4-2 Actual Situation of Construction Work

4-2-1 Outline of Building Contractors

List of names of registered domestic contractors is not available but Institute of Construction Works Contractors is actively working in establishing rules and regulations for construction industry in general. Generally speaking, it seems that technical skills owned by contractors in Bangkok are somewhat inferior to those owned by Japanese contractors.

There are three contractors doing business in city of Nakhon Si Thammarat but the level of their ability in performing construction works seems to be approximately the same. The number of employees of each contractor is less than 30, and engineers graduated from universities are not working in these firms. These firms seem to be operating their business as extremely personal enterprises instead of as corporations. Their ability in construction work may be comparable to that of work done for Taksin Hotel (completed in February, 1978) where the members of the study team stayed during visit. This Taksin Hotel is a 7-story building with about 8,000 square meters of floor areas which was completed within 14 months. Kinds of construction machinery owned by each contractor are concrete mixer, bucket, tower hopper and winch, which means that the contractor has machines for concrete work but only few heavy machinery. It is told that there are two 10-ton truck cranes in city of Nakhon Si Thammarat. As a whole, it seems that they don't have sufficient maneuver ability required for reducing the construction period of time.

4-2-2 Outline of Contractors for Building Equipment

Present contractors particularly for air conditioning work and electrical work are mostly operating their business as engineering firms affiliated with manufacturers, which seems to be one of outstanding characteristics in this country. For example, in the area of air conditioning equipment, the agents of Carrier, York and Trane of United States and agents of Hitachi, Mitsubishi and Sanyo of Japan are operating their business in equipment construction field and actually engage in construction work.

Similar form of business practice is also being carried out in the area of electrical work, and Japanese firms, for instance, such as Hitachi, Meidensha and Toshiba take orders for equipment and also perform electrical construction work.

Introducing of a large number of air conditioning equipment has just begun in recent years so that business as an independent equipment contractor seems to be very difficult to manage under present circumstances, by which present form of business practice seems to have been born. Thus, in making estimate on equipment construction costs, they have to make estimate individually for each work or project at present instead of using unit price of equipment per square meter, since they have not obtained such figures as yet.

4-2-3 Actual Situation of Construction Work

Construction method presently employed for the reinforced concrete buildings at several construction job sites in Bangkok and near the proposed site in Nakhon Si Thammarat that was surveyed by the team this time was compiled and briefly outlined hereinafter. Steel structures are rarely used but steel pipe roof trusses are occasionally seen.

(1) Earthwork and foundation work

The strata of City of Nakhon Si Thammarat comprize, beginning from the ground surface, and sand layer or silty clayer sand with N-value of 0 to 5, sandy clay with N-value less than 20 and, at the depth below 20 meters, gravelly coarse sand layer with N-value of 50 approximately. All layers have reddish brown color. The earth near the ground surface is dry and can be easily handled, and direct excavation work can be possible if it is done during dry season. However, some precautions seem to be necessary during rainy season since the soil conditions of this earth will become very poor after a rainfall. Excavation work is presently being performed mostly by hand without mechanization.

Various kinds of piles such as reinforced concrete pile and precast concrete pile are being manufactured in this country, and precast concrete piles are mainly used in areas near Bangkok while the reinforced concrete piles casted at the job sites are mostly used in southern part of Thailand. Plenty of lumber is available in this country and various kinds of wooden piles are used for construction since groundwater level is high.

(2) Reinforced concrete work

Steel manufacturers in Thailand import ingots from foreign countries and produce round steel bars and deformed steel bars. These bars which are mostly used are equal to or conform to SR24, SD30 and SD40 of Japanese standards. The available diameters are 6, 9, 12, 15, 19 and 25 mm for round steel bars and 10, 12, 16, 20, 25 and 28 mm for deformed steel bars respectively. According to the Construction Material Price List, standard length of bars is 10 meters. When making joints, no pressure welding method is employed and, instead, lapped-splice are practiced in this country.

For bending and fabricating steel bars, two different methods, on-site fabrication and shop fabrication, are mostly used in City of Bangkok but on-site fabrication is dominant in City of Nakhon Si Thammarat. The rate of fabrication for reinforcing steel bars is about 150 to 170 kg/day/worker. When performing strength test, steel bars have to be submitted to Songkla University in Haad Yai.

(3) Concrete work

Portland cement being manufactured in this country is used for concrete work. As aggregates, crushed stone is used for coarse aggregate in many cases while river sand is used for fine aggregate but the use of sea sand is prohibitted. Central batching plant exist only in City of Bangkok and not in Nakhon Si Thammarat. Existing construction job sites near Nakhon Si Thammarat have their own concrete mixers with size suited to each construction scale. Slump is 5 to 12 cm for underground portion and 8 to 15 cm for aboveground portion, which seems to be the concrete of stiff consistency. Placing of concrete is done by manual labor and the rate of concrete placement is 20 to 30 M^3/day.

To control the concrete strength, compression tests are conducted at the ages of 7 days and 28 days respectively after pouring. These tests will be conducted at the Highway Office in Nakhon Si Thammarat.

(4) Formwork

Synthetic type forms are not used and wooden forms made of narrow boards are mostly employed though the accuracy of such forms seems to be not so high. Though the use of steel forms was seen at the job site of Songkla University Hospital where the waffle type slab was employed, this example seems to be a rare case.

As shores for forms, it was found out that only one job site employed pipe supports in City of Bangkok but the rest of job sites were using logs as shores.

(5) Temporary work

Most of job sites in Bangkok had temporary fences made of wood or galvanized iron sheet around sites and only the large scale job sites employed steel fences. However, at the job sites near Nakhon Si Thammarat, only few of them had temporary fences around the sites.

Suspended scaffolds were mostly being used though some construction projects had exterior scaffolds surrounding buildings, but most of them were made of wood. It seems that most of exterior work is being performed by using simple suspended scaffolds.

Lift towers and concrete towers used at construction job sites for high-rise buildings within City of Bangkok are made of steel but towers for other types of buildings are mostly made of wooden trusses. Only few mechanization of construction work is seen and most of work is being done by manual labor at present time, and this tendency is particularly outstanding in the areas near Nakhon Si Thammarat. It seems that such present environment where there is no earthquakes nor strong wind is greatly affecting to the current situation of temporary work in this district.

(6) Structural steel work

As already stated in foregoing paragraphs, structural steel is being used in the areas near the proposed site only as part of building structure such as roof structural members, instead of using as main structural framing. And most of such roof structural members are made of pipe trusses or simple type trusses made of light-gauge steel installed on top of cantilevered columns by using pin connection method in many cases.

(7) Masonry work

Bricks are very frequently used both in urban and local districts as main structural masonry walls for both interior and exterior walls after constructing columns and beams as structural framing system. A considerable amount of bricks of various types are being manufactured in this country. And hollow bricks are mainly used for partition walls. In addition, lots of light-weight concrete blocks are being used in this country but, as same as the hollow bricks, their applications are limited mostly to partitions and interior walls.

(8) Roofing work

Because of a large amount of rainfall, flat roof is rarely used, and the type of roof most frequently used in this district is the slate roofing laid over wooden or steel roof trusses. Flat roofs are frequently seen in City Of Bangkok in recent years but most of them have eliminated substantial waterproofing such as asphalt or sheet waterproofing by improving the waterproofing performance by means of expansion admixture added to roof concrete slabs. It is considered that this kind of roofing is necessary because simplified roof configuration with simple materials is more desirable in this district since conventional type of waterproofing method is unable to withstand high temperature and repetitions between high humidity and drying due to the tropical weather conditions.

(9) Exterior finishing work

Exterior finishing materials with high ability to withstand weather and endurance such as tile and metal curtain wall are being used for high-rise buildings but cement mortar with resin spraying and artificial stones finished with washing are very frequently seen for ordinary low-rise

buildings of reinforced concrete or masonry construction. As a result of improvement in painting materials in recent years, exterior finishes such as painted finish over cement mortar or concrete as well as exposed concrete finishes are very often used. Such artificial stones finished with washing and cement mortar or concrete surfaces finished with painting are very widely used because cement mortar work and concrete work are very elaborately performed for both reinforced concrete and brick masonry structures though they are mostly done by manual labor, without causing structural cracks in consequence.

(10) Interior finishing work

(a) Ceiling

Ceiling heights are very high in comparison to those of Japan. This seems to be very reasonable in consideration of ventilation within the area where high temperature and high humidity always exist. Normally ceiling is finished with gypsum boards laid over wood framing or steel ceiling runners. As insulating materials for ceiling, finishing board materials backed up with aluminum foil and asbestos finishing boards applied on Tatami mat sheathing are frequently used particularly for ceiling of 1-story building requiring insulation.

(b) Floor

Though high class floor materials such as marble, terrazzo and porcelain tile are being used, the majority of floor material used for ordinary hospital buildings is the artificial stone finished with polishing. It seems that this kind of finish is widely used because it has excellent durability and waterproofing and fireproofing abilities as well as easiness for cleaning and can be easily obtained anywhere. Various kinds of plastic tiles

are widely used in spaces such as offices where waterproofing is unnecessary.

(11) Work for plumbing and sanitary fixtures

(a) Sanitary fixtures work

Method of work for areas such as toilets where water is present is about the same as that of Japan and work is normally performed in accordance with American or British Standards. For example, as main plumbing materials, cast iron pipes and steel pipes with drainage joints are used as drain pipes while steel pipes and polyvinyl chloride tubes are used for water supply. Sanitary fixtures used are the products of American Standards, Toyo Toki of Japan, and some of Thai manufacturers (products are similar to those made by Toyo Toki). However, fittings for the plumbing fixtures are likely to be in short supply and, thus, some measures for procuring these fittings should be considered.

(b) Air conditioning work

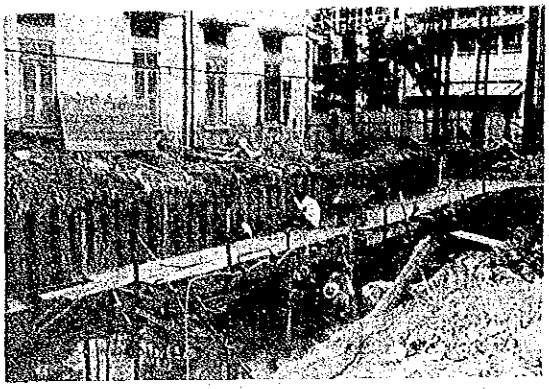
As outlined in "Outline of Contractors for Building Equipment", the work of air conditioning in Thailand is mainly depending upon the technology introduced from developed foreign countries, and specifications are established for each individual work and installation work is strongly governed by individual project at present time.

(12) Electrical work

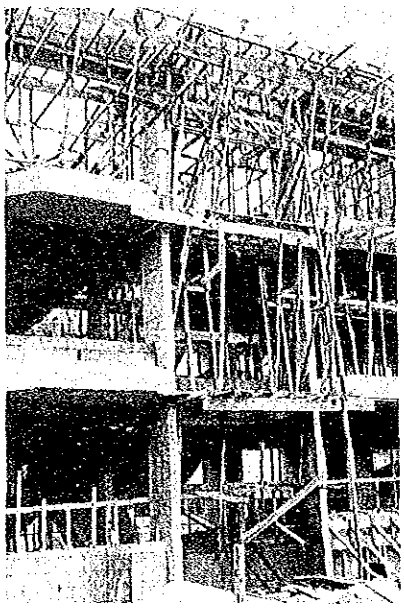
Though technology for main electrical products is greatly depending upon other developed foreign countries as same as the case for air conditioning equipment, the methods of installation and use of equipment are generally conforming to the standards established and owned by electric power corporation such as MEA and PEA, nevertheless some exceptions are occasionally seen. List of Thai manufacturers for main equipment is shown below.

MAKER LIST OF AIR-CONDITIONING, VENTILATING AND OTHERS

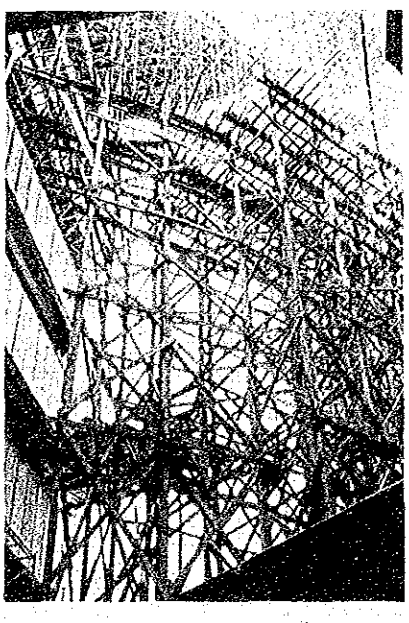
AIR-CONDITIONER	SANYO DENKI, DAIKIN KOGYO, CARRIER, MITSUBISHI DENKI
COOLING TOWER	LIANG-CHI, LIANG-HO
CENTRIFUGAL & PROPELER FAN	EBARA, HITACHI, MITSUBISHI, MATSUSHITA
AUTOMATIC CONTROL	YAMATAKE HONEY WELL, HONEY WELL, JONSON
PUMP	EBARA, HITACHI
AIR INLET, AIR OUTLET	CEMMI-ENGINEERING, WATER LOO
SANITARY FIXTURES	SHANKS, AMERICAN STANDARD, WATER WARE
GALVANIZED STEEL SHEET	SHIN NIPPON SEITETSU, SANGKASI-THAI
GALVANIZED STEEL PIPE	THAI STEEL PIPE INDUSTRY, NIHON KOKAN, SHIN-NIHON SEITETSU, SUMITOMO KINZOKU
GALVANIZED STEEL PIPE FITTING	HITACHI-KINZOKU, THAI FITTING CO., LTD.
CAST IRON PIPE & FITTING	THAI CAST-IRON PRODUCTS, THAI PORN SIN, KUBOTA TEKKO, WENCCO
VINYL PIPE	CMMC, THAI PVC INDUSTRY CO., LTD.
VALVE	TOYO VALVE, YAMATO VALVE, KITAZAWA VALVE
MOTOR	ORIENTAL ELECTRIC, THAI TOSHIBA, NATIONAL THAI, MEIDENSHA, HITACHI
STRAINER	KITAZAWA
DRINKING WATER COOLER	SANYO, HALSEY TAYLAR, MATSUSHITA EATON/CORDLEY
WATER SOFTENER	JAPAN ORGANO, KURITA KOGYO
KITCHEN EQUIPMENT	FUJI CHUBO, SANYO MURAKO, INTERNATIONAL, YON-HONSEN
ASBOESTOS CEMENT PRESSURE PIPE & CONCRETE PIPE	C.P.A.C.
SEWAGE TREATMENT TANK	PREMIER PRODUCTS
SPIRAL DUCT	THAI KENZAISHA CO., LTD.



