of period of transport

At least 11 weeks will be needed from ordering of products to Japan to delivery to the construction job site.

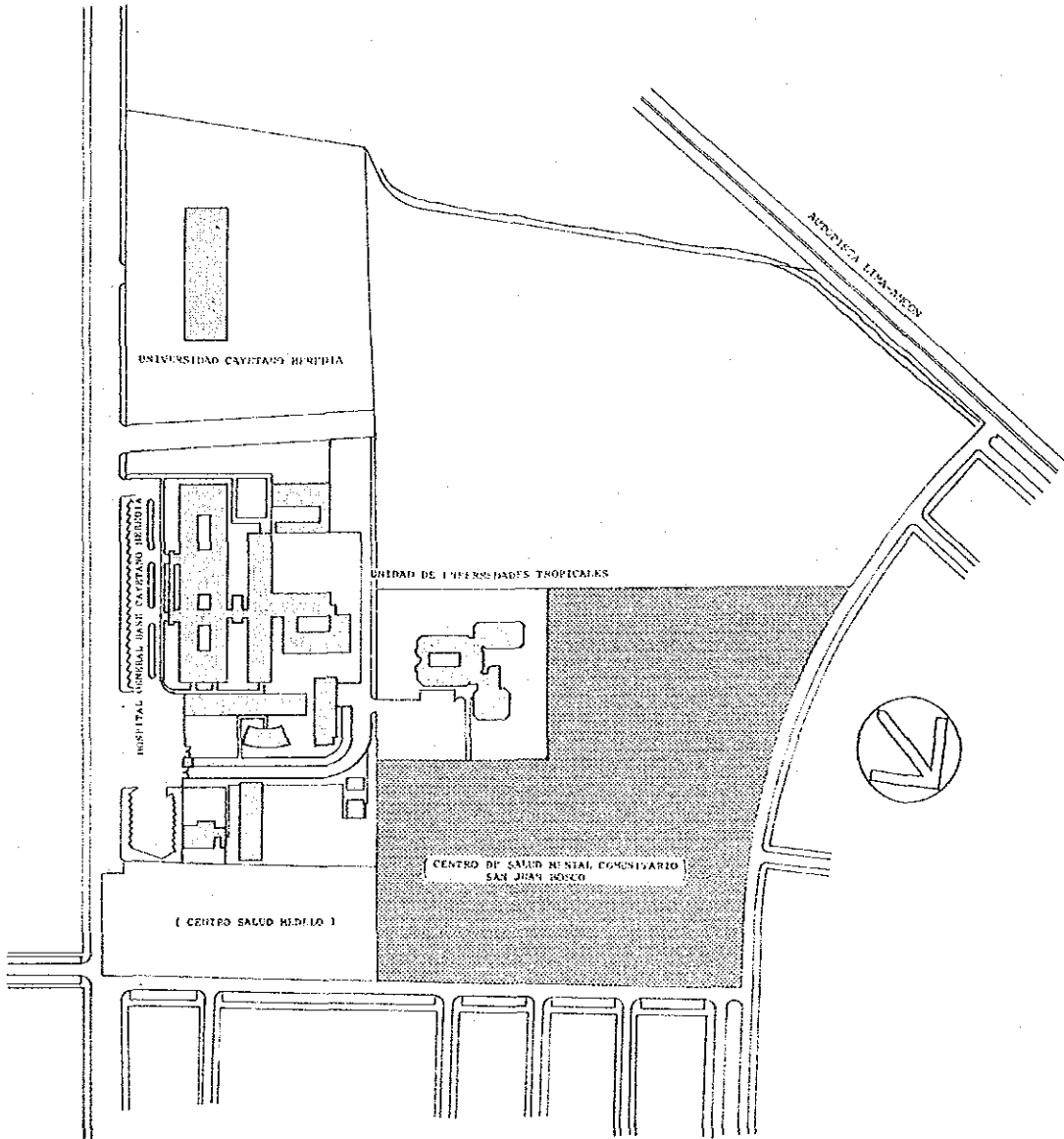
However, this is the minimum time required and, thus, it is required to smoothly process various kinds of relevant work such as preparation of documents needed and processing of customs clearance. In particular, specially favorable treatment by the Government of Peru is highly desirable for the smooth customs clearance and the other relevant items.

3-7 Survey on Construction Site

(1) Outline of construction site

The proposed construction site for the mental health center is located in a suburban residential area that has been developed in recent years between Zarumilla Street (Panam Highway) and Tupac Amaru Street about 1.6 km away from north bank of the Rimac River to which it will take about 20 minutes by an automobile from central part of City of Lima.

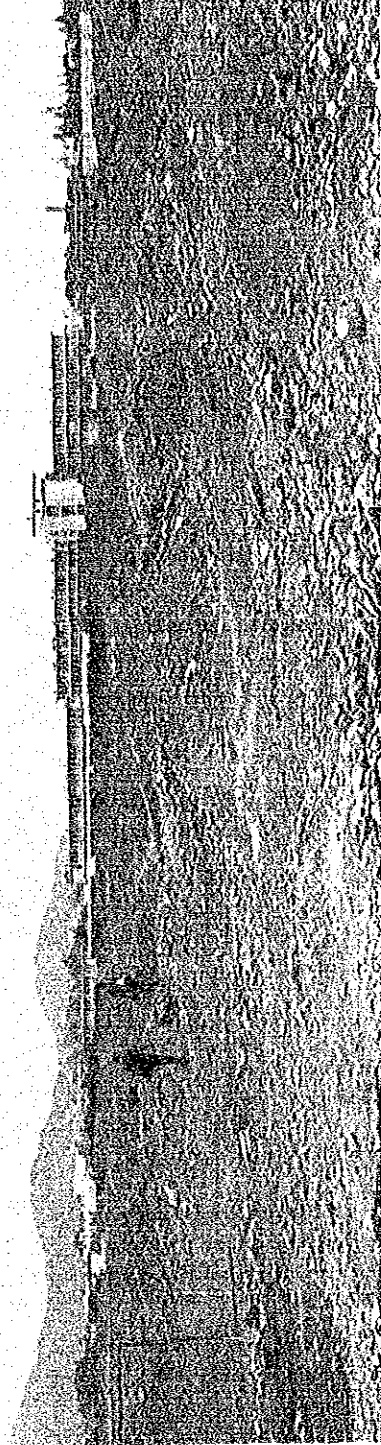
In part of land of 120,000 square meters owned by MINISTERIO DE SALUD, HOSPITAL GENERAL BASE CAYETANO HEREDIA (200 beds) has been completed and, in adjacent to this hospital, UNIVERSIDAD PERUANA CAYETANO HEREDIA and UNIDAD DE ENFERMEDADES TROPICALES are already existing, which will make this lot an integrated medical facility zone. The MINISTERIO DE SALUD is also planning to construct new center for mothers and children in this area in near future. Lot reserved for the mental health center by MINISTERIO DE SALUD has an area of about 45,900 square meters with a reversed-L shape located at a corner of this land. However, in order to widen the surrounding roads at the time of construction of this center, it is required to set back the property lines of this land and to donate the front land strip to city. Thus, actual land area usable for the construction of the center is about 40,100 square meters. Though the proposed site area is fairly flat, it is presently used as disposal area for surplus soil excavated from nearby construction job sites and also as waste disposal area for rubbish and waste building materials. Thus, except part of socker field, present land is devastated and uneven. Thus, grading work is needed for the land and the finished level of grading should be the same as the level of existing roads in surrounding area.



(Site Map)

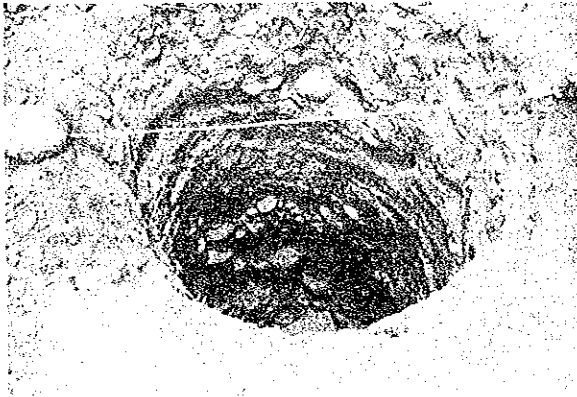


Proposed Construction Site (A Distant View)

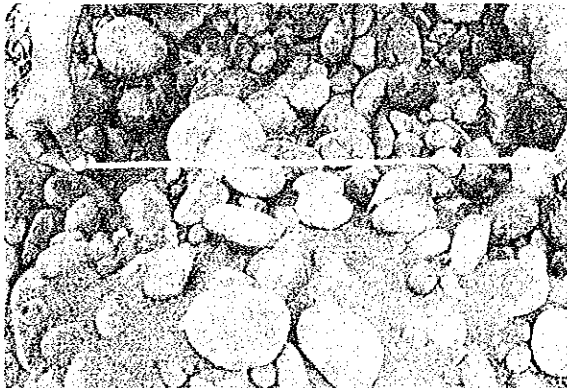


Proposed Construction Site (A Close-up View)

Bearing capacity of subgrade soil for building will be finally found from the results of soil investigation by the Government of Peru, but approximate conditions of soil were already grasped from the trial hole having 2-meter depth and 1-meter diameter located at the center of the proposed site in the basic design survey conducted this time. According to this survey, it was found that there is hard silty loam up to 90 cm depth from the surface. Below this loam, there is a very compact sand gravel layer. There are many boulders with 15 cm to 25 cm diameter within this layer. It seems that this layer was deposited as a result of flooding of the Rimac River in the past. According to hearing conducted, it is said that soil bearing capacity in this area is at least 30 tons/m².



Soil Conditions of
Proposed Construction
Site (Trial Hole)



Sand Gravel Collected
from Underground
Deeper than 90 cm

(2) Utilities in Construction Site

• Electric power

Existing HOSPITAL GENERAL BASE CAYETANO HEREDIA presently has substation at east side of the site, and electric power is supplied through 3-phase, 3-wire, 10 kV, 60 Hz lead-in underground cable. Then, power voltage is dropped to 3-phase, 3-wire, 220V by a transformer to supply the power to each building.

Since there is no spare capacity to the transformer of existing substation, it is scheduled to lead in power to new substation through 3-phase, 3-wire, 10 kV, 60 Hz underground power cable.

• Telephone

At present, HOSPITAL GENERAL BASE CAYETANO HEREDIA has automatic telephone exchange and about 50 dial telephone units are being served.

Proposed center will also install an exclusive automatic telephone exchange system and exclusive subscriber's lines will be connected.

• Water supply

Due to drastic population increase in the nearby area surrounding the proposed site, insufficient water supply capacity of pipeline has become apparent. According to ESAL, water pressure actually measured at a nearby point was 5 lbs/in² during night and close to 0 lbs/in² during day. However, it is planned to newly install 4" city water supply pipe to the road at north side of the proposed site

of this center from which 3" pipeline will be extended to the water receiving tank in the site.

- Sewer line

It is planned to newly install 6" public sewer line to the road at north side of the proposed site of this center and 4" to 6" pipes will be extended at four places from the public sewer line to the points which are 1 meter away from the buildings.

- Fuels

It is planned to deliver the oil to the hospital site by tank lorries.

Chapter 4

BASIC DESIGN

4-1 Basic Planning

The basic plan of this center has been prepared after discussions, and exchange and coordination of views with officials of MINISTERIO DE SALUD at the time of preliminary survey conducted in July of 1979 and basic design survey conducted from October to November, 1979.

4-2 Various Basic Conditions

The objectives of this mental health center are to carry out the mental health measures mainly for the community and to provide and develop primary, secondary and tertiary prevention activities such as prevention, early detection and early treatment of mental disorders, day care, liaison services, and rehabilitation services mainly for 1,500,000 residents living in Rimac district in northern area of City of Lima in accordance with the mental health plan of City of Lima.

Consultation, diagnosis and treatment section of this center will include outpatient department, inpatient department, emergency department, day care department, rehabilitation department, children's special education department, community service department and so forth. Estimated number of annual outpatients is 52,000 and the number of beds for inpatients is 200. As mean period of time of hospitalization, short-term hospitalization of 3 weeks is assumed for inpatients.

In addition to the consultation and treatment activities stated above, other objective of this center is to perform researches and educational activities. 275 employees are expected to work in this center.

4-3 Architectural Planning

The following basic design approaches will be taken in the architectural planning of this center:

- Comfortable environment should be created so as to provide treatment effects of architectural space itself on mental diseases.
- Simple floor plan should be created to provide an overall space easily understandable to the users.
- Bright but simple design with sense of cleanliness which can be well adapted to the surrounding environment should be created without giving the sense of uneasiness to the users.
- While creating the space with the sense of integrity, at the same time, the center should be planned in such a manner that new environment will be able to offer mutually contrasting polarity such as "still and motion", "close and open", "restrain and freedom", "brightness and darkness", and "segregation and integration" in response to possible image conditions of patients.
- Accents should be put on easy maintenance and operation as well as economic running costs by means of design considering the energy conservation.
- Planning should be made so as to adapt Peruvian construction methods and materials as much as possible.