A view of excavatin

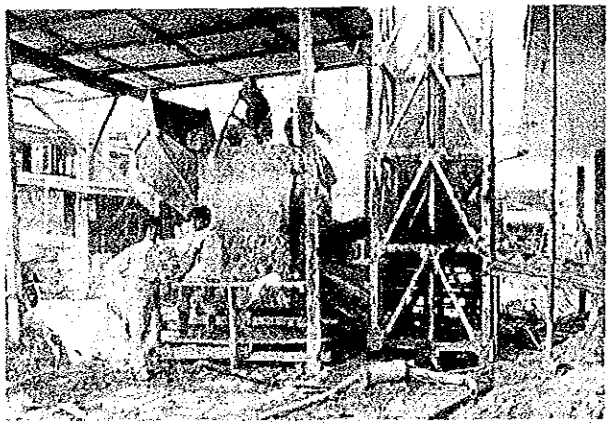


Wood scaffolding

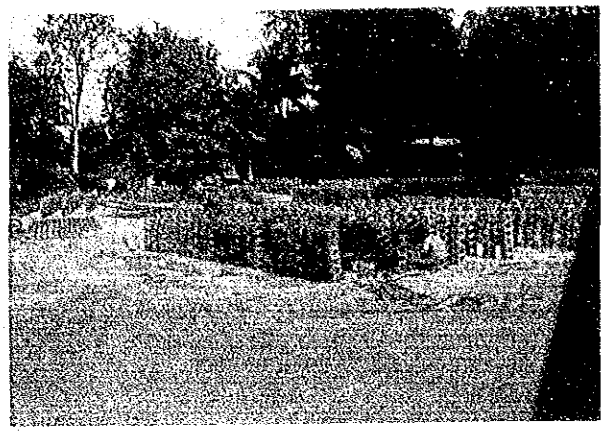


Manufacturing plant
of precase concrete
pile
(near Surat Thani)

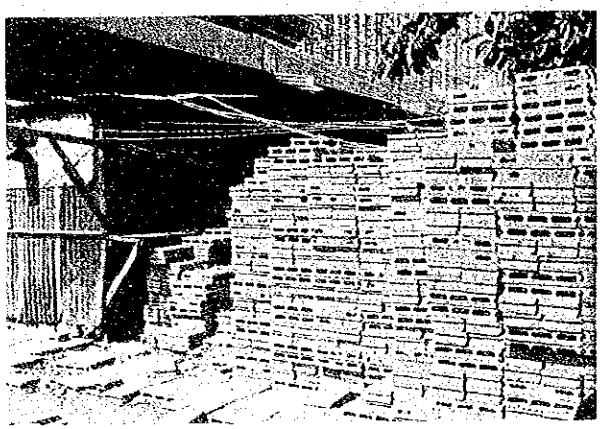
A view of auger drilling
for cast-in-place pile
(HAAD YAI Provincial
Hospital)



Concrete plant
on site

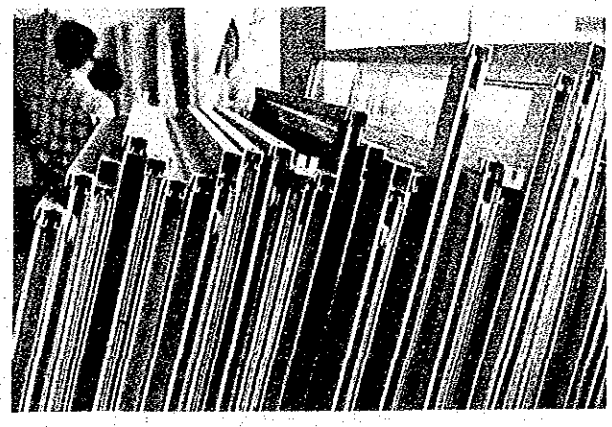


Brick factory

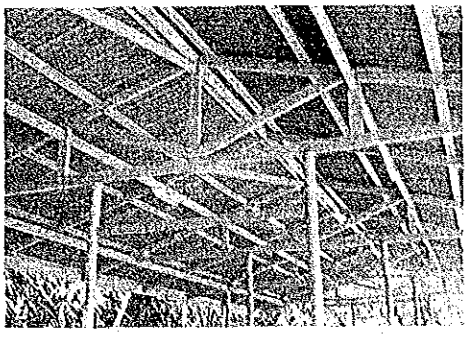


Concrete hollow block seen in construction field

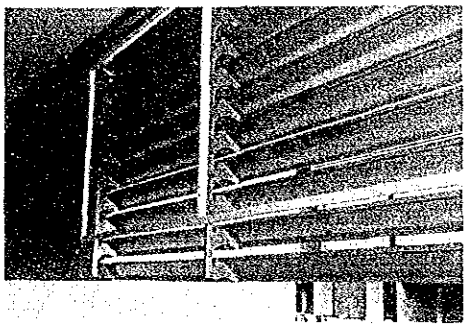
Asbesto-ceiling with insulation board



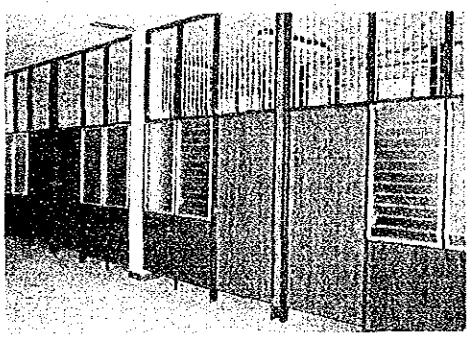
Steel window frame



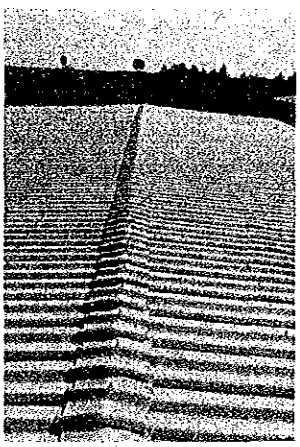
Light-gage
steel truss



Metal louver



Partition
with jalousie



Corrugated asbesto
sheet roofing

4-3 Survey on Transportation of Construction Materials

4-3-1 Transportation of Construction Materials from Japan

The following routes of transportation to the proposed job site are considered:

(1) Route from Bangkok.

(2) Route from Pinang of Malaysia.

(3) Route from Kuantan of Malaysia.

However, the route from Bangkok (1) seems to be the most appropriate and should be studied mainly since routes (2) and (3) may create some possible difficulties in transport process and costs in consideration of marine transport and customs clearance required and of passing required through mountain area between unloaded point and proposed building site. Also, direct transport from Japan to Port of Songkhla is impossible because a chartered ship is required but existing port facilities are not suited to such a ship. Use of Port of Nakhon Si Thammarat is also not appropriate since this port is good only as fishing port and since the cargoes shipped from Japan must be first unloaded at Bangkok before bringing to Nakhon Si Thammarat.

Many ships owned by 12 to 13 marine shipping companies sail from ports of Yokohama, Nagoya, Kobe and Moji of Japan to Bangkok, and the required number of days for the trip is about 15 to 12. Therefore, about 1.5 to 2.0 months will be required for transportation from shipping at manufacturers' factories in Japan to delivery at the job site in Nakhon Si Thammarat as illustrated below.

4-3-2 Route from Bangkok to Nakhon Si Thammarat

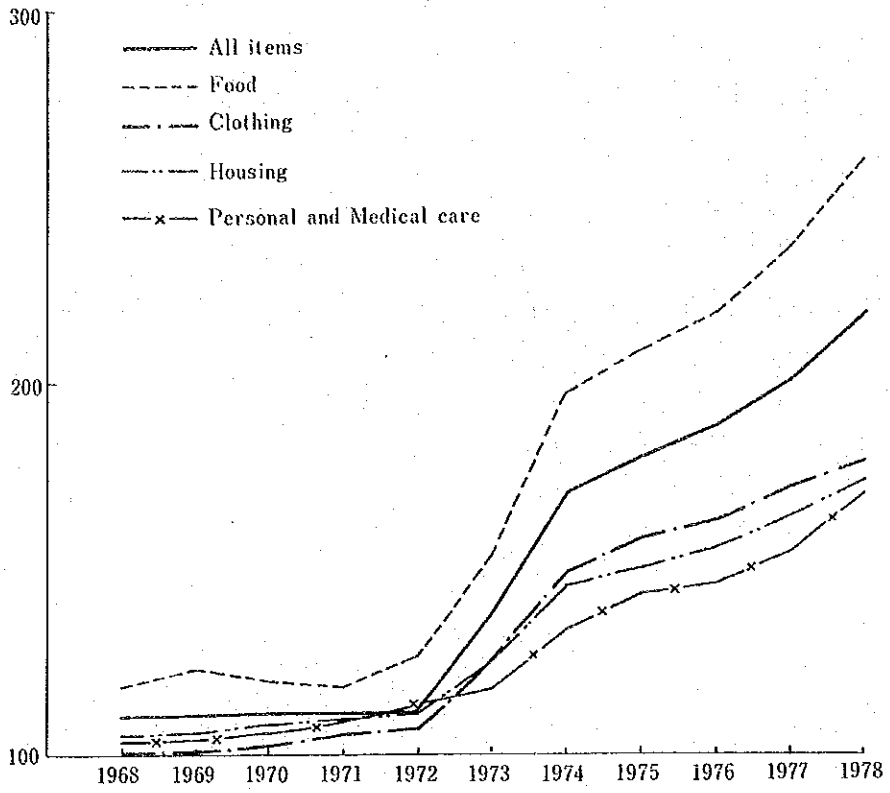
Two routes by truck and train can be considered for transporting construction materials from Bangkok to Nakhon Si Thammarat. The truck route runs for a total length of about 800 km in the order of Bangkok, Phet Buri, Chumphon, Sura Thani, and Nakhon Si Thammarat, and it takes about 10 to 15 hours by truck. The train route runs in the order of Bangkok, Kakhon Pathon, Chumphon, Thung song, Khao Chum and Nakhon Si Thammarat, and it will take about 20 to 25 hours by train. More time is needed by train because Nakhon Si Thammarat is located at an end of branch line coming from junction station Khao Chum. By comparing both truck and train routes to each other, the truck route seems to have more flexibility and mobility but shipping cost by truck is about 2.0 to 2.5 times higher than that of train.

4-4 Survey on Construction Costs

4-4-1 Rate of Consumer's Price Rise

Rising tendency of prices of various commodities was studied for the years from 1968 and 1978. Using data obtained from Department of Business Economics, Ministry of Commerce, the tendency of indexes for consumer price rises is shown below for (1) all items, (2) foods, (3) clothing, (4) housing, (5) medical care and others.

Period	All items	Food	Clothing	Housing	Personal and medical care	Transportation	Recreation reading and education	Tobacco and alcoholic beverages
Oct. 1964-Sept. 1965=100	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Weight	100.0	49.5	12.1	15.5	7.0	4.9	6.1	4.9
1968	110.9	118.8	101.0	105.1	104.7	100.4	101.7	100.5
1969	113.6	123.6	101.6	106.2	105.2	99.4	103.0	100.6
1970	113.5	121.6	103.1	108.2	150.6	100.1	103.9	100.9
1971	114.0	119.3	106.2	110.5	109.8	104.3	109.4	102.0
1972	119.5	127.8	108.7	112.9	114.4	106.1	112.5	103.4
1973	138.1	153.7	125.9	125.8	118.7	115.0	121.2	105.4
1974	171.7	198.8	149.7	146.0	134.1	159.0	138.4	121.7
1975	180.8	209.1	158.0	151.4	144.8	169.2	148.3	126.5
1976	188.4	218.4	163.0	156.0	146.5	185.3	155.1	133.2
1977	201.9	236.6	171.4	165.3	154.9	191.7	161.4	142.3
1978	218.8	260.2	179.2	174.5	169.6	208.3	168.0	146.6



This graph shows that there was a high rate of price rise in various commodities from 1972 to 1974 and it seems that this was affected by the inflation tendency in various foreign countries concerned. In addition, overall price index after these years has risen about 10% annually. It is likely that this rise in price index was affected by the rate of price rise for foods which occupy more than 50% of overall price index considered as shown in the figure below.

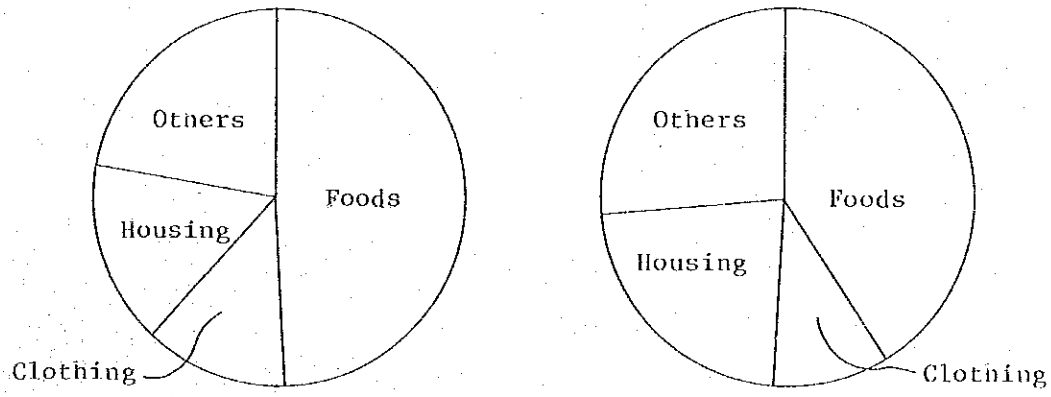


Figure: Percentage of Each Item to Overall Price Index

4-4-2 Prices of Building Materials and Fluctuation

The list of prices of construction materials has been published by the government each month, and the prices as of October, 1979 were compiled by the survey team and indicated hereinafter as reference. Building materials that can be obtained at the proposed site in Nakhon Si Thammarat are cement, aggregates (fine sand and crushed stone), slates, concrete blocks, bricks and lumber, but other materials must be brought from Bangkok. The fluctuation in prices of materials is shown in Fig. 4-4-2(I). It shows that the price of May Yang rose considerably after July, 1978 but became relatively stable after October, 1979. Ordinary type of portland cement for concrete work of buildings in this country is in short supply and cement factories are presently being expanded in Thailand to cope with the short supply of cement. However, a considerable degree of price fluctuation is likely to occur in future because stable supply of cement seems to be difficult to achieve for next several years. Price rise in reinforcing steel bars is still severe even after October of 1979, and the price rose about 25% between November, 1978 and November, 1979.

Generally speaking, the rate of price rise of building materials is higher than that of other commodities (Fig. 4-4-2(II)). Annual rate of price rise for building materials is about 20 to 25% from 1978 to 1979, indicating a tendency to be directly affected by the unstable price of crude oil, so that the annual rate of price rise of building materials in next several years is likely to be about 20 to 30%.

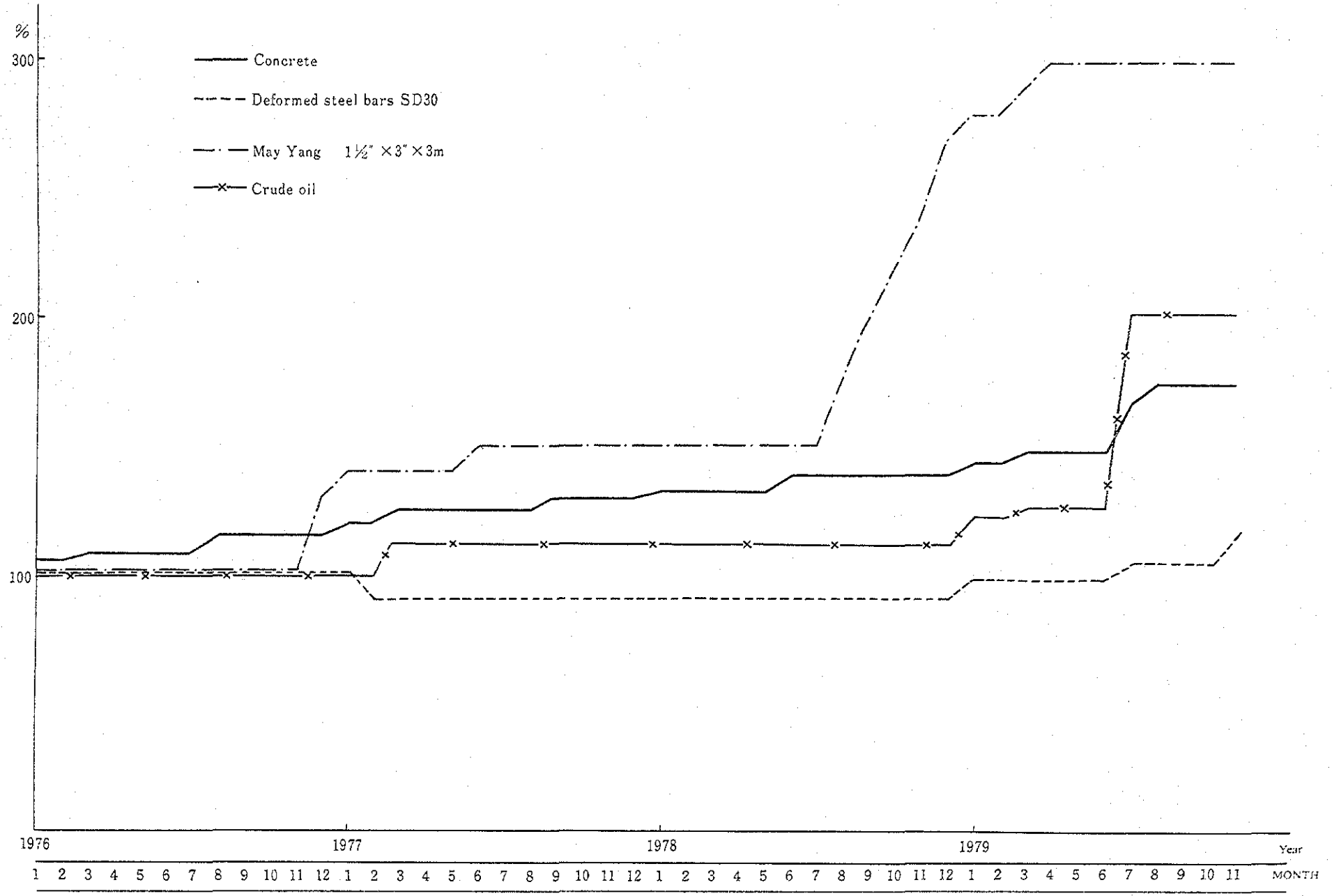

%
300
200
100
Concrete
Deformed steel bars SD30
May Yang 1½" ×3" ×3m
Crude oil
1976
1977
1978
1979
Year
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11
MONTH

Fig. 4-4-2-(1)

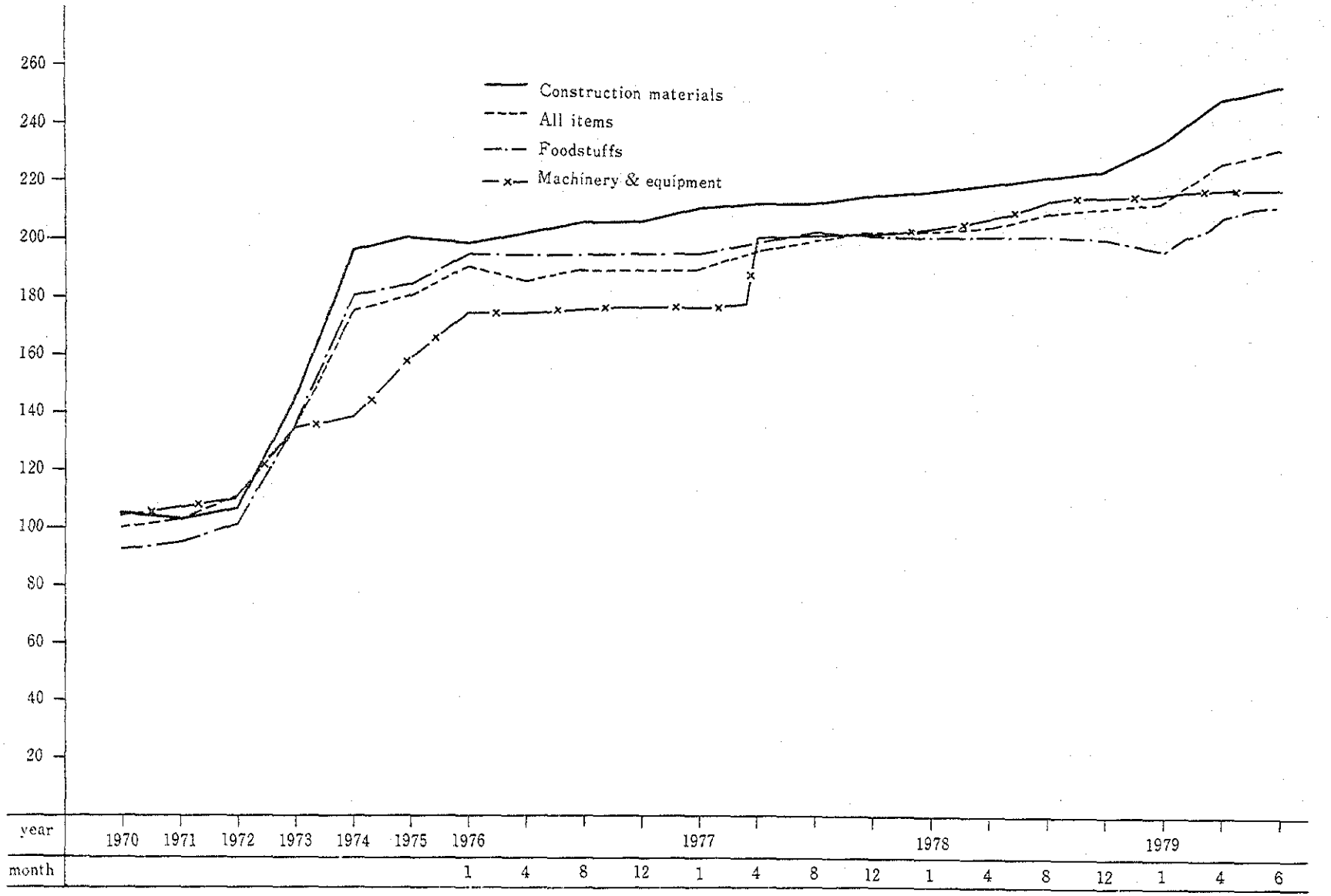


Fig. 4-4-2-(II)

Index : 100 in1968

4-4-3 Building Construction Costs

According to the report made by Ministry of Public Health, the construction costs in City of Bangkok are, for example, 3,500 to 4,000 Bahts/m^2 for outpatient building and ward and 4,500 to 5,000 Bahts/m^2 for ancillary building including plumbing work but not including elevator and air conditioning work. Kitchen equipment and air conditioning equipment are estimated separately. Cost for other building such as bank is, for example, 6,000 to 6,500 Bahts/m^2 after making correction basing upon consumer price. Price for high class hospital is 8,500 to 9,000 Bahts/m^2 for example. However, the extent of building equipment contained in the costs shown above is not accurately known and, thus, these figures should be used only as references.

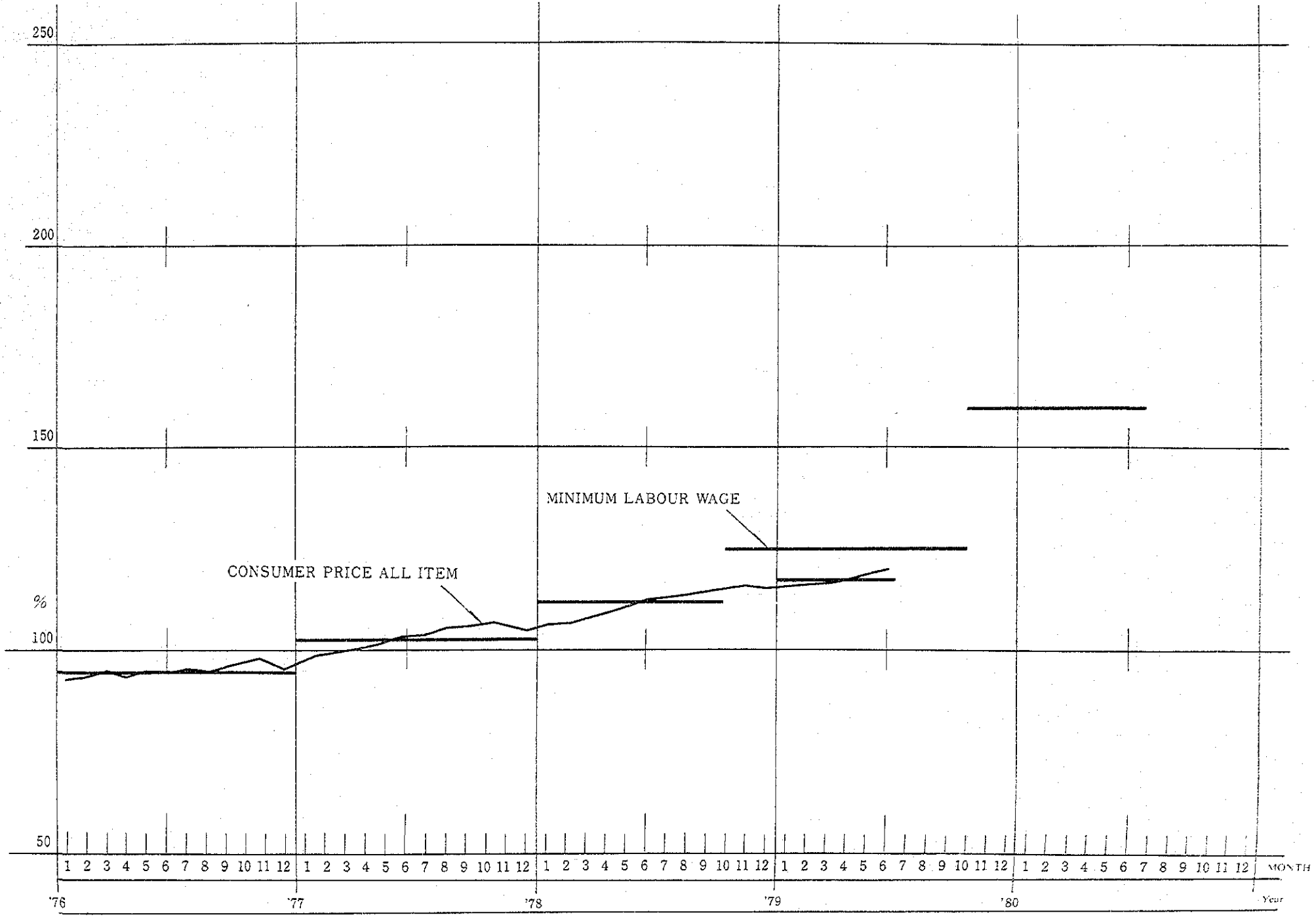
4-4-4 Labor Costs

The wages of construction workers are as indicated below.