(1) Layout Plan

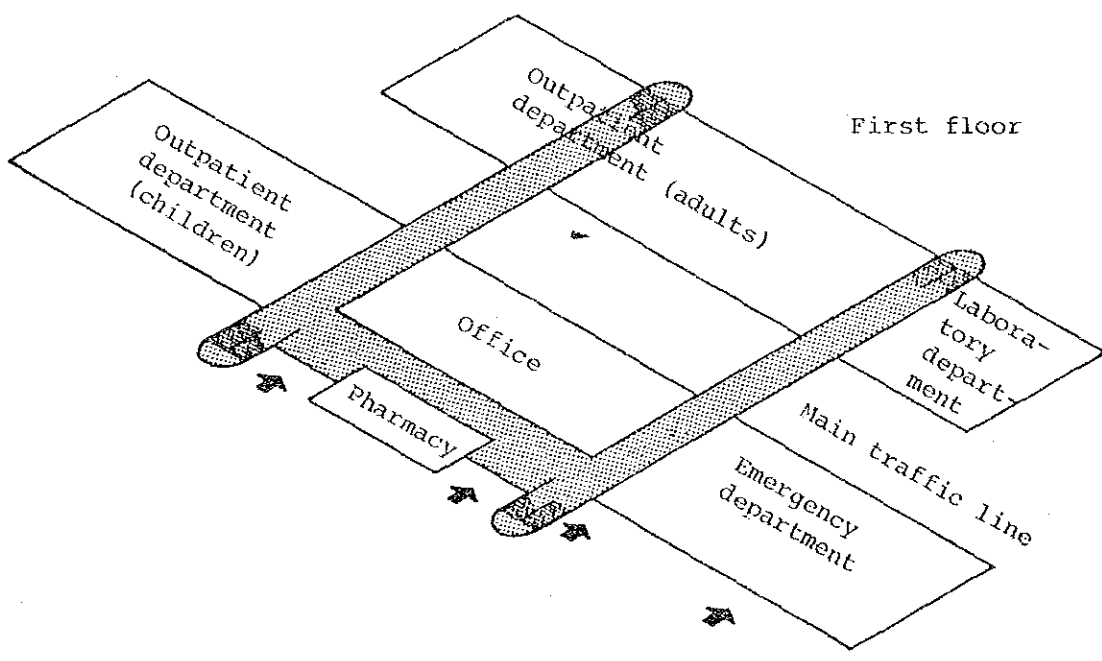
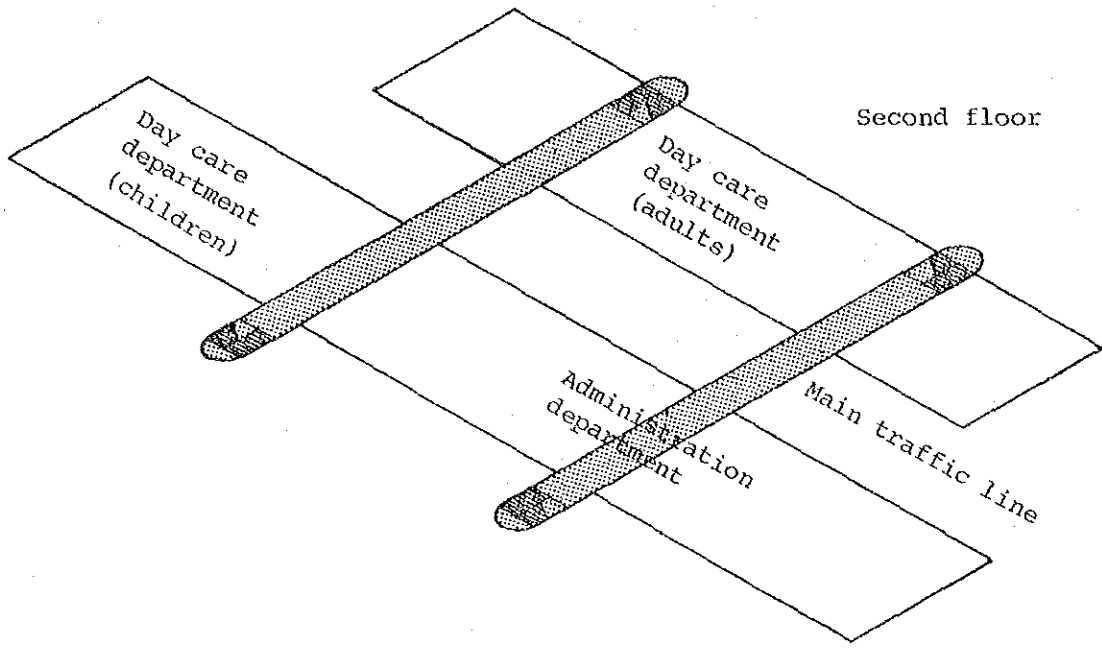
In consideration of relationship with main entrance and layout of existing buildings of HOSPITAL GENERAL BASE CAYETANO HEREDIA, central building of this center will be located nearest to existing hospital. Then, main entrance will be inevitably located near the road at north side (Alameda Palao), and approach that receives rich sunshine will be very appropriate for creating bright image of the center.

In consideration of importance of rehabilitation in the treatment of inpatients, rehabilitation facilities (rehabilitation, cafeteria and gymnasium) will be located at the center of inpatient department, and wards will be arranged to south and north of this department.

Service work shop (kitchen, laundry and mechanical room) will be located in southern part of the site in consideration of the service traffic line and the relation with plan of future energy center.

(2) Planning

- Very simple floor plan will be made for the central building particularly in consideration of uses by various kinds of people. Outpatient department (adults and children), emergency department, day care department (adults and children), laboratory department and administration department will be nearly arranged in 6 sections are clearly separated by traffic lines.



- Rehabilitation center (rehabilitation, cafeteria and gymnasium) will be located around the central plaza, but each building will have the design with at-home flavour compared to central outpatient building and wards to create an environment that will invite inpatients.

Rehabilitation building will be divided into 5 workshops but be designed to provide different kinds of workshop treatments at each shop. In addition, an independent patio will be attached to each workshop so that outdoor workshop treatment can be aggressively performed in the patio and the central patio.

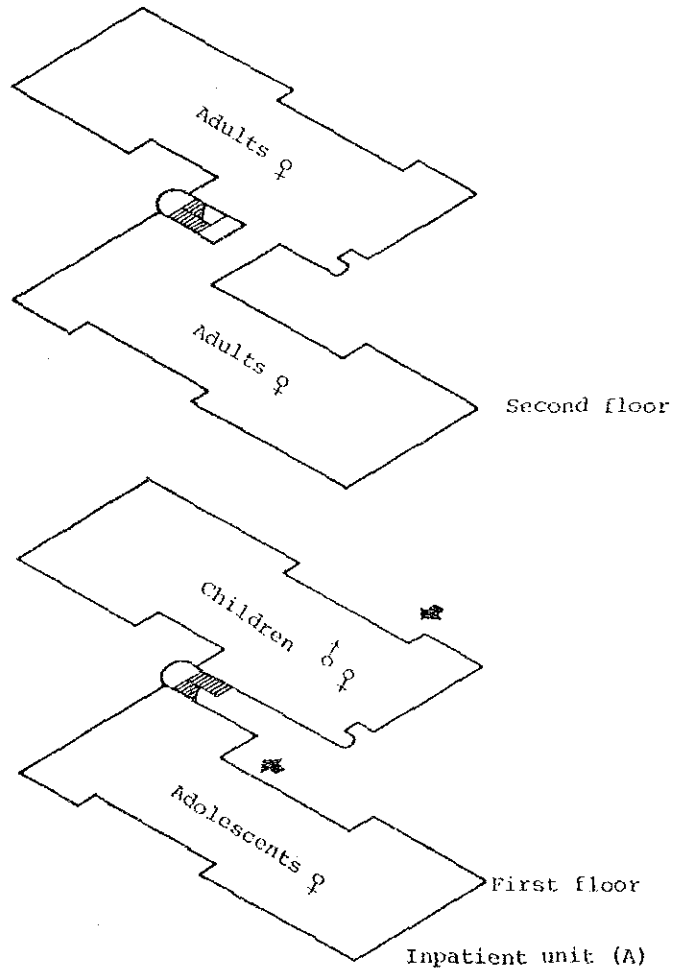
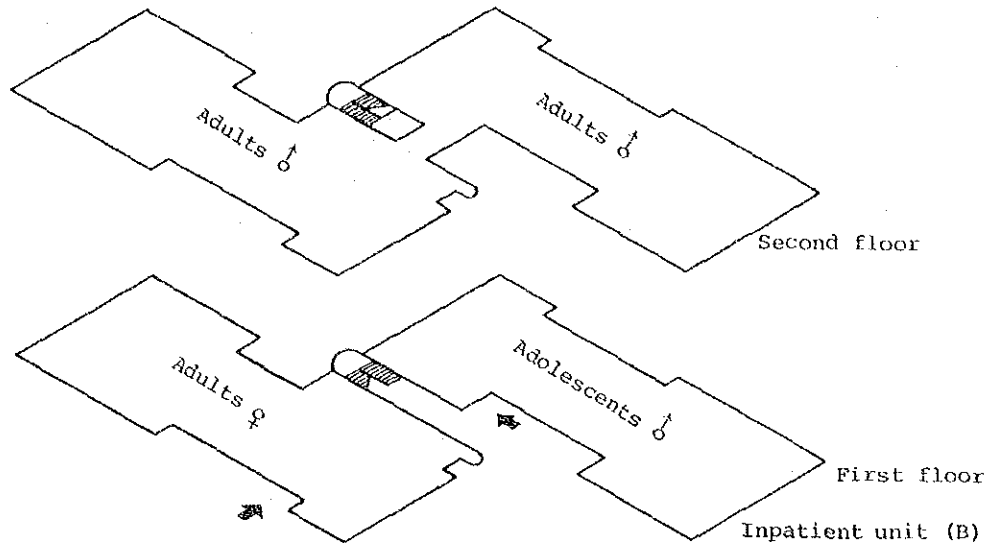
Cafeteria will be separated to patient area and employee area but services will be made from a single pantry and kitchen.

Gymnasium will have an ample space for 200 seats that can be also usable as assembly hall for the center, and stage and public address system will be also provided in this gymnasium.

- 25 beds will be considered for one nursing unit for the inpatient unit, and each inpatient unit will be designed to have 4 nursing units, so that a total of 8 nursing units will be provided. Each nursing unit will have two 6-bed rooms, three 3-bed rooms (two rooms for children ward only), two private rooms, two isolation rooms, day room, nurse station, consultation room and treatment room. For both inpatient units, each nursing unit will be separated from the other on first floor but two nursing units will be planned as an unit on second floor.

Nursing units will be arranged as shown below depending upon ages and sexes of patients.

Exclusive athletic yard will be provided for children ward of Inpatient unit (A).



- Service work shop will be planned to provide sufficient service traffic lines between kitchens, laundry, mechanical room, electrical room, workshop and storage spaces.

Though there are standards for minimum required floor areas for rooms in service building as stated previously, such floor areas will be slightly reduced in planning to the extent that reduced areas will not disturb the operation since this center is exclusively for mental health and since connection with future energy center must be taken into consideration. Storage space and workshop will be planned to allow future extensions.

(3) Exterior facility planning

Main approach for pedestrains will run from central area to road at north side when facing to the central building, and parking area and road for vehicles will be separated from each other in order to give the top priority to the traffic of pedestrians. However, a width required for a vehicle road will be given to the main pedestrian approach so as to use the approach as a long porch. The parking area will provide parking spaces for about 60 cars.

Though the outpatient department will have an appearance open to the outside, it will be inevitable to install fences around inpatient department because of its character. However, exterior fences will be carefully designed to avoid to give the appearance of closing, but it is also expected that the Government of Peru would take some special measures to reduce such appearance of closing as much as possible by means of planting for example since the length of fences is expected to become

very large.

(4) Material planning

In conformity with ordinary method of practice in Peru, main structure will be designed as a reinforced concrete frame, exterior wall will be designed as clay tile block masonry coated with plaster mortar finished by painting, and aluminum windows and aluminum door frames will be employed for exterior openings. Roofing will be finished with clay tile blocks (Pastelero) after laying soil. Sloped roof will be finished with clay tile slates (Teja Plana) for rehabilitation center and with colored corrugated slates (Teja Andina) for service building. Roofs for workshop and storage will be finished with large-size corrugated slates (Canalón). As a rule, Aligerado method will be employed for the floor slabs and ceiling will be finished with plaster. For finishing the floors, vinyl chloride type floor materials, tiles or terrazzos will be selected depending upon the room conditions.

Interior walls will be mainly finished with plaster and paint but tiles will be added partially wherever necessary because of room usages.

4-4 Structural Planning

(1) Basic approach in structural planning

As already stated previously, Peru is within the ring of Pacific Earthquake Zone and frequently attacked by severe earthquakes and, thus, sufficient precautions have to be taken in making earthquake-resistant design. As basic approach to the structural design of this center, rigid frame structural system with seismic walls well arranged for proper balancing will be adapted. Reinforced

concrete structural system that is common method of practice in Peru will be adapted.

(2) Basis of structural design

Disciplines of structural design for this center are stated hereinafter.

- External forces and assumed loads to be acted to the buildings shall conform to RNC of Peru.
 - a) Both dead loads and live loads shall conform to RNC. For rooms to be used for special purposes, proper values corresponding to actual conditions will be used.
 - b) Wind pressure will be determined in accordance with RNC but wind pressure force for this center is negligible.
 - c) As stated previously, seismic force H will be given by the following formula:

$$H = \frac{Z \times U \times S \times C \times P}{R_d}$$

where, Z: 1.0 (Zone I)

U: 1.3 (Class B)

S: 1.0 (Soil I)

$$C = \frac{0.8}{\frac{T}{T_s} + 1.0}$$

$$0.16 \leq C \leq 0.4$$

T: Natural period of building

Ts: 0.3 to 0.9

Rd: 5.0

These coefficients will be used for the proposed site of this center.

- Allowable stresses of materials will be determined in conformity with RNC and various standards of Architectural Institute of Japan. However, $F_c = 210 \text{ kg/cm}^2$ will be used as design standard strength of concrete.
- Stress analysis of rigid frames and design of structural sections will be performed in conformity with RNC and various standards of Architectural Institute of Japan and also by referring to ACI standards.

4-5 Electric Equipment Planning

In the process of planning for the Community Mental Health Center, the following items will be taken into consideration:

- Independent equipment and facilities will be planned since work directly related to HOSPITAL GENERAL BASE CAYETANO HEREDIA is not involved in this project.
- In addition to the products manufactured in Peru, Japanese products will be used for electric equipment and facilities and, thus, special precautions will be taken for preventing problems in maintenance, management and operation in future.
- Peruvian laws and regulations will be observed in determining requirements of construction work and standards of building equipment and materials. Japanese laws will be applied to the items not covered

by Peruvian laws.