Type of worker	Thai currency (Baht)	Japanese currency (Yen)
Earth-worker (male)	45∿ 50	660∿ 730
Earth-worker (female)	35∿ 40	510∿ 590
Pile driver	60∿ 70	880∿1,000
Concrete worker	50∿ 60	730∿ 880
Form worker	90∿100	1,310∿1,460
Reinforcing bar worker	60∿ 80	880∿1,170
Structural steel worker	100∿120	1,460∿1,750
Welder	120∿150	1,750∿2,190
Misc. steel worker	100∿120	1,460∿1,750
Block (or brick) layer	90∿100	1,310∿1,460
Mason	180∿200	2,630∿2,920
Plaster worker	100∿150	1,460∿2,190

Type of worker	Thai currency (Baht)	Japanese currency (Yen)
Tile worker	130∿150	1,900∿2,190
Carpenter (rough)	150∿200	1,900∿2,920
Carpenter (wood cabinet)	100∿120	1,460∿1,750
Carpenter (metal cabinet)	100∿120	1,460∿1,750
Interior-fish worker (carpet, floor tile	90∿150	1,310∿1,314
Painter	60∿ 70	880∿1,020
Glazing worker	70∿ 80	1,020∿1,170
Electrician	100∿120	1,460∿1,750
Plumber	100∿150	1,460∿2,190
Misc. equipment worker	60∿ 80	880∿1,170
Cutter	50∿ 80	730∿1,170
Driver	60∿100	880∿1,460
Laborer	40∿ 50	590∿ 730
Mechanic	100∿200	1,460∿2,920
Bulldozer operator	100∿120	1,460∿1,750
Crane operator	120∿150	1,750∿2,190
Caretaker	100∿300	1,460∿4,380

All figures shown above are the wages in fiscal year 1979, and wages for 1980 to 1981 can be obtained from Fig. 4-4-4. Figures have to be corrected basing upon the minimum wages and consumer price index.



APR/77 = 100

Fig. 4-4-4 CONSUMER-PRICE INDEX ALL ITEM

4-5 Laws Related to Buildings and Engineering Standards

Various laws and engineering standards related to buildings are listed below.

- o The Control of the Construction of Buildings Act 2479
- o Bye-laws of the Bangkok Municipality
- o Re-Construction of Fire Area Control Act 2476
- o Prevention & Repression of Fire Risk Act 2495
- o Ministerial Regulations issued under the Prevention & Repression of Fire Risk Act 2495
- o City & Town Planning Act
- o Fuel Oil Act 2509
- o Ministerial Regulations issued under the Act Relating to the Storage of Oil Fuel 2474
- o Petroleum Act 2514
- o Provincial Electricity Authority Act 2503

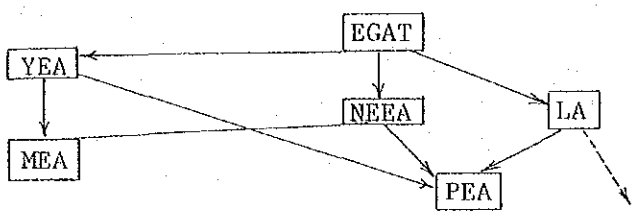
Some of the above laws and standards are outlined below.

4-5-1 Architecture

Laws which are equivalent to Japanese Building Code are The Control of the Construction of Building Act (B.E 2479) and, particularly for the City of Bangkok, Bye-laws of the Bangkok Metropolis. These laws contain the requirements for application for building permit, limitation for wall line, restriction on building height, strength of materials, loads, environment around building, ventilation, natural lighting, detailed regulations for each use of building, and so forth. It has been confirmed by the authorities concerned that the present hospital project of Nakhon Si Thammarat is not required to conform to the laws stated above.

4-5-2 Regulations by Electricity Authorities

Electric power supply system in Thailand is shown below.



Organization for thermal and hydraulic power generating facilities

EGAT	Electricity Generating Authority of Thai
YEA	Yanhee Electricity Authority
NEEA	Northeast Electricity Authority
LA	Lignite Authority
MEA	Metropolitan Electricity Authority
PEA	Provincial Electricity Authority

EGAT is a bureau supervising the power generation, power transmission and power development projects. As subordinate organs under EGAT, there are YEA, NEEA, and LA for power generation and power supply to MEA and PEA.

Both MEA and PEA have their own engineering standards such as MEA Standards and PEA Standards. PEA also has its own complete standards for interior wiring and complete handbooks for various classes of voltage.

The following electric power is being supplied:

Frequency	50 Hz
Phase	Three-phase
Primary voltage	12 KV, 24 KV, 69 KV, 11 KV and 33 KV
Secondary voltage	380 V/220 V, 3-phase, 4-wire

4-5-3 TIS (Thai Industrial Standards)

TIS Committee consisting of representatives from various kinds of organizations has established Thai Industrial Standards. These standards have been prepared basing upon the standards of foreign countries such as Germany, U.S.A. and British.

4-5-4 Law for Professional Engineers

Thailand has its own law for registration of professional engineers by which only the registered engineers are allowed to engage in professional work in the fields of construction, communication, control and others. Applicants for professional engineers must take examination prepared by the government but they can be also registered if eligible in view of experience.

4-5-5 Law by Ministry of Industry (MOI)

This law will control the construction and operation of factories and also includes the provisions for controlling the waste water. In addition, regulations for environmental health and disaster prevention are included in this law. As one of examples of such regulations, control values recommended by MOI and WHO are shown in Fig. 4-5-5.

Table 4-5-5 Comparison Table for Treated Waste Water and Water Quality

		WHO	THAI
BOD	mg/ℓ	40 Maximum	20 Maximum
COD	mg/ℓ	100 Maximum	-
Permanganate value	mg/ℓ	-	60 Maximum
Suspended solids	mg/ℓ	60 Maximum	30 Maximum
Dissolved solids	mg/ℓ	2,000 Maximum	2,000 Maximum
pH value		5∿9 Maximum	5∿9 Maximum
Sulfide (as H2S)	mg/ℓ	3.0 Maximum	1.0 Maximum
Cyanide (as HCN)	mg/ℓ	1.0 Maximum	0.2 Maximum
Oil and grease	mg/ℓ	15.0 Maximum	-
Tar	mg/ℓ	-	-
Formaldehyde	mg/ℓ	-	1.0 Maximum
Phenolic	mg/ℓ	0.05 Maximum	1.0 Maximum
Free chlorine	mg/ℓ	5.0 Maximum	1.0 Maximum
Zinc	mg/ℓ	2.0 Maximum	Each content or total of each is 1.0 mg/ℓ
Chromium	mg/ℓ	0.1 Maximum	
Arsenic	mg/ℓ	-	
Silver	mg/ℓ	-	
Selenium	mg/ℓ	-	
Lead	mg/ℓ	-	
Nickel	mg/ℓ	-	
Copper	mg/ℓ	2.0 Maximum	
Iron	mg/ℓ	5.0 Maximum	
Insecticides	mg/ℓ	-	-
Pesticides	mg/ℓ	0.01 Maximum	-
Radioactive material		-	-
Temperature	°C	40 Maximum	40 Maximum
Detergent	mg/ℓ	1.5 Maximum	-
Ammonium nitrogen	mg/ℓ	5.0 Maximum	-

4-6 Urban Facilities and Utilities of Nakhon Si Thammarat

4-6-1 Electric Power Facilities

Electric power of Nakhon Si Thammarat is being transmitted from four power stations at Kra-bi (3×20 MW), Phoo Ket (4×2.5 MW), Phun Pw (1×30 MW, 3×15 MW), and Nakhon (2×1 MW) all owned by EGAT. And construction and management of transmission lines are controlled by PEA. Though interruption of service of power rarely occurs, fluctuation in voltage and frequency is considerably high, creating some problem in service quality.

The route of transmission lines of Nakhon Si Thammarat is shown in Fig. 4-6-1. The cost for construction of power line is borne by power corporation (PEA) for primary portion up to leading-in transformer and by users for leading-in transformer and secondary portion though installation and maintenance of transformer are performed by the power corporation.

Sufficient electric power is available for the consumption expected in this area. Though present rate of charge for electricity is 0.9 Baht/KWH (Dec. 20, 1979), rise of this rate is anticipated in future because of recent tendency of tremendous rise in oil price.

4-6-2 Communication Facilities

Television: Three channels of 7, 9 and 10 are currently being used for television broadcasting. Channels 7 and 9 are being broadcasted from Malaysia while Channel 10 is from Haad Yai. The frequency range is 200 to 210 MHz for Channels 7 and 9 and 210 to 220 MHz for Channel 10 but the image on television set is unclear because the signal is weak and easily affected by weather.

Radio: Radio broadcasting for both AM and FM is presently in service. Since telephone service is presently not fully available, microwave network that covers a wide area through relay stations is presently being utilized for the medical activities, and particularly the transmitting and receiving with FM waves is performing important functions.

Telephone: Telephone services are operated by TOT, a government-controlled organization. General public is still unable to fully utilize such telephone services. And the services are not always fully available even for emergency communication related to the medical activities. The burden for leading-in of telephone service line is 1,500 Bahts/line, and the rate of charge for telephone call is 2 Bahts/call for local call and 8 Bahts/min for long distance call, at the time of Dec. 20, 1979. Expansion of telephone exchanges and facilities by TOT for Nakhon District has been scheduled around August, 1980 by which an increase in telephone lines in this district is expected.

4-6-3 Water Supply

Groundwater is mostly used as water sources. However, the performance of the supply water treatment facilities is still poor and water quality is still unsatisfactory. Maintenance and management of water sources and supply pipes are presently being performed by MOI. Amount of water supply to Nakhon Si Thammarat is still not sufficient.

4-6-4 Sewer Lines

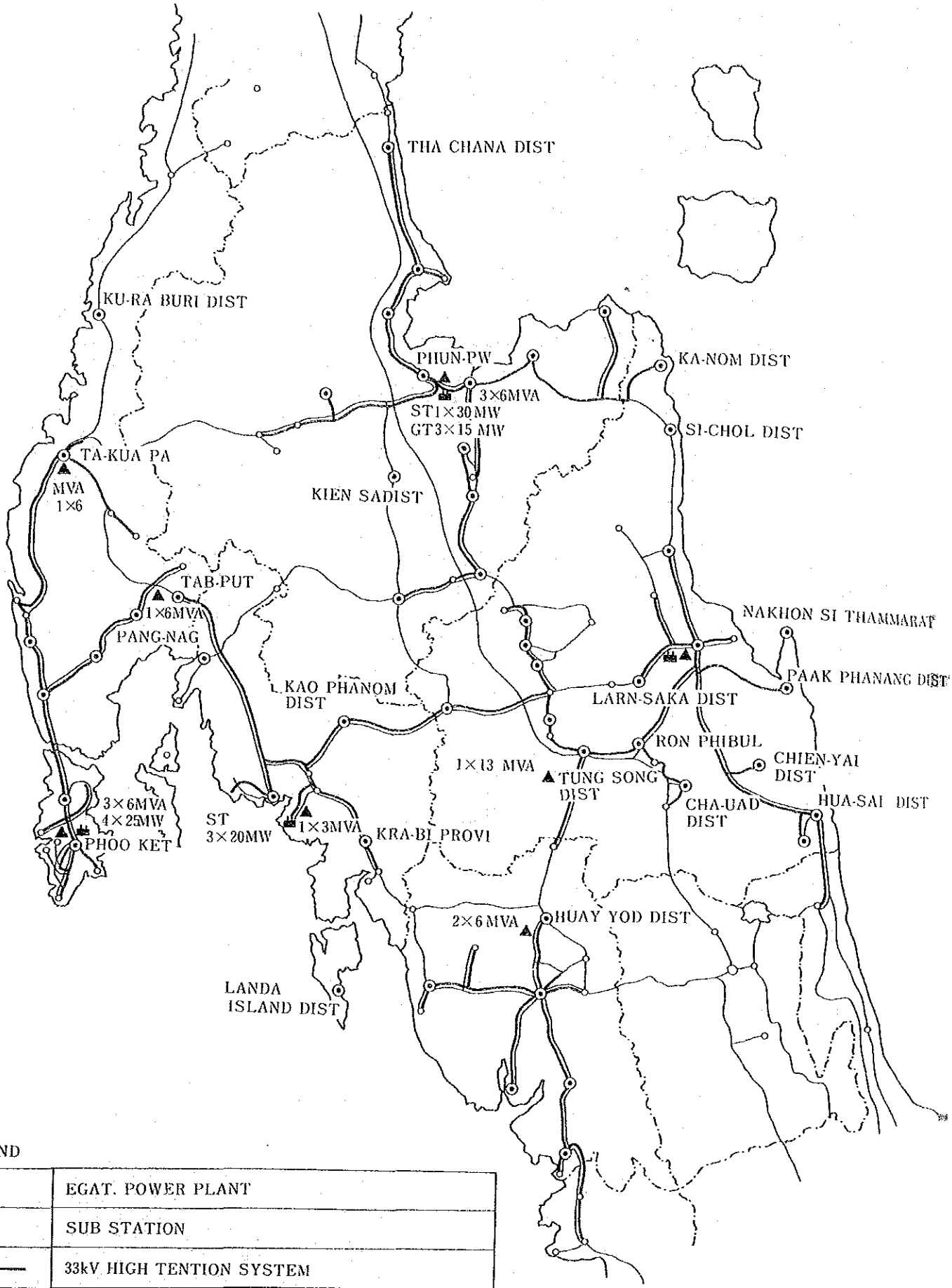
There is no existing sewer line and most of sewage is directly discharged at present.

4-6-5 Gas Facilities

City gas supply service is not available but propane gas or butane gas is locally supplied whenever necessary.

4-6-6 Traffic

Since most of transportation and traffic are greatly depending upon the roads, trunk road network has been greatly improved and mostly paved in recent years, and thus road conditions are extremely good. Therefore, roads can be fully utilized for the purpose of medical activities and material transportation. The routes of roads and railways are indicated in Fig. 4-6-6.



REGEND

	EGAT. POWER PLANT
▲	SUB STATION
———	33kV HIGH TENTION SYSTEM
—— · ——	33kV WIRE EXTENSION 1980
———	3.5kV HIGH TENTION SYSTEM

Fig. 4-6-1 Map Showing Erectric Power Stations and Transmission Lines

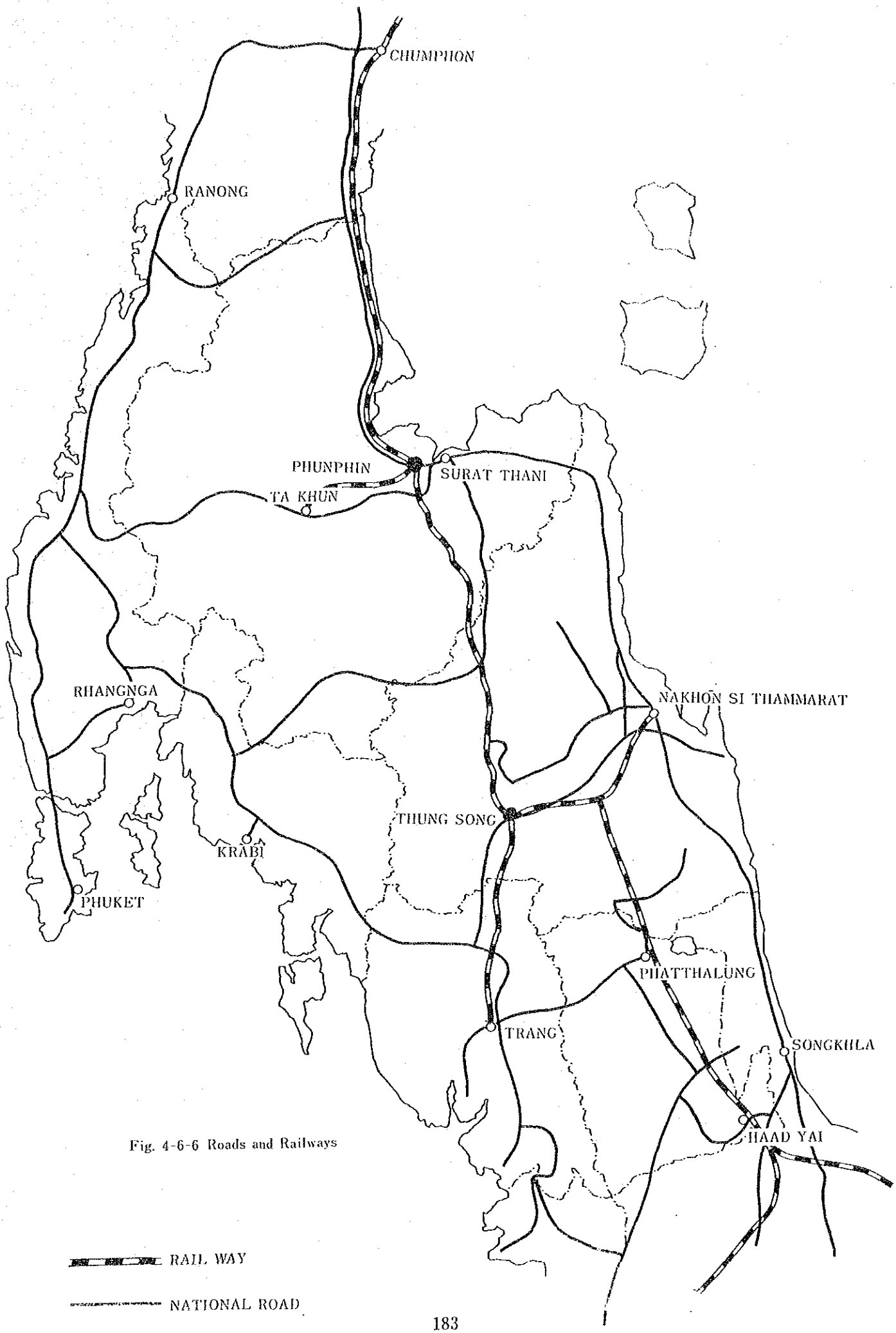


Fig. 4-6-6 Roads and Railways

Appendix

1. DATA FOR PRICES OF CONSTRUCTION MATERIALS AND EQUIPMENT.

			UNIT	UNIT PRICE	
				BAHT	SATANE
1.	E	CAST-IN-SITU			
1.1	Eq4	READY-MIX CONCRETE (TRANSPORTATION INCLUDED WITHIN 5∿10 KMS)			
.1	"	POLTLAND CEMENT, ELEPHANT BRAND 250 KG/M^3	CU.M.	800	
.2	"	" " 300 KG/M^3	"	855	
.3	"	" GREEN SERPENT BRAND 250 KG/M^3	"	800	
.4	"	" " 300 KG/M^3	"	855	
.5	"	" DIAMOND BRAND 250 KG/M^3	"	800	
.6	"	" " 300 KG/M^3	"	855	
2	F	MASONRY (BRICK, BLOCK) SIZE WIDTHxHEIGHTxLENGTH			
2.1	Ff	CORPORAL BLOCK SIZE 90x190x390MM (No.C4-1) WEIGHT 11.3 KG/PC	PIECE	4	20
2.2	"	" SIZE 190x190x390MM (No.C8-1) WEIGHT 16.7 KG/PC	"	6	50
2.3	"	CONCRETE BLOCK 70x190x390MM (MARKET IN GENERAL)	"	2	50
2.4	"	" 90x190x390 (")	"	2	70
2.5	"	DETAC BLOCK 70x190x390MM (No.D-701) WEIGHT 7.0 KG/PC	"	2	80
2.6	"	" 90x190x390MM (No.D-910) WEIGHT 8.5 KG/PC	"	3	10
2.7	"	D.A. BLOCK VENTILATION TYPE 90x190x390MM (No.DA-103)	"	6	-
2.8	"	" DECORATION TYPE 90x190x190MM (No.DA-127)	"	3	-
2.9	Fg2	ORDINARY BRICK (MORN BRICK) SIZE 70x35x160MM	1,000	220 ∿250	
2.10	"	CHONBURI BRICK (W/2 HOLES) 70x30x160MM	1,000	400 ∿450	
2.11	"	HOLLOW BRICK S.B.P. SIZE 80x120x250MM (No.W4) NON-BEARING TYPE	PIECE	2	90
2.12	"	" 80x125x250 (No.W14) BEARING TYPE	"	3	95
2.13	"	" C.M. 80x145x290 (No.10B5) NON-BEARING TYPE	"	3	75
2.14	"	" 80x145x290 (No.21A) DECORATION & BEARING TYPE	"	6	50
2.15	"	FIRE-RESISTING BRICK SIZE 115x76x230 (No.ST76)	"	11	-

			UNIT	UNIT PRICE	
				BAHT	SATANE
3.	G	READY-MADE STRUCTURAL MEMBER			
3.1	Gf2	R.C. PILE (TRANSPORTATION INCLUDED WITHIN BKK METROPOLIS)			
.1	"	HOLLOW POLYGON (M.P.) SIZE 150x150MMx4.00M	PILE	220	
.2	"	" (A.R.E.) " 4.00	"	220	
.3	"	" (S.T.) " 5.00	"	250	
.4	"	CENTRIFUGAL PILE SIZE ϕ350MMx10.50Mx2 (COMPOSITE)	"	5,685	
3.2	Gf2	PRESTRESSED CONCRETE PILE (TRANSPORTATION INC. IN BKK AREA)			
.1	"	□ (C.PAC) SIZE 220x220MMx10.50M	P	1,555	
.2	"	" 350x350 x21.00M	"	7,850	
.3	"	" 400x400 x21.00M	"	9,400	
.4	"	SOLID SQUARE □ (SUPER-P) SIZE 180x180MMx10.50M	P	987	
.5	"	" (SUPER-P) 260x260MMx10.50M	"	2,150	
.6	"	" (TPC) 250x250 x21.00M	"	4,345	
.7	"	" (MCON) 350x350 x23.00M	"	9,550	
.8	"	" (S.P.A.) 180x180 x21.00 x3(COMPOSITE)	"		
.9	"	" (U.C.M.) 180x180 x6.00	"	650	
.10	"	" (U.C.M.) 180x180 x21.00M	"	2,300	
.11	"	" (M.P.) 150x150 x6.00	"	468	
.12	"	" (A.R.E.) 180x180 x5.00	"	400	
.13	"	I SECTION (MCON) 260x260MMx21.00M	"	2,750	
.14	"	" (S.P.A.)	"		
.15	"	" (I-PRESTRESSED PILE)	"	480	
.16	"	" (")	"	1,215	
.17	"	" (S.T.)	"	300	
.18	"	" (A.R.E.)	"	2,770	
.19	"	DH SECTION (CPAC) 300x300MMx21.00M	"	4.065	
.20	"	" (TPC)	"	3,778	
.21	"	Y SECTION (P.C.C.) LENGTH=20M(Y-114) BEARING CAP. 40T	"	3,810	
.22	"	(PCC)	"	225	
.23	"	(PCC)	"	6,220	
.24	"	SOLID OCTAGON (T.P.C.) 250x250MMx21.00M	"	4,345	