- Since thunder and fire rarely occur in City of Lima, facilities required by Japanese laws will not be provided.

(1) Substation and receiving equipment & facilities

Lead-in of power to the center will be made by 3 ϕ , 3-wire, 10 KV, 60 Hz underground cable directly to the electric equipment room.

From the results of calculations for facility load capacity, transformers with capacity of about 500 KVA will be installed in electric equipment room, and power will be supplied to the load of each facility through branch switches within low-voltage power distribution panel. Power service facilities at primary side including transformer are scheduled to be provided by the government of Peru.

(2) Stand-by generator facilities for emergency

Though interruption of service rarely occurs in city of Lima, AC generator will be installed as emergency power to supply power to limited facilities such as security lighting, water supply pumps, freezers and telephone exchange.

Capacity of generator will be determined within the range from 70 KVA to 100 KVA, and it will be designed to provide automatic start following interruption of service and automatic stop upon recovery of service.

To meet the needs of emergency operation, the type of engine of the generator will be selected on the following basis:

- Forced air-cooling method is to be adopted for cooling.
- Combustion air is to be supplied by the natural ventilation system through the louver in wall.
- Type of fuel is to be the same as that used for boiler.

(3) Trunk line power facilities

Power will be supplied from low-voltage power distribution panel in electric equipment room to each building through underground cable (3 ϕ , 3-wire, 220 V, 60 Hz). Start and stop operation of power will be simplified and clarified by employing hand control method.

(4) Lighting and convenience outlet facilities

Lighting panel boards, and wiring and conduit from panel boards to convenience outlets, switches and lighting fixtures will be installed. Turning on and off of lighting fixtures will be made at each room as a rule, but bedrooms will be turned on or off at corresponding nurse station.

Automatic photoelectric relay switches will be used for controlling exterior lighting fixtures.

(5) Lighting fixtures

Fluorescent lamps will be mainly used as light sources, and incandescent lamps and other types of lamps will be added whenever necessary.

Standard intensity of illumination for main rooms is shown below.

Room Name	Intensity of Illumination (LUX)
Offices, consultation rooms	300 to 500
Dining room, kitchen, rehabilitation	300
Bedrooms	100
Entrance, hall	200
Corridors, toilets, mechanical room	100 to 200
Storages	100

(6) Telephone exchange facilities

As telephone exchange facilities, a set of automatic telephone exchange employing exclusive crossbar system will be installed for performing communication services for users within an outside the center.

Automatic exchange will have functions to serve 10 subscriber's lines and 100 extension lines, and about 55 dial telephones will be installed in main rooms.

Work for primary side up to the main distribution frame (MDF) is included in the scope of work to be performed by the Government of Peru.

(7) Public address and intercommunication system

Independent public address and intercommunication system will be installed for each building in the center, however out-patient department building will provide both intercommunication within building and independent call to out-patients. Locations where amplifiers (AMP) will be installed are shown below.

- Central Building: Office in 1st floor; children's reception; adult's reception
- Inpatient unit : Each nurse station
- Rehabilitation building : Office

(8) Electric clocks

About 20 wall-mount type clocks with dry cells will be installed in main rooms of each building.

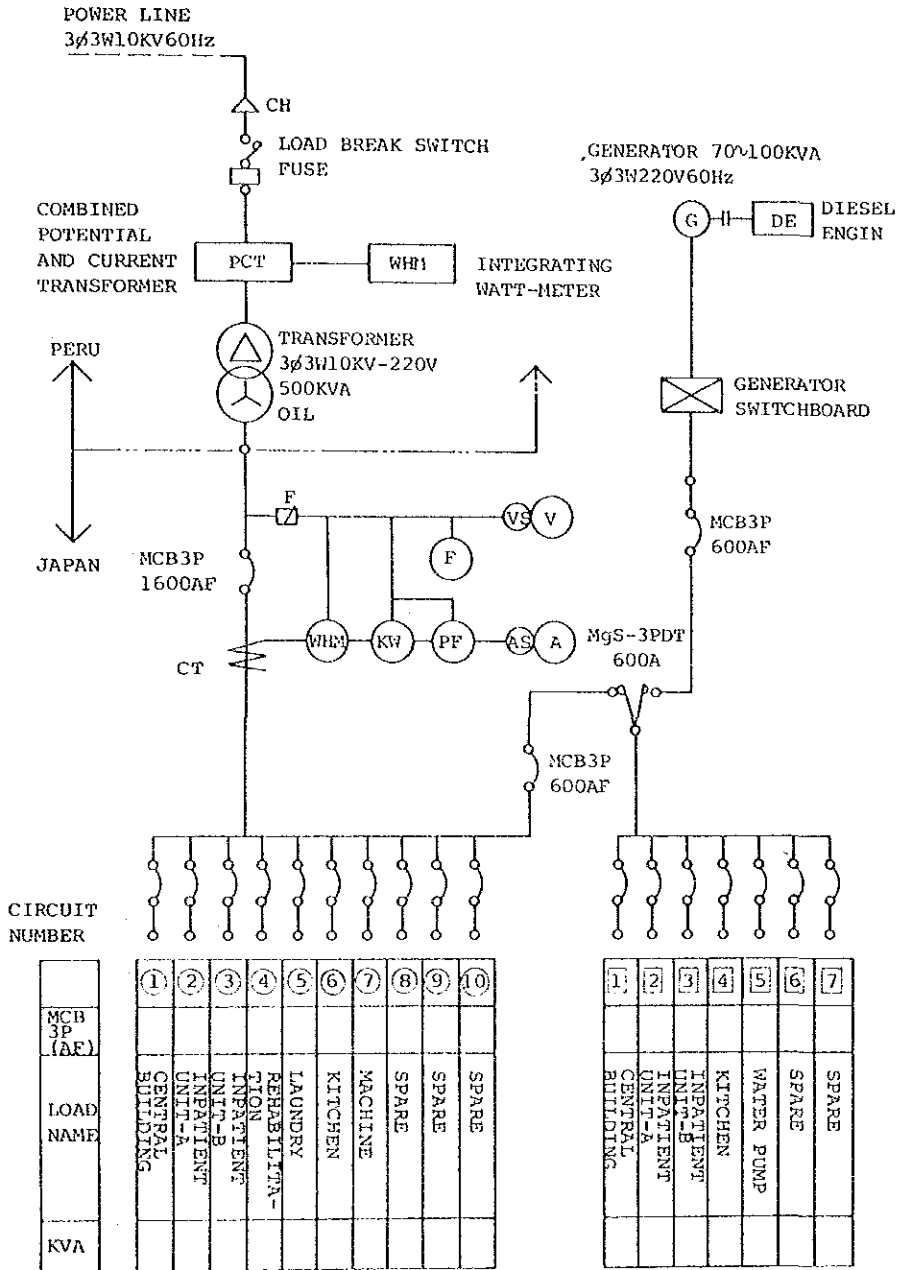
(9) Interphone system

Interphones will be installed at employees' entrance and emergency entrance of central building to provide communication between interior and exterior spaces. In addition, interphone will be installed at each station of dumbwaiter to provide communication between stations.

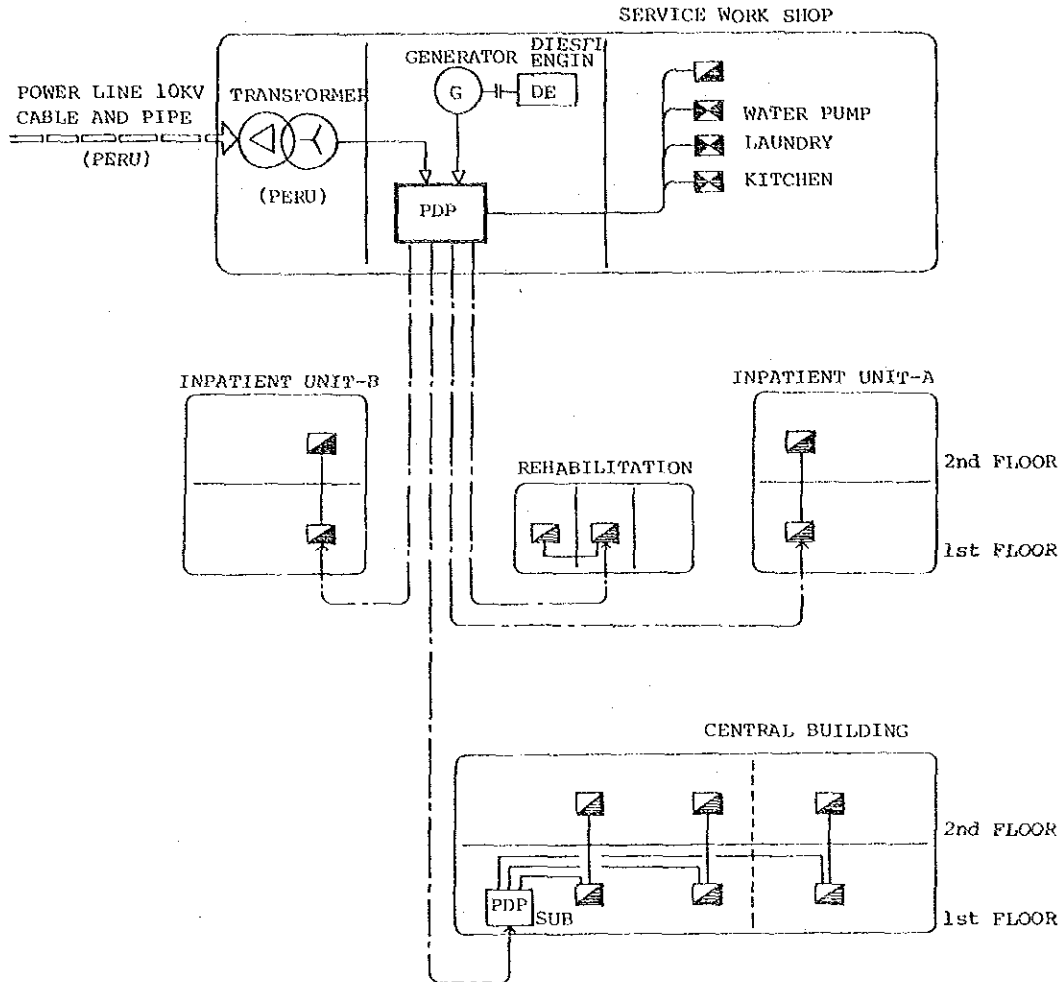
(10) ITV facilities

As part of medical equipment to be supplied, ITV and VTR equipment will be installed to contribute to education and improvement of indirect diagnosis. Equipment will be separated into three groups of adults, children and emergency, and independent functions will be maintained for each group.