			UNIT	UNIT PRICE	
				BAHT	SATANE
3.3		R.C. FENCE POST			
.1	Gf2	GENERAL MARKET LENGTH 2.10M W/BASE SIZE 275x275MM	P	60	
.2	"	" 2.70	"	65	
.3	"	(ARE) 2.10 (PRESTRESSED CONC.)	"	60	
.4	"	(ARE)	"	70	
.5	"	(C-PAC)	"	60	
.6	"	(C-PAC)	"	70	
3.4	Gf2	PRESTRESS CONC. ELECTRICAL POST			
.1	"	(ARE) LENGTH 8.00M	P	975	
.2	"	(ARE)	"	1,150	
.3	"	(C-PAC)	"	-	
.4	"	(C-PAC)	"	-	
.5	"	(C-PAC) 10.50M	"	-	
3.5	Gf2	R.C. FOOTING POST W/BASE (SIZE 275x275MM) GENERAL MARKET			
.1	"	POST SIZE 100x100MMx1.00M	P	40	
.2	"	" 100x100MMx2.00M	"	80	
.3	"	" 100x100MMx3.00M	"	120	
.4	"	"	"	50	
.5	"	"	"	100	
.6	"	"	"	150	
3.6	Gi	WOODEN PILE-BARK SMASHING (FULL SIZE)			
.1	"	ϕ 75MMx3.00M	P	25∿30	
.2	"	ϕ100 x4.00	"	40∿45	
.3	"	ϕ125 x5.00	"	70∿80	
.4	"	ϕ150 x6.00	"	140 ∿160	
.5	"	ϕ200 x8.00 (PINE TREE)	"	290	
.6	"	ϕ250 x10.00 (PINE TREE)	"	500	
4	H	SECTIONAL MEMBER			
4.1	Hh2	STRUCTURAL STEEL (LENGTH 6.00M PER PIECE)			
.1	"	ANGLE STEEL (EQUAL LEG) SIZE 3.0x40x40MM	PIECE	90	
.2	"	" 4.0x40x40	"	120	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.3	Hh2	ANGLE STEEL (EQUAL LEGO) SIZE 4.0x50x50MM	PIECE	160	
.4	"	" 6.0x50x50	"	210	
.5	"	" 6.0x65x65	"	290	
.6	"	" 8.0x65x65	"	370	
.7	"	" 6.0x75x75	"	320	
.8	"	" 9.0x75x75	"	480	
.9	"	LIGHT ANGLE STEEL 3.0x40x40MM	"	80	
.10	"	" 6.0x50x50	"	190	
.11	"	CHANNEL STEEL SIZE 75x6.92 KG/M	"	380	
.12	"	" 100x9.36	"	500	
.13	"	LIGHT CHANNEL STEEL SIZE 2.6x45x38MM	"	110	
.14	"	" 2.0x80x40	"	100	
.15	"	LIGHT LIP CHANNEL STEEL 2.3x100x50MM	"	195	
.16	"	" 3.2x150x50	"	330	
4.2	Hh2	ROUND BAR SR.24 (LENGTH 10.00M/BAR)			
.1	"	ϕ 6MM WEIGHT 2.22 KG/BAR	BAR	18	25
.2	"	ϕ 9 4.99	"	40	25
.3	"	ϕ12 8.88	"	68	50
.4	"	ϕ15 13.90	"	103	
.5	"	ϕ19 22.30	"	165	50
.6	"	ϕ25 38.50	"	285	50
.7	"	ϕ 6 (FACTORY PRICE)	TON	7,890	
.8	"	ϕ 9 "	"	7,770	
.9	"	ϕ12 "	"	7,420	
.10	"	ϕ15 "	"	7,200	
.11	"	ϕ19 "	"	7,200	
.12	"	ϕ25 "	"	7,200	
4.3	Hh2	DEFORMED BAR SD.30 (LENGTH 10.00M/BAR)			
.1	"	D.A. 10MM (FACTORY PRICE) WEIGHT 6.17 KG/BAR	TON	7,900	
.2	"	12 " 8.88	"	7,600	
.3	"	16 " 15.80	"	7,490	
.4	"	20 " 24.70	"	7,490	
.5	"	25 " 38.50	"	7,490	
.6	"	28 " 48.30	"	7,490	

			UNIT	UNIT PRICE	
				BAHT	SATANE
4.4	Hh2	DEFORMED BAR SD 40 (LENGTH 10.00M/BAR)			
.1	"	DIAMETER 10MM (FACTORY PRICE) WEIGHT 6.17 KG/BAR	TON	8,100	
.2	"	12 8.88	"	7,800	
.3	"	16 15.80	"	7,700	
.4	"	20 24.70	"	7,700	
.5	"	25 38.50	"	7,700	
.6	"	28 48.30	"	7,700	
4.5	Hi	YANG WOOD (MODIFIED)			
.1	"	SIZE 12.7x152.4MM (1/2"x6")x6.00M (PLANNING INCLUDED)	CU.FT	140 ∿160	
.2	"	25.4x25.4 (1"x1")x<4.00M	"	100 ∿110	
.3	"	25.4x203.2 (1"x8")x6.00	"	140 ∿150	
.4	"	38.1x76.2 (1 1/2"x3")x2.50	"	100 ∿110	
.5	"	38.1x76.2 (1 1/2"x3")x3.00∿5.50	"	110 ∿120	
.6	"	127.0x127.0 (5"x5")x6.00	"	135 ∿145	
.7	"	38.1x76.2 (1 1/2"x3")x3.00∿5.00M (PRESERVED)	"	122 ∿132	
.8	"	127.0x127.0 (5"x5")x6.00	"	147 ∿157	
4.6	Hi	HARD WOOD (MODIFIED)			
.1	"	KRABARK 25.4x203.2MM(1"x8")x4.00M	CU.FT	140 ∿150	
.2	"	HARD WOOD (MIXED) 50.8x152.4MM(2"x6")x6.00M	"	160 ∿180	
.3	"	TENG RUNG (2"x6")x6.00	"	250 ∿280	
.4	"	TA-KIEN THONG (2"x6")x6.00	"	250 ∿280	
.5	"	TA-KIEN HIN (2"x6")x6.00	"	180 ∿190	
.6	"	TA-KIEN THRAI (2"x4")x4.00	"	160 ∿180	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.7	Hi	DAENG (SEASONED & GROOVED) 50.8x152.4MM(1"x4")x4.00	CU.FT	260 ∿280	
.8	"	MAKA (") (1"x4")x4.00	"	290 ∿310	
4.7	Hi	TEAK WOOD 2ND GRADE, ORDINARY TYPE			
.1	"	SIZE 12.7x25.4MM(1/2"x1")x3 FT & OVER	CU.FT	220	
.2	"	(1/2"x4")x6.5 FT	"	300	
.3	"	(1"x1")x5 FT	"	250	
.4	"	25.4x101.6MM(1"x4")x6 FT & OVER	"	330	
.5	"	(1"x6") "	"	330	
.6	"	(1"x12")x6 "	"	420	
.7	"	(1.1/2"x3")x6.5 FT	"	300	
.8	"	(1.1/2"x3")x4 "	"	320	
.9	"	(1.1/2"x4")x3.5 "	"	350	
.10	"	(1.1/2"x4")x6.5 "	"	390	
.11	"	(2"x4")x6 "	"	390	
.12	"	(2"x12")x4 "	"	460	
4.8	Hi	SMALL BAMBOO, BAMBOO			
.1	"	SMALL BAMBOO ϕ18MM LENGTH 2.50M (20 RODS/BUNDLE)	BUNDLE	11	
.2	"	ϕ25MM LENGTH 4.00M (10 RODS/BUNDLE)	"	11	
.3	"	BAMBOO ϕ75∿100MM LENGTH 7.00M	ROD	11	
5	I	PIPING			
5.1	If6	ASBESTOS CEMENT DRAINAGE PIPE, CLASS A, SINGLE SOCKET (LENGTH=3.00 M/P)			
.1	"	ϕ 80MM	PIPE	45	
.2	"	ϕ100MM	"	77	
.3	"	ϕ150MM	"	111	
.4	"	ϕ200MM	"	156	
.5	"	90° BEND ϕ 80MM	PC	9	
.6	"	" ϕ100MM	"	10	
.7	"	" ϕ150MM	"	18	
.8	"	" ϕ200MM	"	25	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.9	If6	90° TEE ϕ 80MM	PC	12	
.10	"	" ϕ100MM	"	15	
.11	"	" ϕ150MM	"	25	
.12	"	" ϕ200MM	"	40	
5.2	If6	CONCRETE PIPE (44MM THK, 1.00M LENGTH)			
.1	"	BELL & SPIGOT TYPE ϕ300MM	PIPE	70	
.2	"	" ϕ600MM	"	185	
.3	"	TONGUE & GROOVE TYPE ϕ300MM	"	60	
.4	"	" ϕ600MM	"	170	
5.3	If2	R.C. PIPE, (LENGTH 1.00M)			
.1	"	BELL & SPIGOT TYPE, CLASS 3 ϕ300MM	PIPE	95	
.2	"	" " ϕ600MM	"	265	
.3	"	TONGUE & GROOVE TYPE, CLASS 3 ϕ400MM	"	165	
.4	"	" " ϕ600MM	"	230	
5.4	Ih2	CAST IRON PIPE-ASPHALT COATING FOR RUSTPROOF (SOIL PIPE) T.C.P			
.1	"	ϕ100MM, LENGTH 1.80M, WEIGHT 16.50 KG	P	114	
.2	"	ELBOW 90°	"	25	
5.5	Ih2	SQUARE STEEL PIPE (LENGTH 6.00 M/P)			
.1	"	SIZE 13MMx13MMx0.9MM THK	P	21	
.2	"	19 x19 x0.9	"	32	
.3	"	25 x25 x1.0	"	43	
.4	"	38 x38 x1.2	"	79	
.5	"	50 x50 x1.6	"	160	
.6	"	75 x75 x2.3	"	290	
.7	"	100MMx100MMx2.3MM THK	"	400	
5.6	Ih2	ROUND STEEL PIPE FOR CONSTRUCTION, LENGTH 6.00 M/P			
.1	"	NOMINAL SIZE 100MM, OUTSIDE DIAMETER 114.3MM, 3.6MM THK	P	620	
.2	"	" 100 " 114.3 4.5	"	650	
.3	"	" 150 " 165.1 4.5	"	1,100	
.4	"	" 150 " 165.1 6.0	"	1,450	

			UNIT	UNIT PRICE	
				BAHT	SATANE
5.7	Ih2	THICK GALVANIZED STEEL PIPE (LENGTH=6.00 M/P)			
		JOINT ACCESSORIES PURCHASING BY LARGE AMOUNT OF CASE-DISCOUNT		%	10~20
.1	"	NOMINAL SIZE 15MM, OUTSIDE DIAMETER 21.4MM	P	89	
.2	"	20 26.9	"	115	
.3	"	25 33.8	"	177	
.4	"	32 42.5	"	225	
.5	"	40 48.4	"	259	
.6	"	50 60.2	"	366	
.7	"	SOCKET, NOMINAL SIZE 15MM	P	3	70
.8	"	20	"	4	
.9	"	25	"	5	90
.10	"	32	"	8	40
.11	"	40	"	10	40
.12	"	50	"	15	90
.13	"	90° ELBOW, NOMINAL SIZE 15MM	P	4	
.14	"	" 20MM	"	4	70
.15	"	" 25MM	PC	7	10
.16	"	" 32MM	"	11	40
.17	"	" 40MM	"	14	10
.18	"	" 50MM	"	21	40
.19	"	90° TEE, NOMINAL SIZE 15MM	"	11	40
.20	"	" 20MM	"	12	30
.21	"	" 25MM	"	16	70
.22	"	" 32MM	"	23	40
.23	"	" 40MM	"	28	40
.24	"	" 50MM	"	40	
5.8	Ih2	IRON PIPE (FURNITURE), LENGTH=6.00 M/P			
.1	"	ϕ15MM (1/2"), 1.2MM THK	PC	22	
.2	"	ϕ20 (3/4"), 1.2 "	"	31	
.3	"	ϕ25 (1") , 1.6 "	"	52	
5.9	Ih4	ALUMINUM PIPE, LENGTH=6.00 M/P			
.1	"	ϕ15MM, 1.0MM THK	PC	65	
.2	"	ϕ20 , "	"	80	
.3	"	ϕ25 , "	"	100	

			UNIT	UNIT PRICE	
				BAHT	SATANE
5.10	In6	PVC PIPE, D-PLAST, WATER SUPPLY PIPE, PVC 5 NO SOCKET			
.1	"	NOMINAL SIZE 18MM, OUTSIDE DIAMETER 22MM	PC	19	25
.2	"	20 26	"	23	50
.3	"	25 34	"	33	
.4	"	35 42	"	42	50
.5	"	40 48	"	52	
.6	"	55 60	"	78	25
.7	"	100 114	"	265	
.8	"	SOCKET, NOMINAL SIZE 18MM	PC	2	50
.9	"	" " 20MM	"	3	
.10	"	" " 25MM	"	3	50
.11	"	" " 40MM	"	7	70
.12	"	" " 100MM	"	70	
.13	"	90° BEND, ONE END SOCKET, NOMINAL SIZE 18MM	PC	4	
.14	"	" " " 20MM	"	6	50
.15	"	" " " 25MM	"	9	50
.16	"	" " " 40MM	"	18	50
.17	"	" " " 100MM	"	178	
	In6	PVC WATER SUPPLY PIPE (THAI MADE), PVC 5 TYPE, NOSOCKET LENGTH 4.00 M/P			
.18	"	NOMINAL SIZE 35MM, OUTSIDE DIAMETER 42MM	PC	41	
.19	"	" 40 " 48	"	53	50
.20	"	" 55 " 60	"	80	
.21	"	" 65 " 76	"	127	
.22	"	" 80 " 89	"	173	50
.23	"	" 100 " 114	"	278	
.24	"	" 125 " 140	"	422	
.25	"	" 150 " 169	"	888	
6	J	WIRE MESH			
6.1	Jh2	WIRE MESH-RHOMBUS PATTERN			
.1	"	MESH SIZE 38MM, DIAMETER OF WIRE 3.0MM (No.11)	SQ.M	46	
.2	"	" 50 " 3.0 (")	"	34	
.3	"	" 38 " 3.15MM(No.10)	"	53	
.4	"	" 50 " 3.15 (")	"	43	

			UNIT	UNIT PRICE	
				BAHT	SATANE
6.2	Jh2	WIRE MESH - SQUARE PATTERN			
.1	"	MESH SIZE 38MM, DIAMETER OF WIRE 3.0MM (No.11)	SQ.M	52	
.2	"	" 50 " 3.0 (")	"	43	
.3	"	" 38 " 3.15 (No.10)	"	61	
.4	"	" 50 " 3.15 (")	"	50	
6.3	Jh2	WIRE MESH - SQUARE PATTERN, WELDED (ROLL SIZE 0.90x30.48M)			
.1	"	MESH SIZE 13MM	M	26	50
.2	"	" 19MM	"	24	50
.3	"	" 25MM	"	23	
.4	"	" 31MM	"	21	
6.4	Jh2	WIRE MESH - POLYGON PATTERN, WELDED (ROLL SIZE 0.90x45.72M)			
.1	"	MESH SIZE 13MM	M	14	
.2	"	" 19MM	"	12	
.3	"	" 25MM	"	11	
.4	"	" 31MM	"	8	50
6.5	Jh2	STEEL MOSQUITO NET (GREEN COLOR) WIDTH=900MM	M	22	
6.6	Jh4	ALUMINUM MOSQUITO NET, WIDTH=900MM	"	35	
6.7	Jh4	" " 1,200MM	"	46	
6.8	Jh	GALVANIZED BARBED WIRE, ϕ OF WIRE 1.60MM	KG	18	
6.9	Jh	" 2.00MM	"	17	
6.10	Jh2	TIED WIRE (No.18) ϕ1.25MM	KG	15	
7	K	INSULATION			
7.1	Kml	GLASS FIBRE			
.1	"	GLASSWOOL W/ ALUM. FOIL (SIAM INSULATION) 25MM THK, ROLL SIZE 1.22x30.48M	ROLL	1,350	
.2	"	MICROFIBRE W/ ALUM. FOIL (SIAM GLASSWOOL) 50MM THK, ROLL SIZE 1.22x15.25M	"	1,400	
.3	"	PIBREGLASS CROWN W/ RESIN BONDED (YIP-IN-SOI) No.100, ROLL SIZE 1.22x60.96M	"	650	
7.2	Kn6	POLYFOAM (SIZE 600x1,200MM THK 12.7∿304.8MM)			
.1	"	SIZE 600x1,200MM 25.4MM THK (DENSITY 1.0 LBS/BLOCK)	SHEET	18	
.2	"	50.8 " (")	"	36	

			UNIT	UNIT PRICE	
				BAHT	SATANE
8	L	THIN SHEET			
8.1	Lh4	ALUMINUM FOIL (SISALATION) No.402 ROLL SIZE 1.35x60.00M	ROLL	850	
8.2	LY	HARVI FOIL (HARVI-FOIL) No.405 ROLL SIZE 1.35x60.00M	"	920	
8.3	Ln2	DAMP-PROOF SHEET (SISALTHENE) No.353 ROLL SIZE 1.80x50.00M	"	2,200	
9	N	OVERLAPPING SHEET			
9.1	Nf2	C-PAC MONIER			
.1	"	SIZE 330x420MM - MANY COLORS	TILE	5	50
.2	"	RIDGE SIZE 255x425MM - COLORS	"	9	
9.2	Nf2	VIBULSRI TILE			
.1	"	CORRUGATED 240x390MM RED COLOR	TILE	4	
.2	"	RIDGE (1M. USED 3 PIECES) "	"	7	
.3	"	SHINGLE TILE SIZE 200x320MM "	"	-	70
9.3	Nf6	CARPORT UNIT SIZE 980x5,000MM, 8MM THK, CEMENT COLOR	SHEET	400	
9.4	Ng	GLAZED, BURNT CLAY, SHINGLE TILE (GREY)			
	"	MALE (SIZE 140x186MM) FEMALE (SIZE 143x270MM)	SHEET	3	
9.5	Nf6	ROMAN TILE - ASBESTOS CEMENT			
.1	"	SIZE 500x1,200MM CEMENT COLOR WEIGHT 6.2 KG/SHEET	SHEET	20	
.2	"	500x1,200MM RED COLOR " 6.2 "	"	27	
.3	"	RIDGE SIZE 500x450MM CEMENT COLOR WEIGHT 2.0 "	"	11	75
.4	"	" 500x450 RED COLOR WEIGHT 2.0 "	"	16	25
9.6	Nf6	CORRUGATED ASBESTOS CEMENT SHEET			
.1	"	LARGE SIZE 1020x1200MM CEMENT COLOR WEIGHT 15.7 KG/SHEET	SHEET	59	
.2	"	x1500 CEMENT COLOR WEIGHT 19.7 "	"	74	
.3	"	RIDGE FOR LARGE 1020x450 CEMENT COLOR WEIGHT 4.5 "	"	27	
.4	"	SMALL 540x1200 CEMENT COLOR WEIGHT 5.3 "	"	17	50
.5	"	" RED COLOR WEIGHT 5.3 "	"	25	50

			UNIT	UNIT PRICE	
				BAHT	SATANE
.6	Nf6	SMALL 540x1500 CEMENT COLOR WEIGHT 6.6 KG/SHEET	SHEET	21	
.7	"	" RED COLOR WEIGHT 6.6 KG/SHEET	"	29	50
.8	"	RIDGE FOR SMALL, SIZE 540x500MM, CEMENT COLOR, WEIGHT 2.0 KG/SHEET	"	11	75
.9	"	" 540x500 RED COLOR, WEIGHT 2.0 KG/SHEET	"	16	25
9.7	Nh2	GALVANIZED STEEL SMALL CORR. SHEET, WIDTH BEFORE CORRUGATED 760MM			
.1	"	THK 0.2MM (No.35)	FT	5	80
.2	"	" 0.25 (No.32)	"	7	80
.3	"	" 0.40 (No.28)	"	11	
9.8	Nn6	GLASOLIT ROMAN TILE SIZE 500x1200MM, YELLOW, GREEN, BLUE	SHEET	120	
10	P	THICK COATING (10.1∿10.3 LABOUR INCLUDED BUT SCAFFOLDING EXC.)			
10.1	Pq5	CEM WASH SPRAYED TYPE(AREA OVER 300M^2)	SQ.M	35	
10.2	"	SAND-TEX " (" 400M^2)	"	60	
10.3	"	ARCD TEXTURED COATING " (" 50M^2)	"	65∿105	
10.4	"	TERRAZZO W/ BRASS STONE No.3 (LABOUR INCLUDED)	"	200 ∿220	
10.5	"	GRAVEL WASH STONE No.3 (")	"	100 ∿120	
11	R	HARD BOARD			
11.1	Rf6	ASBESTOS CEMENT FLAT SHEET, SIZE 1200x2400MM			
.1	"	THK 4MM	SHEET	63	50
.2	"	" 6MM	"	96	
.3	"	" 8MM	"	126	50
11.2	Rf7	GYPSUM BOARD			
.1	"	ORDINARY TYPE, SIZE 1200x2400MM, THK=9MM	SHEET	125	
.2	"	" 1200x2400 12MM	"	140	
.3	"	W/ALUMINUM FOIL 1200x2400 , THK=9MM	"	163	
.4	"	" 1200x2400 12MM	"	180	
.5	"	TEXTURED BOARD (RELIEF PATTERN) 600x600MM, THK=9MM	"	40∿85	

			UNIT	UNIT PRICE	
				BAHT	SATANE
11.3	Rh2	GALVANIZED STEEL SHEET			
.1	"	SIZE 910x1825MM THK 0.20MM (No.35)	SHEET	47	
.2	"	" 910x2435 " 0.25 (32)	"	66	
.3	"	" " " 0.30 (30)	"	82	
.4	"	" " " 0.40 (28)	"	100	
.5	"	" " " 0.50 (26)	"	122	
11.4	Rh2	BLACK STEEL PLATE 1215x2435MM			
.1	"	THK 1.6MM, WEIGHT 37.5 KG	SHEET	280	
.2	"	" 3 " 70 KG	"	525	
.3	"	" 6 " 140 KG	"	1,050	
11.5	Rh2	STAINLESS STEEL PLATE, SIZE 1215x2435MM, THK 2MM (No.14)	SHEET	2,016	
11.6	Rh4	ALUMINUM PLATE SIZE 1000x2000MM			
.1	"	WEIGHT 1.7 KG (No.30)	SHEET	102	
.2	"	" 2.2 (28)	"	128	
.3	"	" 2.5 (26)	"	142	
11.7	Ri4	PLYWOOD BOARD SIZE 1220x2440MM			
.1	"	INTERIOR USE TEAK/TEAK, THK 4MM (GOOD)	SHEET	328	
.2	"	" " 6MM (")	"	414	
.3	"	" YANG/YANG, 4MM, KAPUR & LAWAN PLYD	"	128	
.4	"	" " 6MM	"	182	
.5	"	" " 10MM	"	306	
.6	"	" " 15MM	"	446	
.7	"	" " 20MM	"	590	
.8	"	EXTERIOR USE TEAK/TEAK, THK 4MM (GOOD)	SHEET	415	
.9	"	" " 6MM	"	494	
.10	"	" YANG/YANG 4MM, KAPUR & LAWAN PLYWD	"	170	
.11	"	" " 6MM "	"	246	
.12	"	" " 10MM "	"	377	
.13	"	" " 15MM "	"	545	
.14	"	" " 20MM "	"	697	
11.8	Ri4	PHENOBOARD SIZE 1220x2440MM THK 8MM	SHEET	145	