POWER SERVICE SYSTEM



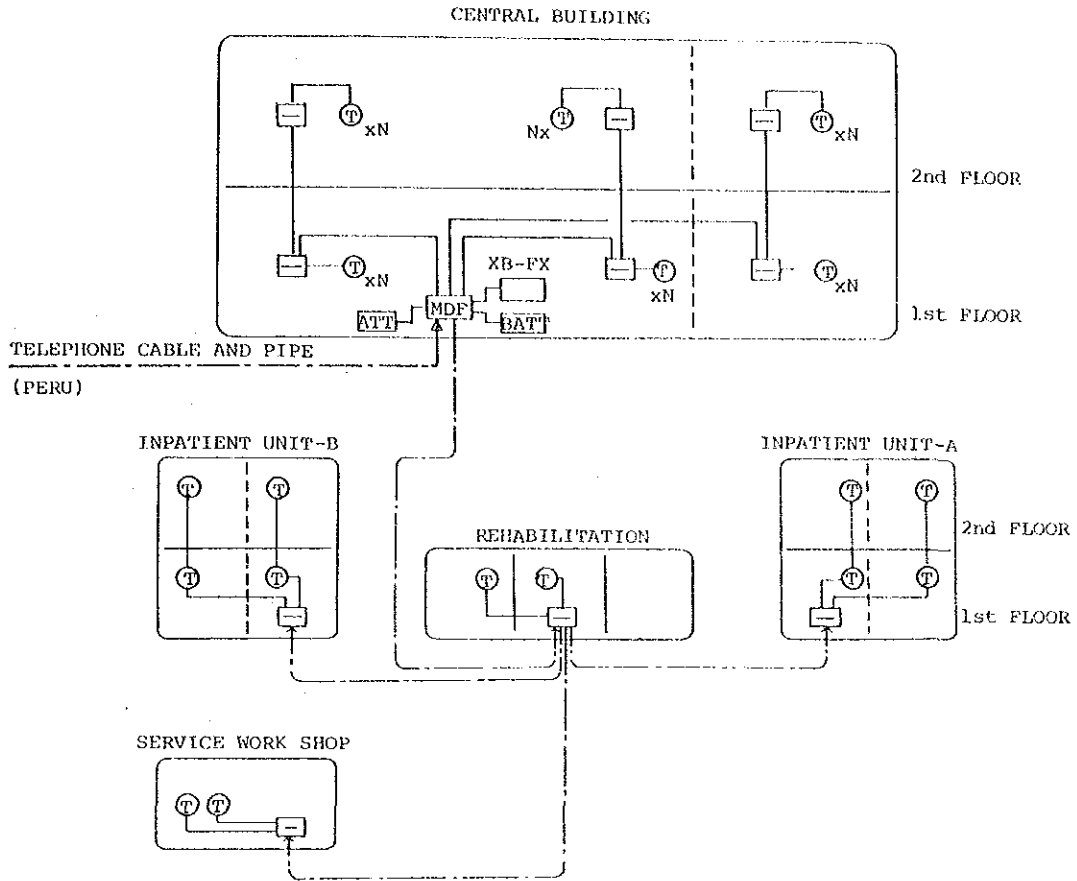
MAIN FEEDER SYSTEM



LEGEND

SYMBOL	DESCRIPTION
PDP	POWER DISTRIBUTION PANEL
☐	LIGHTING PANEL BOARD
⊗	CONTROL PANEL BOARD

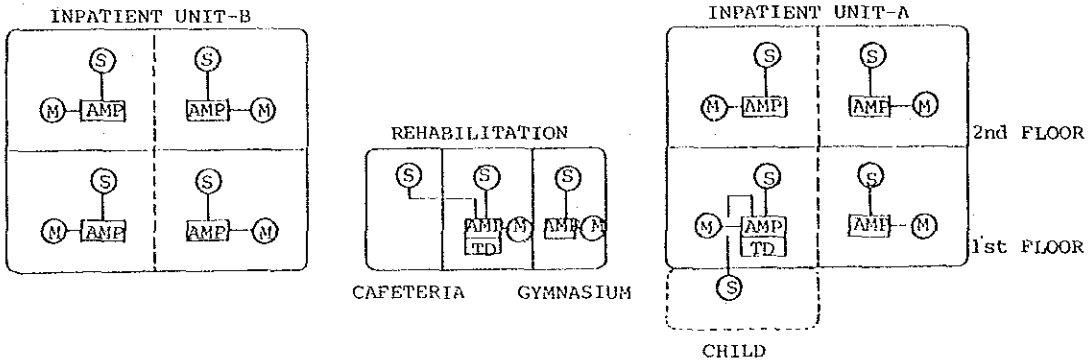
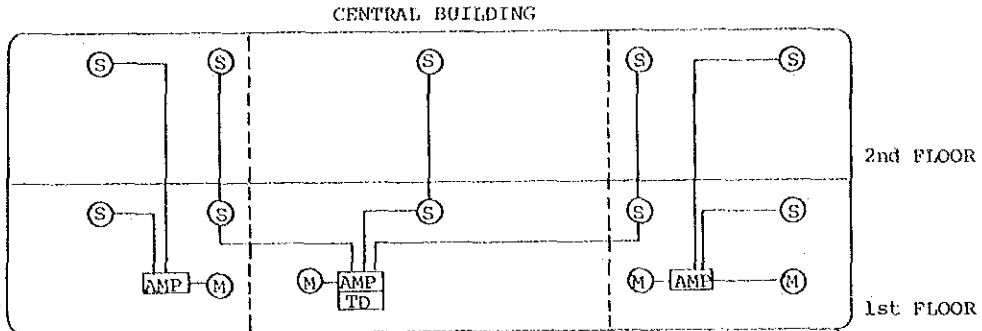
TELEPHONE SYSTEM



LEGEND

SYMBOL	DESCRIPTION
MDF	MAIN DISTRIBUTION FRAME
XB-EX	CROSSBAR SWITCH EXCHANGE CABINET-TYPE
BATT	BATTERY AND CHARGER
ATT	ATTENDANT CONSOLE
☐	TELEPHONE TERMINAL
⊙	TELEPHONE OUTLET BOX

PUBLIC ADDRESS SYSTEM

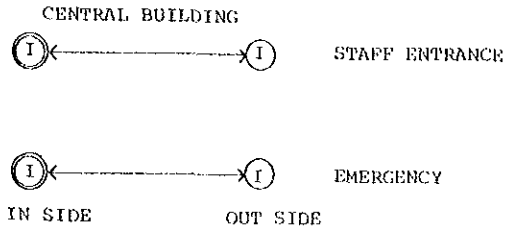


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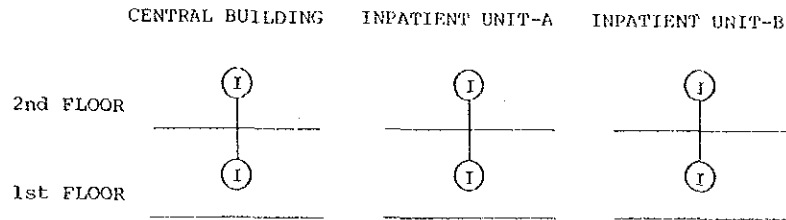
SYMBOL	DESCRIPTION
AMP	AMPLIFIER
(M)	MICROPHON
(S)	SPEAKER
TD	TAPE DECK

INTERPHONE SYSTEM

o NIGHT RECEIPT

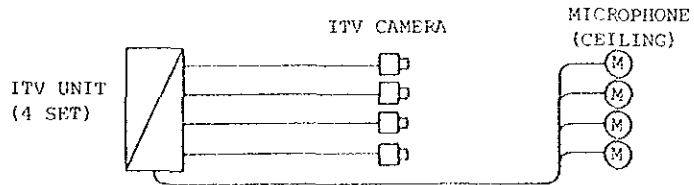


o DUMPWAITER

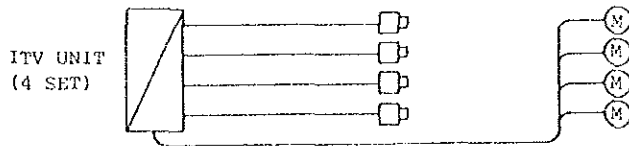


ITV SYSTEM

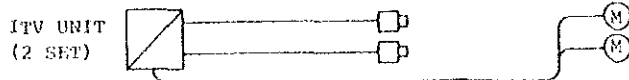
o ADULT



o CHILD



o EMERGENCY



4-6 Air Conditioning Equipment Planning

Weather in city of Lima requires no air conditioning since air temperature difference between 29°C maximum and 13°C minimum is small with annual average of 18.4°C.

No air conditioning equipment will be used in this center and only the ventilation equipment will be planned. For planning ventilation, natural ventilation will be mainly considered and mechanical ventilation will be provided only when its use is inevitable.

4-7 Mechanical Equipment Planning

Mechanical equipment described in this section will include water supply, water drainage and sanitary equipment including plumbing as well as kitchen, laundry and steam boiler equipment, and the following considerations will be made for planning:

- Planning will be made in conformity with Peruvian regulations and requirements for design and construction.
- High hardness of water of city water supply system.
- Domestic products are to be used as much as possible when selecting materials and equipment.
- Systems capable to assure easy maintenance and management are to be adopted.

(1) Water supply equipment

From city water main pipe that will be installed by MINISTERIO DE SALUD, water sufficient for use in the center at least for one day will be stored in tank.

(This amount of water storage was determined in

consideration of many hours of interruption of water service.) Water will be lifted to an elevated tank by two lift pumps, and supplied to each building by gravity.

Water to be supplied to boilers and washing machines will be pretreated to prevent scaling and to improve the cleaning effects of soap. Sand filter equipment and water softening equipment will be installed for treating water.

Amount of water required for the center is about 140,000 liters per day and, thus, lead-in pipe for water will have 3" diameter at 1 kg/cm² pressure.

Material of pipe shall be galvanized steel pipe for ordinary water system and PVC pipe for sprinklers.

(2) Hot water supply equipment

Hot water will be supplied to the kitchen and the laundry from the boiler room. Showers in each building will be supplied with hot water from storage tanks heated with electric heaters located at each floor. No special equipment will be used for drinking hot water. L-type copper tubing will be used for piping.

(3) Water drainage and vent system

There is a complete sewer system in the city of Lima and, thus, sanitary sewage can be directly discharged to the public sewer line. However, drainage from kitchen will be made after removing grease and garbage. No storm drainage system will be made. Vent pipes within a building will be connected together, and vent will be provided to each group of fixtures. Plumbing will be made through ceiling spaces and pipe spaces without embedding pipes into building structures whenever possible

for easier maintenance. Material of pipes for vent, sanitary sewage and miscellaneous drain water within building shall be cast iron. Concrete pipes will be used for exterior sewer line. At least one exterior sump pit will be provided in every 30 meters for easier cleaning of pipes.

(4) Sanitary fixtures

Various kinds of domestic products are available for sanitary fixtures, and fixture suited to each purpose will be installed. Water closet will be used flushing valve and urinal will be used handle valve.

(5) Gas facilities

No utility gas is available in city of Lima but propane gas system is available for houses. However, since supply of propane gas is presently unstable, use of this gas as various heat sources is may lower the hospital functions. Thus, the use of propane gas will be limited only to testing function.

(6) Laundry facilities

Laundry equipment and facilities required in the hospital will be provided in the service work shop. The scope of laundry service will cover the washing and cleaning of bed sheets, blankets and pajamas for 200 beds, white robes for doctors and nurses, and working clothes for employees and service men. Washing facilities will be operated with water and consist of washing machines, hydroextractors, pressers and dryers. Steam will be used as heat source. No dry cleaning facilities will be provided.

(7) Kitchen equipment

Foods for dietary services will be prepared in main kitchen of service building, and delivered to pantry of central cafeteria and each pantry of each floor of two Inpatient units for distribution to patients.

As a rule, only one kind of food menu will be available for each meal, and the same food menu will be served for doctors, nurses, employees and Inpatients. Steam will be used as main heat source for main kitchen but electric power will be used for equipment requiring high temperature such as meat cooking.

Refrigerators will be installed separately for meats, fishes and vegetables.

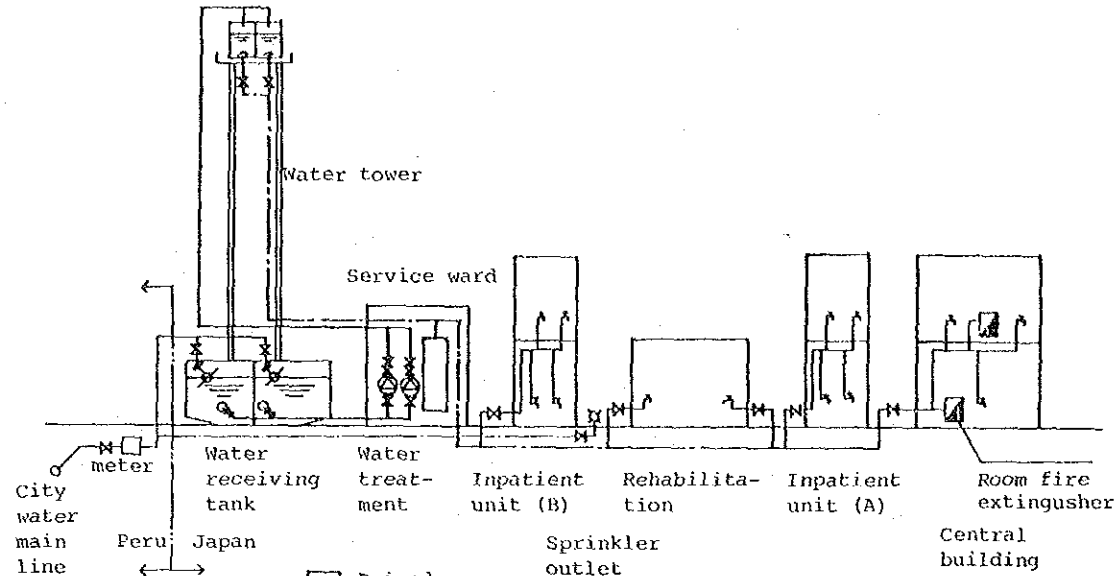
(8) Fire extinguishing facilities

According to RNC, requirements for interior fire hydrants are that "Fire hydrants with 4-inch diameter minimum shall be installed to building higher than two stories with building height greater than 15 meters but less than 20 meters".

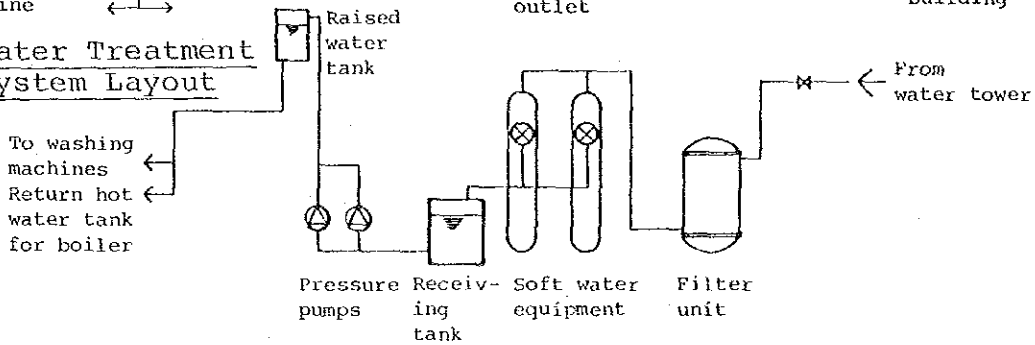
However, this hospital will have two stories but its height is 7.5 meters so that installation of fire hydrants will not be required by laws.

However, for the purpose of self-defense, interior fire hydrants of simplified type will be provided. This type is capable to discharge water with a water pressure created by elevated tank, and they will be installed at each floor of each building. Pumps for tank will be operated during fire fighting so that volume of water stored in the receiving tanks may be discharged during fire fighting.

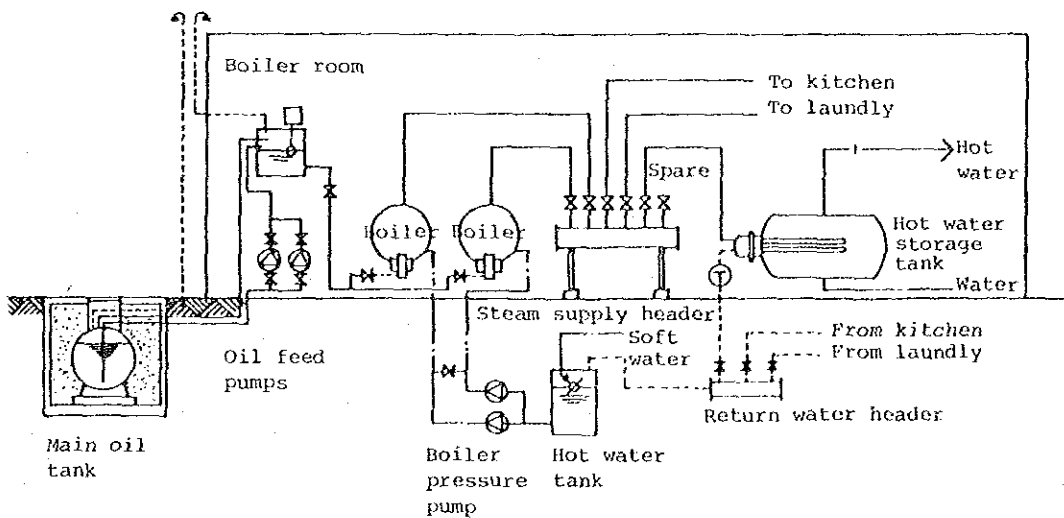
Water Supply Equipment System Layout



Water Treatment System Layout



Boiler System Layout



4-8 Medical Equipment Planning

E.E.G., E.C.G., supersonic diagnostic equipment, enzyme analyzer, gas chromatograph, multiple auto-analyzer, etc. will be installed in laboratory department of the central building.

E.E.G. is needed for diagnosing epilepsy, brain disorders, mental disorders for the aged and so forth, and it will have excellent functions such as 17 channels, photic stimulator, sound stimulator, polygraph, television camera, etc.

In addition, for early detection of epilepsy and organic mental disorders by means of community survey, portable E.E.G. will be also provided for use during medical examination tour particularly for children and youths. In this case, however, portable E.C.G. and X-ray equipment will be also required for finding mental disorders associated with respiratory and circulatory diseases.

Supersonic diagnostic equipment will be provided to diagnose brain disorders caused by head injury or other brain damages through the inspection by echo-encephalograph. Blood tests and liver function tests are indispensable for early detection of side effects due to use of psychotropic drugs, and multiple auto-analyzer will be indispensable for quickly processing a number of examinations for the early detection.

Since psychotropic drugs are used for a prolonged period of time in many cases, side effects or ineffectualness of such drugs will naturally occur if the amount is excessive or too small. Therefore, measuring of concentration of drugs in blood is extremely meaningful and is widely performed in Japan and European countries. For the purpose of maintaining appropriate uses of drugs for mental

diseases, it is extremely important to install gas chromatograph and enzyme analyzer in this center.

For the outpatient department (adults and children) and emergency department, electric convulsion therapy equipment will be provided in addition to ordinary medical equipment. In addition, VTR systems will be provided in outpatient department (adults and children) and emergency department for the purposes of analysis of patient's symptoms and of education for doctors, nurses and other employees concerned.

In day care department for adults and children, rehabilitation tools must be provided as well as educational materials for special education for children.

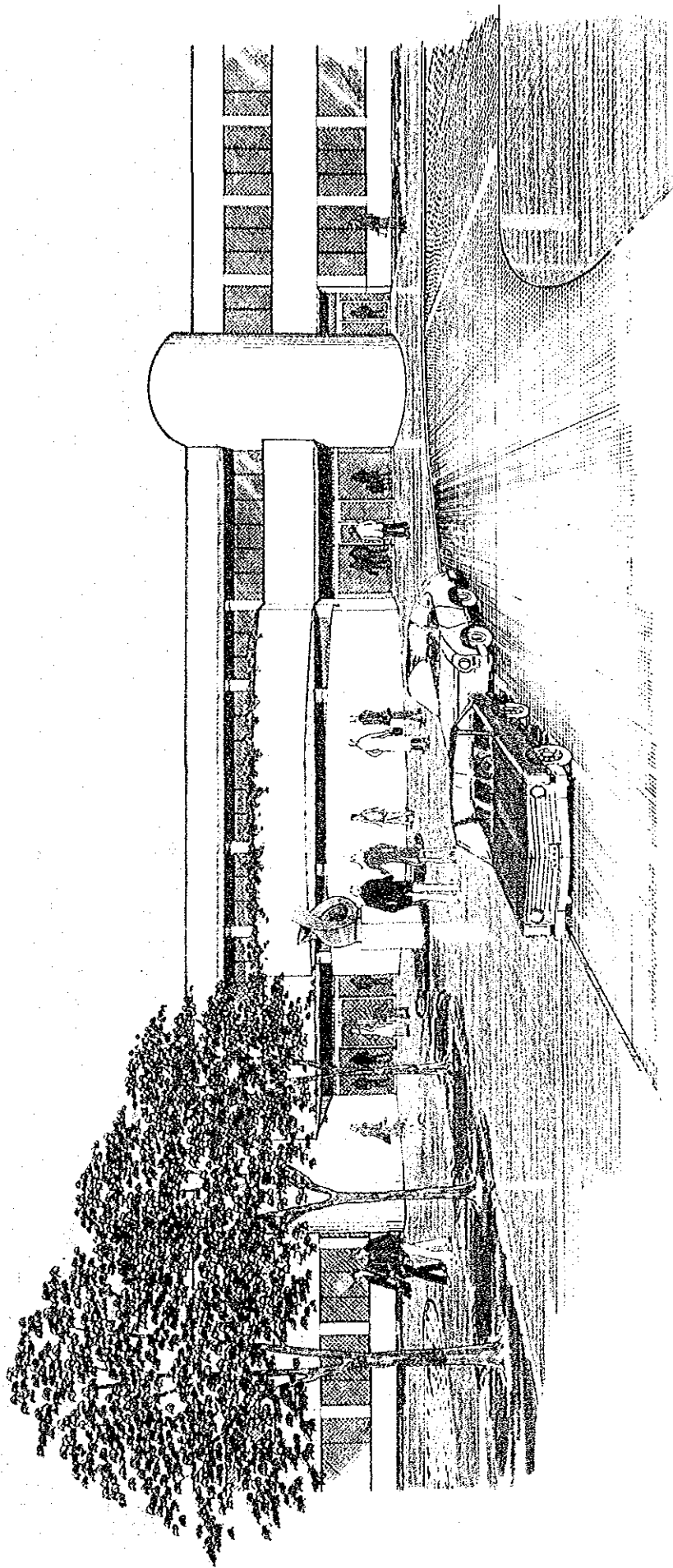
In 200-bed wards, not only various equipment and materials for consultation rooms and treatment rooms but also equipments for electric convulsion therapy and other special therapies will be necessary.

In the rehabilitation department, the equipment and materials required for workshop therapy and recreation therapy such as physical training, music, woodworking, and leatherwork will be required, and children's wards will need various equipment and materials for children's play therapy and education.

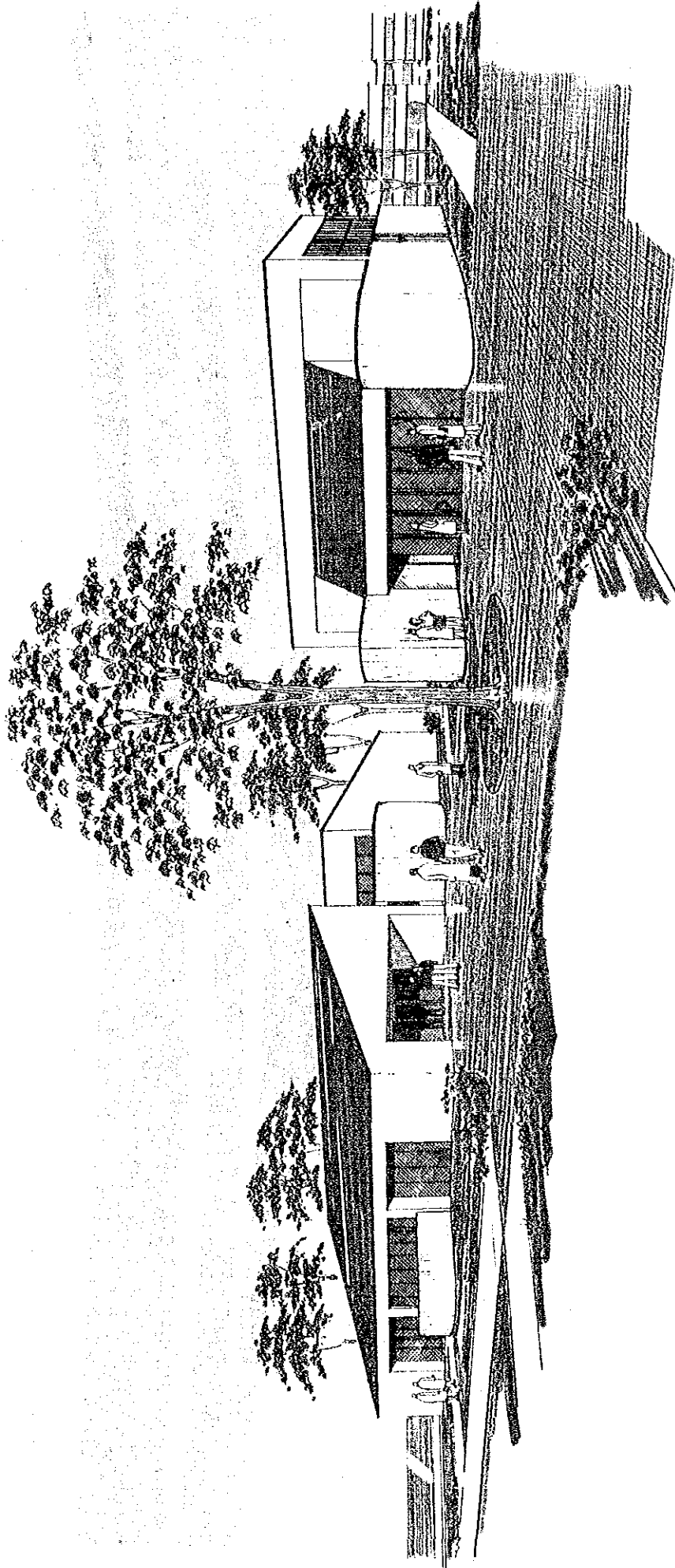
4-9 Drawings for Basic Design

List of drawings for basic design

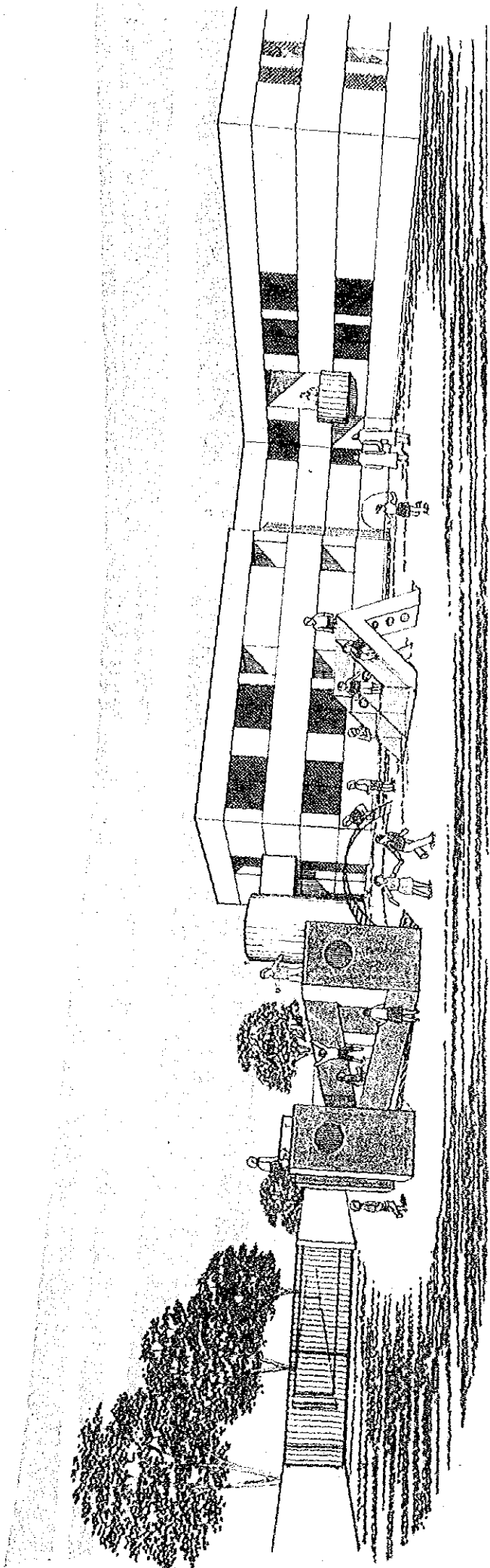
Perspective:	Central building Rehabilitation center Inpatient Unit (A)
Plot Plan:	
Central building:	First floor plan Second floor plan Exterior elevations Building sections
Rehabilitation center:	Floor plan
Rehabilitation:	Exterior elevations and building sections
Cafeteria:	Exterior elevations and building sections
Gymnasium:	Exterior elevations and building sections
Inpatient unit (A):	First floor plan Second floor plan
Inpatient unit (B):	First floor plan Second floor plan
Inpatient unit (A & B):	Exterior elevations and building sections
Service work shop:	Floor plan Exterior elevations and building sections



CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU

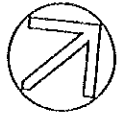
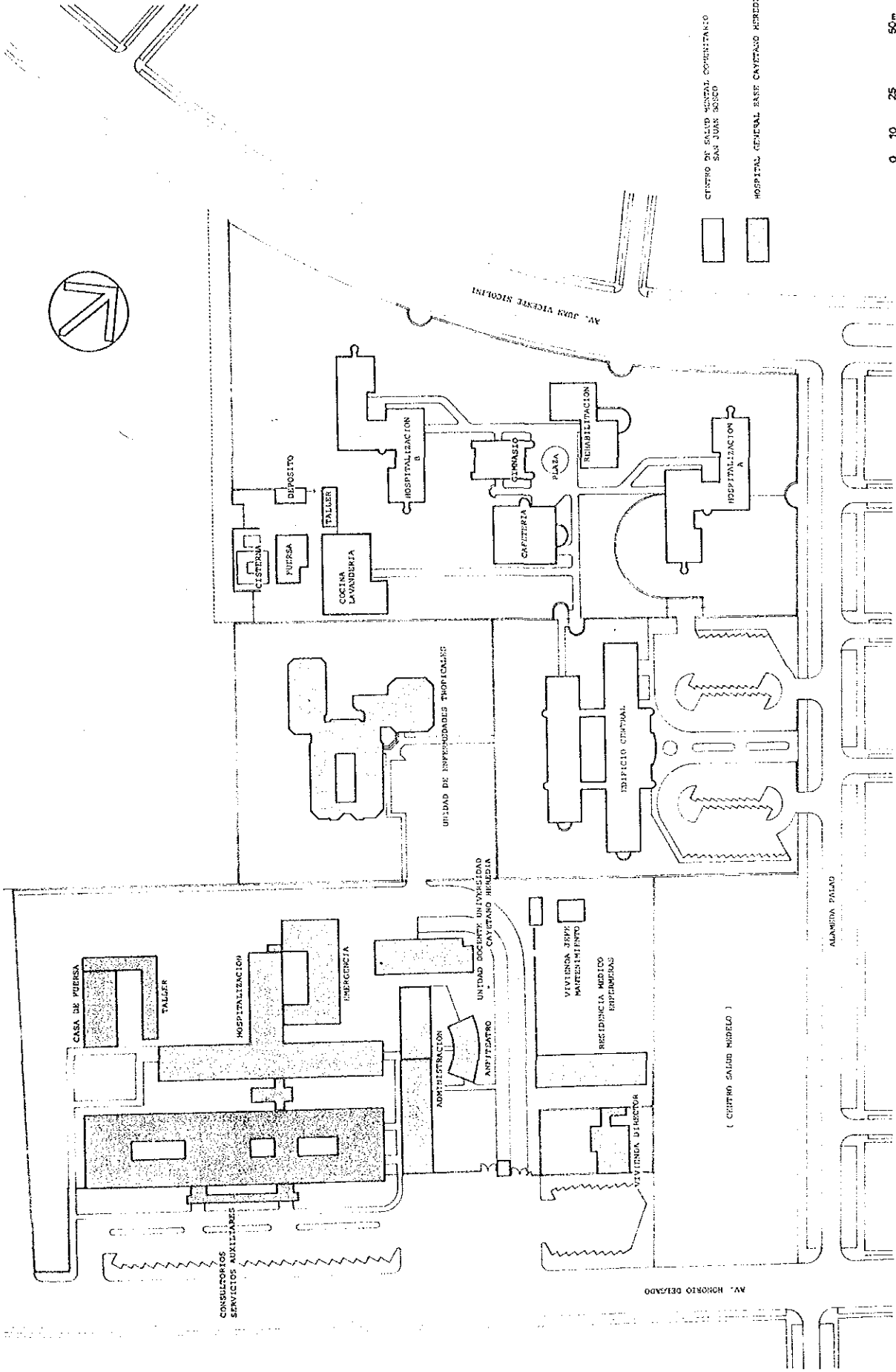


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CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO

HOSPITAL GENERAL BASE CAYETANO HEREDIA

UBICACION

**CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU 01**

AV. HORACIO DELGADO

ALAMEDA PALAO

AV. JUAN VICENTE RIQUELME

(CENTRO SALUD MODELO)

CONSULTORIOS
SERVICIOS AUXILIARES

CASA DE PUERA

TALLER

HOSPITALIZACION

EMERGENCIA

ADMISION

UNIDAD DOCENTE UNIVERSIDAD
CAYETANO HEREDIA

VENTANA SERVICIO
MATERIALES
EXTERMINAS

REGISTRARIA MEDICO
EXTERMINAS

SECRETARIA DIRECTOR

DEPOSITO

TALLER

COCINA
LAVANDERIA

HOSPITALIZACION
B

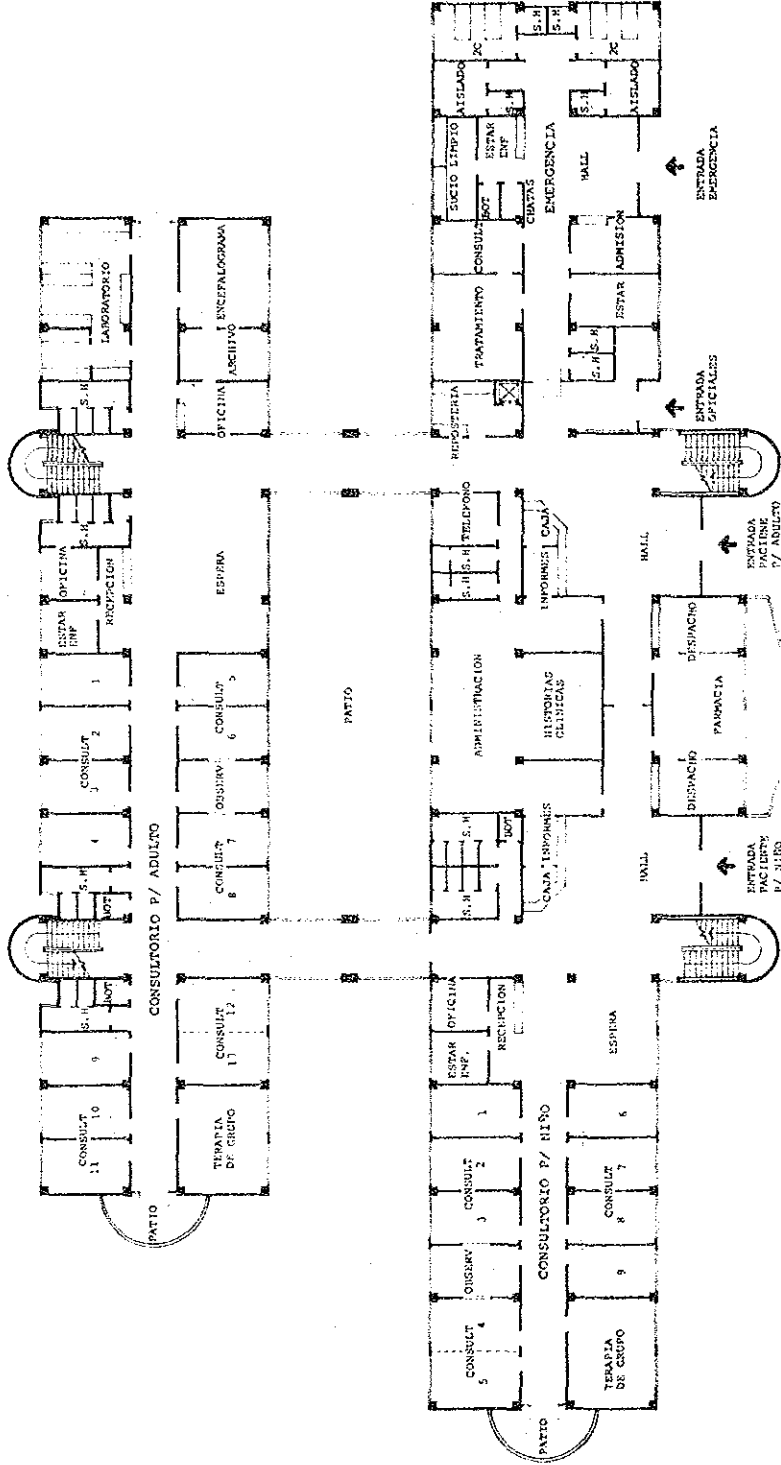
CAFETERIA

CIRUJIA

SALA

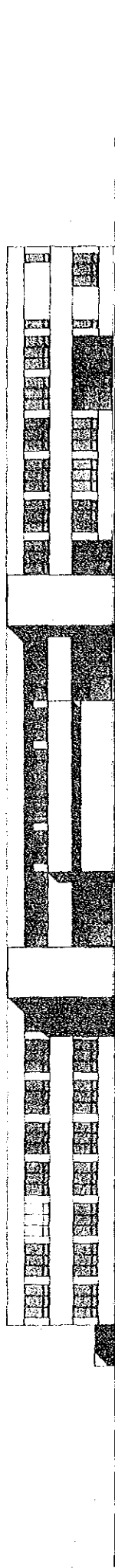
REHABILITACION

HOSPITALIZACION
A



PLANTA BAJA
EDIFICIO CENTRAL



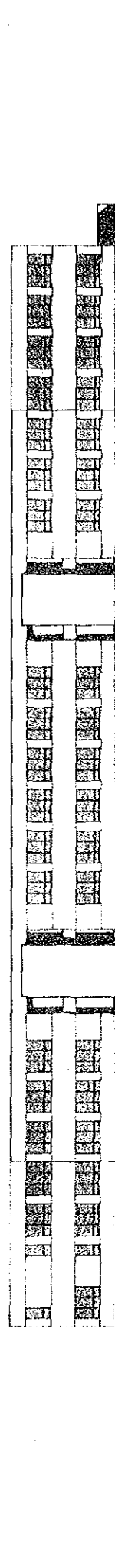


ELEVACION-NORTE



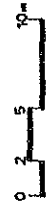
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ELEVACION-OESTE

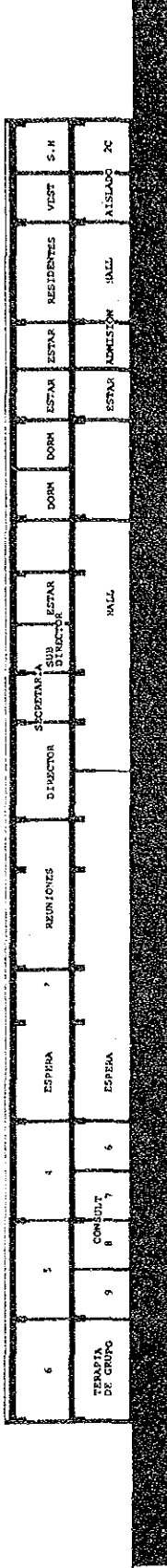


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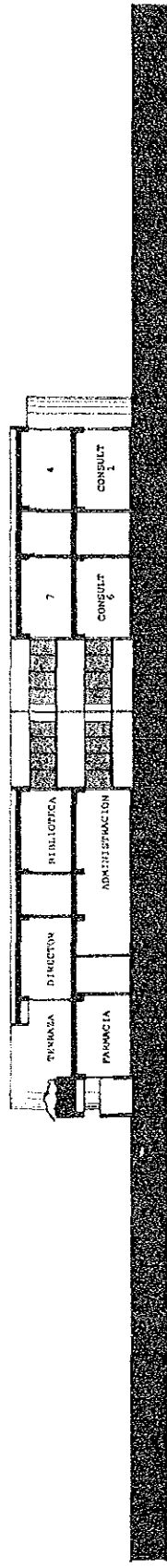
ELEVACION
EDIFICIO CENTRAL



CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU 04



CORTE

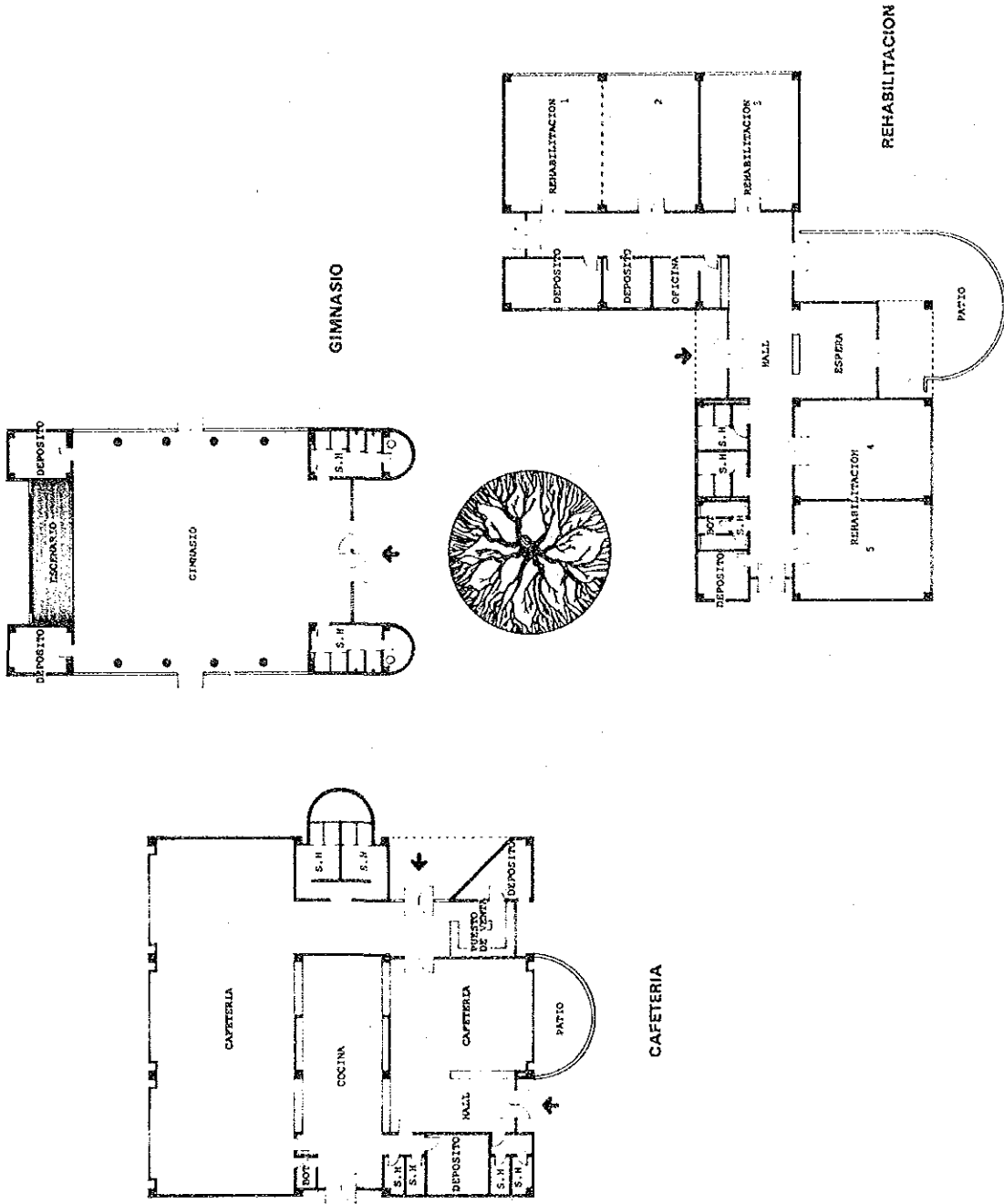


CORTE

CORTE
EDIFICIO CENTRAL



CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU
05



PLANTA
ZONA DE REHABILITACION 0 2 4 6
CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO LIMA-PERU 06



ELEVACION-NORTE



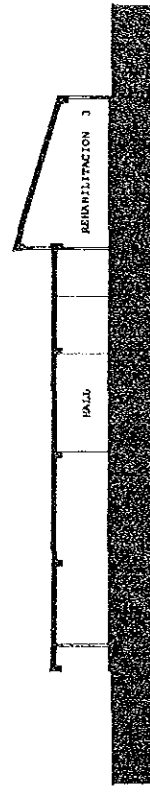
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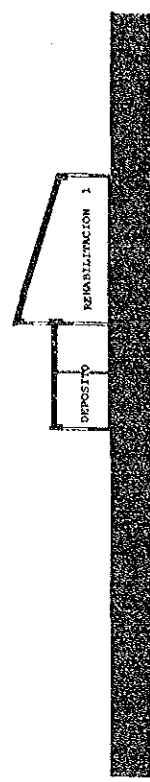
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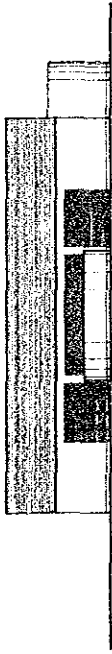


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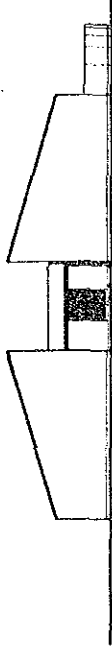


ELEVACION, CORTE
REHABILITACION





ELEVACION-NORTE



ELEVACION-ESTE



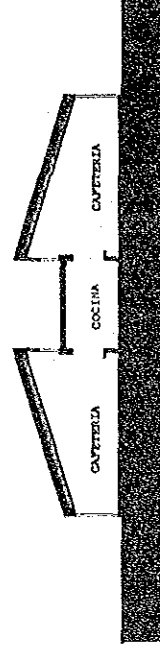
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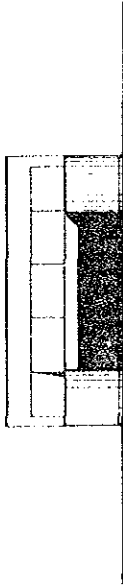


CORTE



ELEVACION, CORTE
CAFETERIA

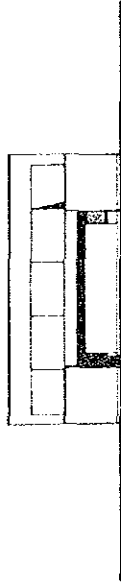




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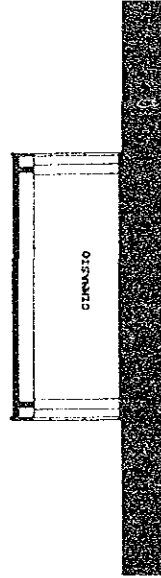
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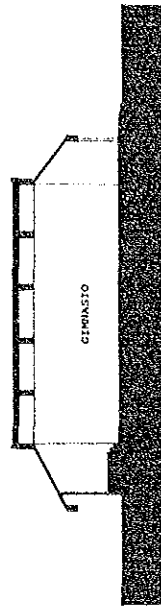
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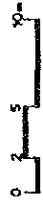
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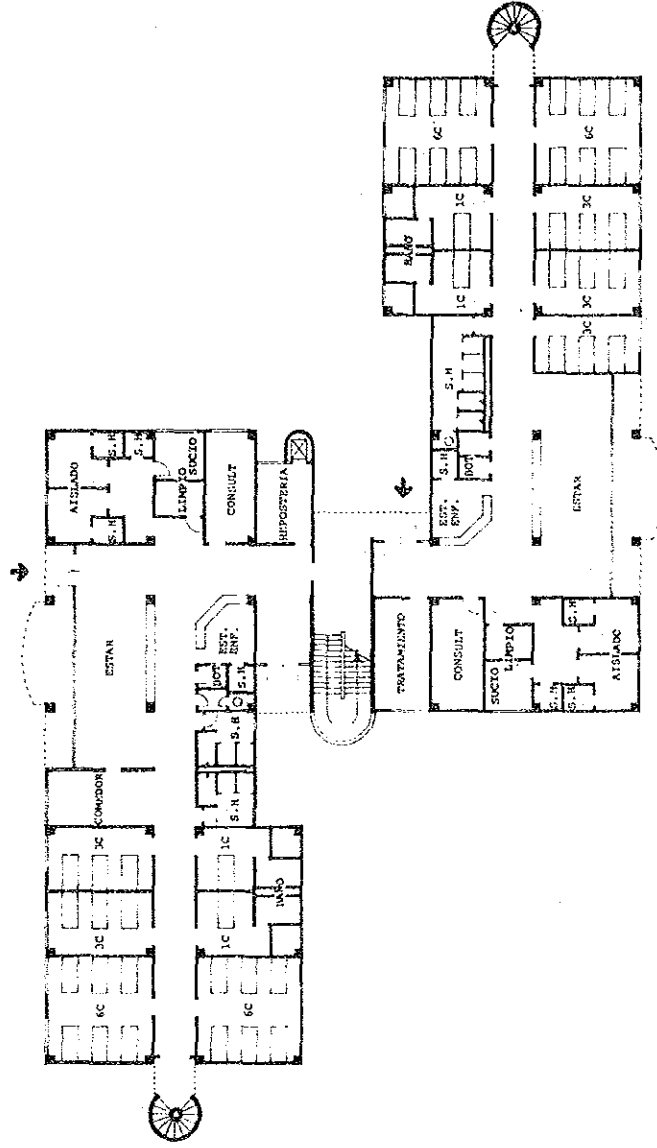
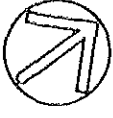


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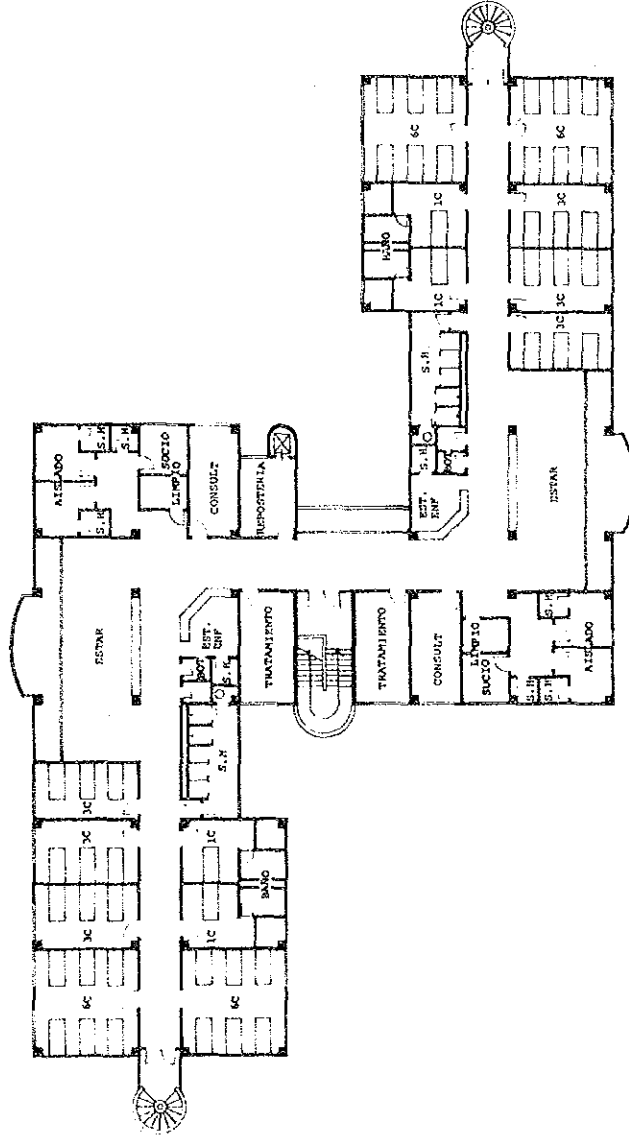


ELEVACION, CORTE
GIMNASIO





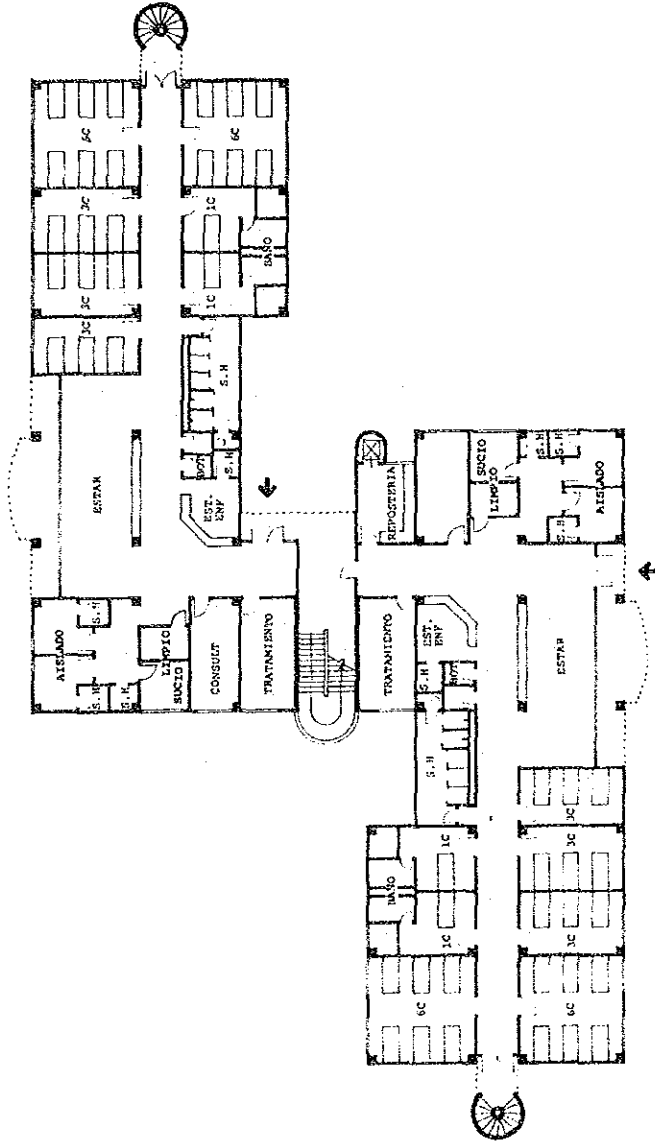
PLANTA BAJA
 HOSPITALIZACION-A 0 2 5 10m
 CENTRO DE SALUD MENTAL COMUNITARIO
 SAN JUAN BOSCO LIMA-PERU 10



PLANTA ALTA
HOSPITALIZACION-A



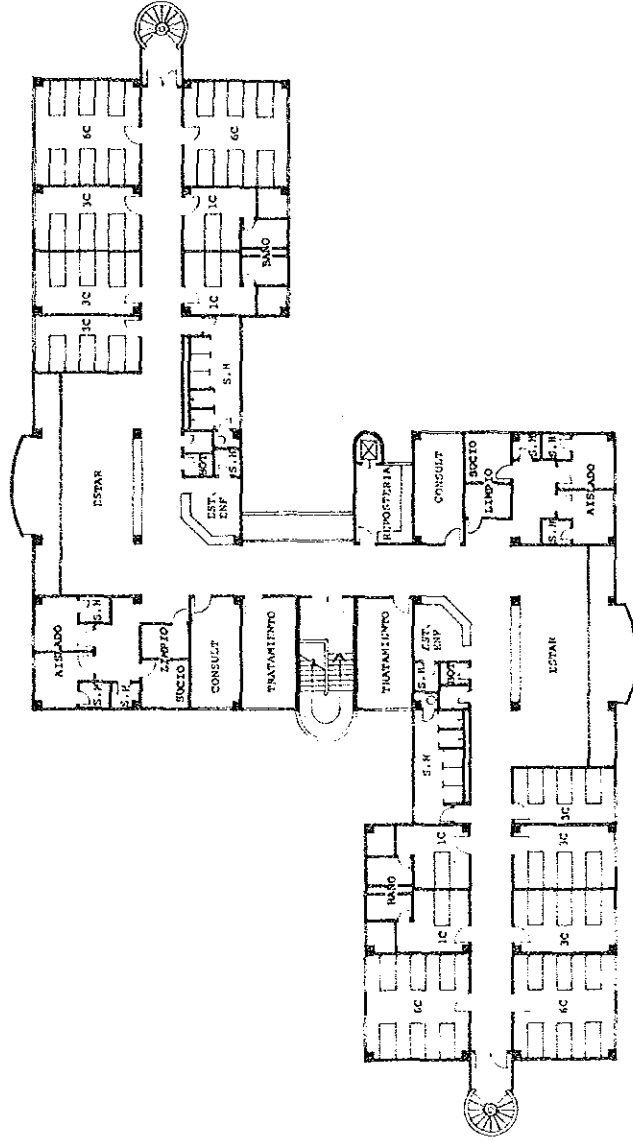
CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU 11



PLANTA BAJA
HOSPITALIZACION-B



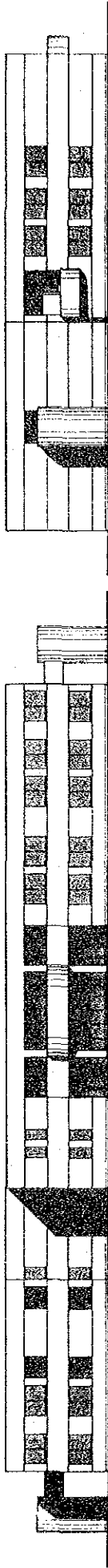
CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO LIMA-PERU 12



PLANTA ALTA
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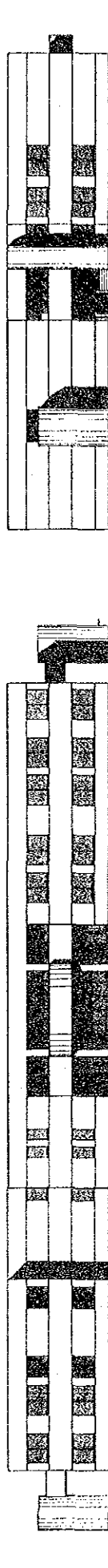


CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU



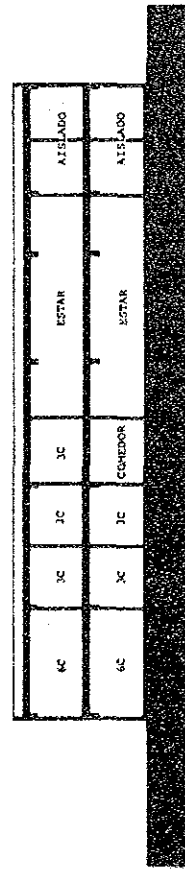
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ELEVACION-ESTE

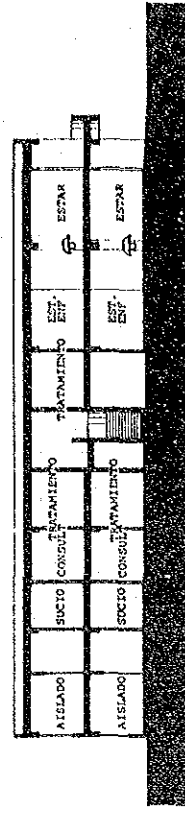


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ELEVACION-OESTE

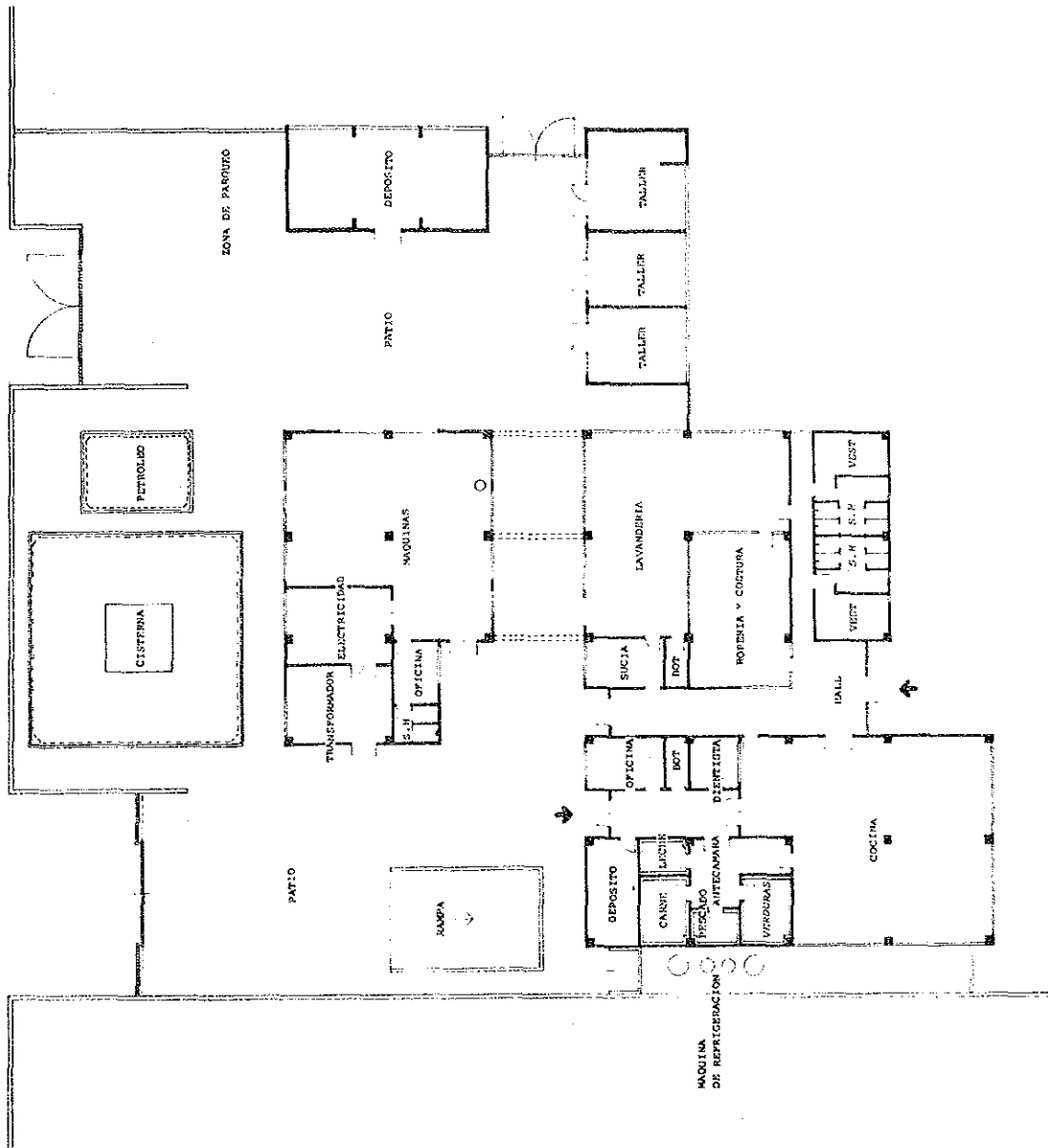


CORTE



ELEVACION, CORTE
HOSPITALIZACION-A, B

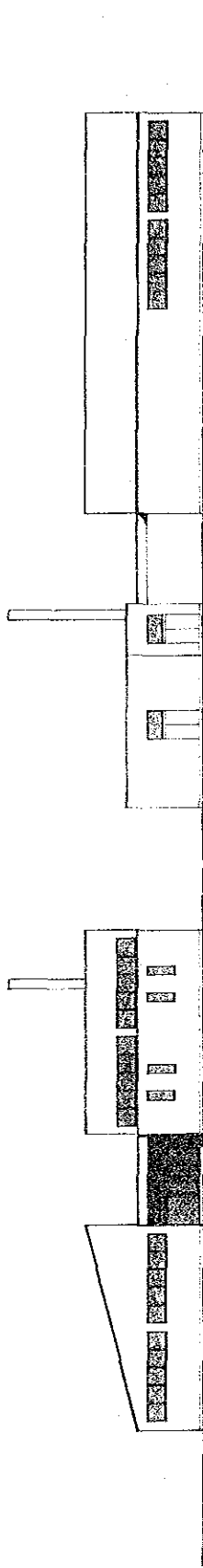




PLANTA
ZONA DE SERVICIO

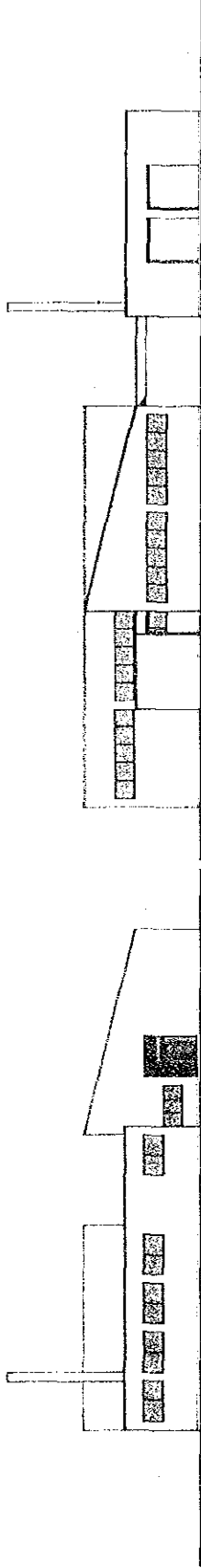


CENTRO DE SALUD MENTAL COMUNITARIO
SAN JUAN BOSCO
LIMA-PERU



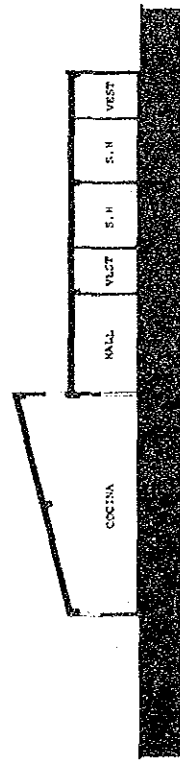
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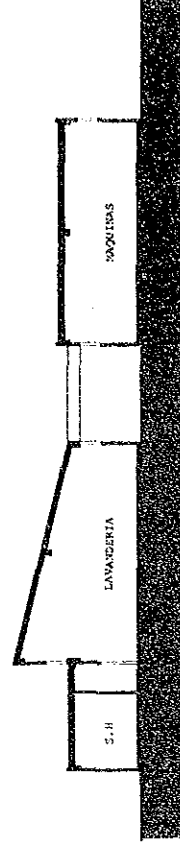


ELEVACION-SUR

ELEVACION-OESTE



CORTE



ELEVACION, CORTE
ZONA DE SERVICIO



4-10 Tabulation for Floor Areas

Name of buildings	Floor	Floor area	Total floor area
Central bldg.	1st	1,923 m ²	3,773 m ²
	2nd	1,850 m ²	
Rehabilitation bldg.	1st		487 m ²
Cafeteria	1st		495 m ²
Gymnasium	1st		329 m ²
Inpatient unit (A)	1st	944 m ²	1,900 m ²
	2nd	956 m ²	
Inpatient unit (B)	1st	944 m ²	1,900 m ²
	2nd	056 m ²	
Service workshop	1st		820 m ²
Repairshop	1st		162 m ²
TOTAL			9,866 m ²

4-11 Tentative Time Schedule

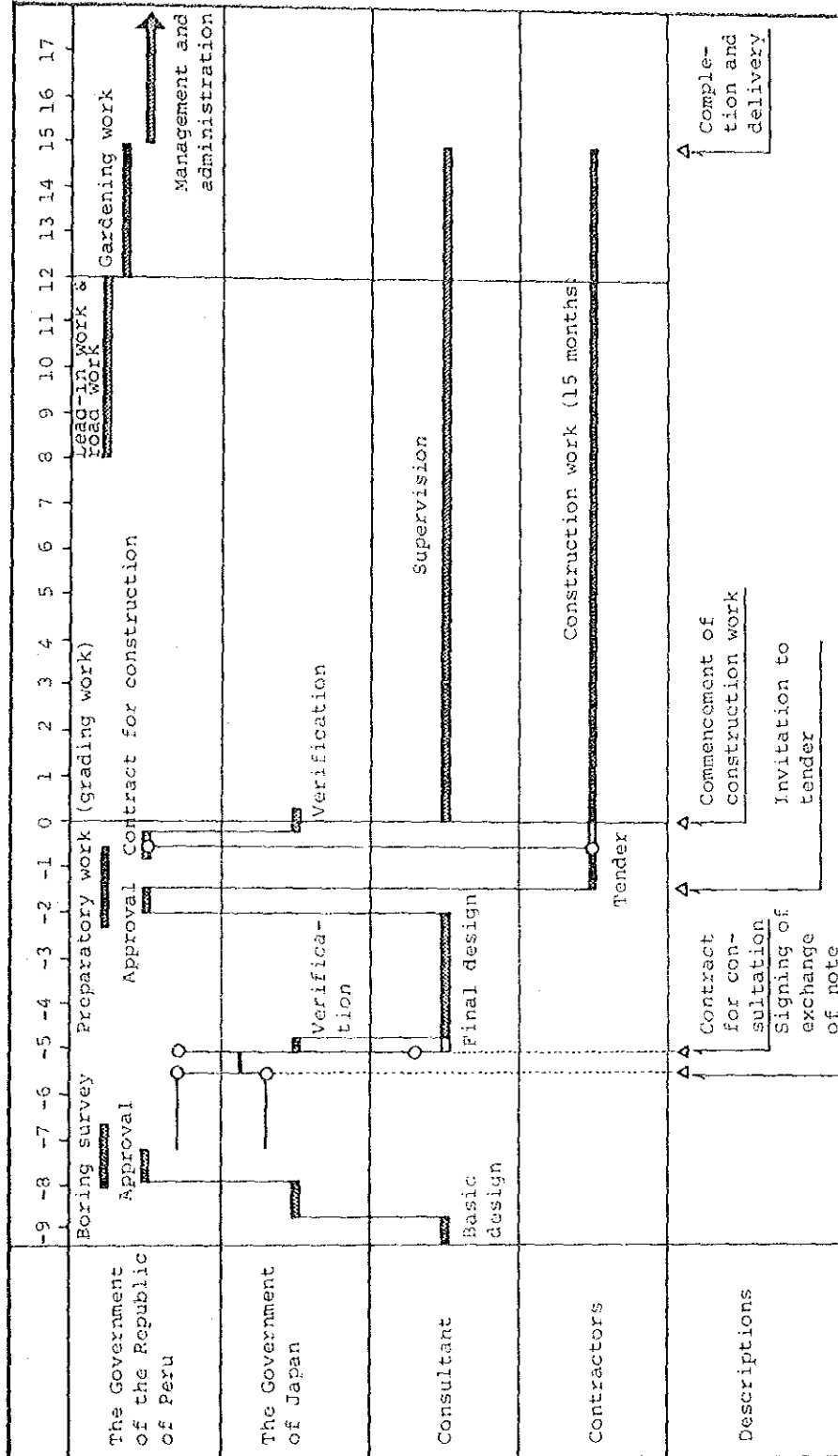
After completing signing of minutes on the construction of this mental health center by the Government of Japan and the Government of Peru, contract for final design and architectural services must be awarded prior to start of final design and preparation of working drawings.

When all necessary working drawings, project specifications and other documents required for tender and awarding of contract are completed, an approval by the Government of Peru will be necessary for the contents of final design documents, then contractors will be invited for the tender.

When the contract is formally awarded to a particular tenderer, this contract will be authorized by the Government of Japan and construction work will be commenced. It is estimated that about 15 months are required to complete this construction work. Tentative time schedule of this project is shown as following.

Tentative Time Schedule

(Unit: month)



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JICA