			UNIT	UNIT PRICE	
				BAHT	SATANE
11.9	Ri4	HARD BOARD	SHEET		
.1	"	THK 2.5MM	"	51	
.2	"	" 3.0	"	52	
.3	"	" 3.5	"	55	
.4	"	" 3.0 (PERFORATED PATTERN)	"	56	
11.10	Ri4	BANGNA PLYWOOD, SIZE 1220x2440MM			
.1	"	ORDINARY TYPE, THK 2.5MM	SHEET	58	
.2	"	" " 3.2	"	63	
.3	"	" " 4.0	"	69	
.4	"	" " 4.8	"	76	
.5	"	" " 6.0	"	98	
.6	"	DOCORATED PATTERN, THK 2.5MM	"	68	
.7	"	" " 3.2	"	80	
.8	"	" " 4.0	"	86	
.9	"	" " 4.8	"	92	
.10	"	" " 6.0	"	115	
.11	"	PERFORATED PATTERN, THK 2.5MM	"	63	
.12	"	" " 3.2MM	"	68	
.13	"	PERFORATED THK 4.0MM	"	75	
11.11		FORM BOARD (CONC. FORM) SIZE 1220x2440MM			
.1		THK 8MM	BOARD	210	
.2		" 10MM	"	225	
11.12	Rj1	ACOUSTIC BOARD THK 10MM			
.1	"	SIZE 600x600MM	BOARD	35	
.2	"	600x1200	"	50	
.3	"	600x2440	"	99	
11.13	Rj1	CELOTEX (PAPER BOARD)			
.1	"	SIZE 1220x2440MM THK 12MM	BOARD	135	
.2	"	600x600 12 (PERFORATED)		32	
11.14	Rj1	CHIPBOARD			
.1	"	FLAT SHEET, TEAK/YANG, SIZE 1220x2440MM, THK 12MM	BOARD	-	
.2	"	" " " " 15	"	-	
.3	"	" YANG/YANG, " " 12	"	265	
.4	"	" " " " 15	"	315	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.5	Rj1	PARTITION, TEAK/TEAK, SIZE 125x2440MM, THK 37MM	BOARD	585	
.6	"	" YANG/YANG " " 37	"	395	
11.15	Rj3	STRAMIT BOARD, SIZE 1220x1800∿3500MM, THK 50MM			
.1	"	No.3 GRAY SURFACE 2 FACES	SQM	68	
.2	"	5 " 1 FACE, BLACK 1 FACE	"	68	
.3	"	7 HARD BOARD SURFACE 2 FACES	"	150	
.4	"	8 ASBESTOS CEMENT SHEET SURFACE 2 FACES	"	170	
.5	"	9 " 1 FACE, HARD BOARD 1 FACE	"	160	
.6	"	12 BRIMER SURFACE 2 FACES	"	200	
.7	"	13 ASBESTOS CEMENT SURFACE 1 FACE	"	125	
11.16	Rm	ASBESTROLUX			
.1	"	SANDED SURFACE, SHARP CORNOR, SIZE 600x1200MM THK 4MM	BOARD	70	
.2	"	" " SIZE 600x1200MM THK 6MM	"	90	
.3	"	" " SIZE 600x600MM THK 4MM	"	35	
.4	"	TEXTURED PATTERN 600x600MM, THK 4MM	"	45	
11.17	Rn6	PLASTIC SIZE 1210x2435MM			
.1	"	THK 2MM	SHEET	695	
.2	"	" 3MM	"	875	
.3	"	" 6MM	"	1,745	
11.18	Rn8	PLASTIC - HARD SURFACE			
.1	"	FORMICA (BRITISH), SIZE 1220x2440MM, THK 1.25MM	SHEET	598	
.2	"	" (THAI) , " " 0.8MM, WHITE COLOR	"	210	
.3	"	" (THAI) , SIZE 1220x2440MM, THK 0.8MM, COLORS	"	310	
.4	"	" DUROPAL, SIZE 1220x4115MM, THK 1.2MM, SMOOTH SURFACE	"	864	
.5	"	" " SIZE 1220x4115MM, THK 1.2MM, ORANGE SURFACE	"	918	
11.19	Ro1	GLASS			
.1	"	CLEAR GLASS, THK 3MM, SIZE NOT MORE THAN 920x1533MM (INSTALLATION INCLUDED)	SQ.FT	10	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.2	Ro1	CLEAR GLASS, THK 5MM, SIZE NOT MORE THAN 920x1533MM (INSTALLATION INCLUDED)	SQ.FT	17	50
.3	"	CLEAR GLASS, THK 6MM, SIZE NOT MORE THAN 920x1533MM (INSTALLATION INCLUDED)	"	19	50
.4	"	CLEAR GLASS, THK 5MM, SIZE 101.6x700MM (INSTALLATION INCLUDED)	"	10	50
.5	"	" " 5MM, SIZE 600x600	SHEET	36	
.6	"	" " 3MM, SIZE 490x1200	"	72	
.7	"	CLOTH PATTERN GLASS, THK 5MM, SIZE NOT MORE THAN 920x1533MM (INSTALL. INCLUDED)	SQ.FT	16	
.8	Ro3	GREY GLASS, THK 5MM, SIZE NOT MORE THAN 920x1533MM, LOCAL MADE (INSTALLATION NOT INCLUDED)	SQ.FT	31	
.9	Ro3	GREY GLASS, THK 5MM, SIZE 1200x1200MM, LOCAL MADE (INSTALLATION NOT INCLUDED)	SHEET	854	
11.20	Rf5	LELLOCRETE			
.1	"	SIZE 100x2000MM THK 12.7MM	SHEET	105	
.2	"	" " 25.4	"	130	
.3	"	" " 76.2	"	300	
.4	"	600x600 " 10.0 (SHELL, DOME TYPE)	"	39	
12	S	TILE			
12.1		MARBLE (SIZE 20x300x300MM)			
.1	Se2	MARBLE (THAI), GREY WHITE COLOR (MARBLE CO.,LTD.)	SQ.M	720	
.2	"	" ("), PINK BLACK COLOR (")	"	830	
.3	"	" ("), LIGHT GREY, GREY, PINK (SUKHOTHAI MARBLE CO., LTD.)	SHEET	100	
.4	"	" (IMPORTED), " (THAI VISAWAKIJ LTD.)	"	200 ∿300	
12.2	Se2	SPLIT BLOCK SIZE 25x80x320MM	SQ.M	225	
12.3	Se3	REX STONE 25x320x320MM	"	225	
12.4	Sg2	BURNT CLAY TILE (LOCAL MADE)			
.1	"	NON-GLAZED SIZE 101x101MM (RED, BROWN)	SHEET	1	
.2	"	" 98x198 (" ")	"	3	
.3	"	" POLYGON TYPE	"	2	
.4	"	GLAZED SIZE 97x195MM COLORS	"	7	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.5	Sg2	DAN KWIAN, POLYGON TYPE (160 SHEETS/M^2)	SQ.M	100	
12.5	Sf3	IMITATED MARBLE - MARBLEX SIZE 300x300MM THK 25MM	SHEET	12	
12.6	Sg2	MOSAIC TILE (MATT SURFACE) SIZE 305x305MM (LOCAL MADE)	TILE	12∿45	
12.7	Sg3	" (SHINY ") SIZE 305x305MM (LOCAL MADE)	"	14∿45	
12.8	Sg3	GLAZED WALL TILE SIZE 108x108MM (LOCAL MADE)			
.1	"	WHITE	TILE		
.2	"	COLOR	"		
.3	"	PATTERN 1 COLOR	"		
.4	"	" 2 COLORS	"		
12.9	Si3	WOOD PARQUET (INSTALLATION & BRUSHING INCLUDED)			
.1	"	TEAK, WOOD THK 19MM	SQ.M	350	
.2	"	DAENG 19	"	280	
.3	"	MAKA 19	"	330	
.4	"	PRADOO OR DAENG 16	"	220	
12.10	Si3	TONGUE & GROOVE WOODEN FLOOR-FOREST IND. ORGA. SIZE 750x500∿1500MM THK 22MM	SQ.M		
12.11	Si7	VINYL ASBESTOS TILE, SIZE 227x227 MM (9"x9") INSTALL INCLUDED			
.1	"	THK 1.6MM	SQ.M	90	
.2	"	2.0	"	103	
.3	"	2.5	"	130	
13	T	BENDABLE SHEET (INSTALL. & SUPPORTING VINYL EXCLUDED) 1SΦM =1.19599			
13.1	Tj6	CARPET (MACHINE TUFTED CARPET 100% VIRGIN WOOL)	SQ.M	520 ∿940	
13.2	Tj7	" (MACHINE TUFTED CARPET 100% ACRYLIC)	"	320 ∿530	
14	U	DECORATIVE SHEET (INSTALLATION EXCLUDED) IMPORTED			
14.1	Un6	WALL PAPER, ORDINARY TYPE (VINYL COATED PAPER)	SQ.M	110	
14.2	Un6	" , VINYL TYPE	"	130	
15	V	THIN COATING (CAN 3,785 LITRES)			
15.1	Vu3	SOUBNUM (LIGHT BROWN, INTER-, DARK) LERDSIRI.SAHAKOL CO., LTD	CAN	210	

			UNIT	UNIT PRICE	
				BAHT	SATANE
15.2	Vu6	SILICONE (R 221)	CAN	229	
15.3	Vu4	VARNISH, SIGMAWA (SHINY TYPE)	"	200	
15.4	"	" " (MATT TYPE)	"	205	
15.5	"	LACQUER, -CAMEL BRAND (No.6022)	"	350	
15.6	"	SHELLAC YELLOW	KB	25	
15.7	"	WHITE	"	34	
15.8	"	INDOTANE (HALF SHINY & MATT TYPE)	CAN	460	
15.9	Vu5	OIL PAINT (COMPANY'S QUOTED PRICE) CAN CAP, 3,785 LITRE (1 GALLON)			
.1	"	ALFA	CAN	298	
.2	"	SIGMA (MATT TYPE) ← NOT SHINY	"	260	
.3	"	I.C.I.	"	337	
.4	"	KANSAI	"	270	
.5	"	PAMMASTIC	"	330	
.6	"	MONO	"	220	
.7	"	SINCLAIR	"	335	
.8	"	JOTUN	"	320	
15.10	Vu6	EMULSION PAINT (COMPANY'S QUOTED PRICE) 3,785 LITRE CAN (1 GALON)			
.1	"	ALFA INTERIOR PAINT	CAN	108	
.2	"	" EXTERIOR PAINT	"	205	
.3	"	SIGMA (SIGMA WALL) INT.	"	130	
.4	"	" EXT.	"	170	
.5	"	I.C.I. INT.	"	276	
.6	"	" EXT.	"	276	
.7	"	KANSAI INT.	"	110	
.8	"	" EXT.	"	240	
.9	"	PAMMASTIC INT.	"	294	
.10	"	" EXT.	"	294	
.11	"	MONO INT.	"	110	
.12	"	" EXT.	"	180	
.13	"	ARCHO INT. (LABOUR INCLUDED EXCEPT SCAFFOLDING)	SQ.M	27	
.14	"	" EXT. (")	"	30	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.15	Vu6	SINCLAIR INT.	CAN	235	
.16	"	" EXT.	"	270	
.17	"	JOTUN INT.	"	140	
.18	"	" EXT.	"	260	
15.11	Vu6	SNOWCEM BUCKET - 50 KG	BUCKET	575	
15.12	Vu9	RUST PREVENTING PAINT (COMPANY'S QUOTED PRICE) 3.785 LITRE CAN (1 GAL.)			
.1	"	RUST-O-CRUM (DARK RED COLOR - FOR NEW METAL)	CAN	422	
.2	"	RUST GON SPECIAL TYPE No.100	"	320	
.3	"	GENERAL RUST-PREVENTING PAINT	"	90∿120	
16	X	READY MADE FITTING			
16.1	Xh2	WINDOW-DOOR STEEL (INSTALLATION INCLUDED)			
.1	"	STEEL FOLDED SHUTTER (LOCAL STEEL) W/SCREEN SIZE 2.70M H x 3.50M W	SET	4,550	
.2	"	SOLID TYPE STEEL ROLLING SHUTTER, STEEL GALVANIZED SLAT, 0.7MM THICKNESS (QA.NO22) WIDTH NOT MORE THAN 5.00M (THAI ROLLING PRODUCTS)	SQ.M	750	
.3	"	STEEL ROLLING GRILLE, STEEL GAL, SLAT WIDTH NOT MORE THAN 6.50M	SQ.M	850	
.4	"	STEEL-WINDOW FRAME & PANEL FRAME 600x600MM (PROJECTED WINDOW TOP HINGE)	SET	440	
.5	"	STEEL-WINDOW FRAME & DOUBLE PANEL FRAME 980x1200MM	SET	1,220	
16.2	Xh4	ALUMINUM WINDOW - DOOR (INSTALLATION INCLUDED)			
.1	"	ALUM. WINDOW FRAME & PANEL FRAME 600x600MM (TOP HINGE) INCLUDED	SET	760	
.2	"	ALUM. WINDOW FRAME & DOUBLE PANEL FRAME 980x1200MM, INSTALL INCLUDED	SET	1,520	
.3	"	ALUM. SLIDING DOOR, SIZE 1200x2000MM (W/FIXED PART SAME SIZE)	SET	2,530	
16.3	Xh4	ALUMINUM LOUVRE, ALUMINUM MOSQUITO NET WINDOW			
.1	"	ALUMINUM LOUVRE, SLAT SIZE 101.6MM, 6-SLAT TYPE (GOOD)	SET	133	
.2	"	" " 101.6MM, 13-SLAT TYPE (GOOD)	"	238	
.3	"	ALUMINUM MOSQUITO NET WINDOW PANEL, SIZE 800x1200MM	PANEL	120 ∿135	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.4	Xh4	ALUMINUM MOSQUITO NET DOOR PANEL, SIZE 800x2000MM	PANEL	370 ∿390	
16.4	Xi	WOODEN WINDOW & DOOR PANEL			
.1	"	PLYWOOD FLUSH DOOR, YANG/YANG, SIZE 800x2000MM	PANEL	295	
.2	"	" , TEAK/TEAK, 800x2000MM	"	448	
.3	"	TEAK WOOD DOOR PANEL, SIZE 800x2000MM, PANEL FRAME SIZE 31.75x101.6MM (1 1/4"x4"), PANEL THK 12.7MM (1/2")	"	485 ∿515	
.4	"	TAKIEN THONG WOOD DOOR PANEL, SIZE 800x2000MM, PANEL FRAME SIZE 31.75x101.6MM (1 1/4"x4"), PANEL THK 12.7MM (1/2")	"	370 ∿395	
.5	"	HARD WOOD DOOR PANEL, SIZE 800x2000MM, PANEL FRAME SIZE 31.75x101.6MM (1 1/4"x4"), PANEL THK 12.7MM (1/2")	"	305 ∿325	
.6	"	SOLID TEAK WOOD WINDOW PANEL, SIZE 600x1200MM, PANEL FRAME SIZE 31.75x101.6MM (1 1/4"x4"), PANEL THK 12.7MM (1/2")	SET	290 ∿900	
.7	"	WINDOW PANEL FRAME FOR GLASS WINDOW, SIZE 800x1200MM, PANEL FRAME SIZE 31.75x101.6MM (1 1/4"x4")	PANEL	175 ∿190	
.8	"	HARDWOOD DOOR FRAME, SIZE 800x2000MM (NO TRANSOM)	BAY	150 ∿180	
.9	"	TAKIEN THONG WOOD DOOR FRAME, SIZE 800x2000MM (NO TRANSOM)	"	265 ∿295	
.10	"	(HARD WOOD) WINDOW FRAME, FIXED GLASS LOUVRE SIZE 1000MM H x 800MM W, 2 ADJACENT BAYS	SET	230 ∿250	
.11	"	(TAKIEN THONG WOOD) WINDOW FRAME, FIXED GLASS LOUVRE SIZE 1000MM H x 800MM W, FRAME SIZE 50.8x101.6MM (2"x4") 2 ADJACENT BAYS	SET	370 ∿430	
.12	"	(HARD WOOD) WINDOW FRAME W/ALUMINUM LOUVRE SIZE H 1030MM x W 800MM, FRAME SIZE 50.8x101.6MM (2"x4") 2 ADJACENT BAYS	SET	225 ∿245	
.13	"	(TAKIEN THONG WOOD) WINDOW FRAME W/ALUMINUM LOUVRE SIZE H 1030MM x W 800MM, FRAME SIZE 50.8x101.6MM (2"x4") 2 ADJACENT BAYS	SET	355 ∿415	
16.5	Xt6	NUTS, NAILS, ACCESSORIES FOIL ROOFING TILE			
.1	"	ROUND HEAD NUT (CARPENTRY), ϕ 9.42MM, LENGTH 152MM	KG	12	50
.2	"	" ϕ12.70MM, LENGTH 152MM	"	11	50
.3	"	" ϕ19.05MM, LENGTH 152MM	"	11	50

			UNIT	UNIT PRICE	
				BAHT	SATANE
.4	Xt6	NAIL, LENGTH 76.2MM (No.10)	KG	13	
.5	"	" 25.4	"	15	
.6	"	" 25.4 WEIGHT 18 KG/CRATE	CRATE	250	
.7	"	NAIL FOR CONCRETE	KG	30~40	
.8	"	NAIL FOR GALVANIZED SHEET (80 PCS/BOX)	BOX	5	
.9	"	IRON SCREW NAIL (144 RCS/BOX) SIZE 19.06MM(No.6)	"	7~12	
.10	"	EXPANDED PLUG -BRASS ϕ 5MM	PCS	8	
.11	"	" -ALUMINUM ϕ12.7MM	"	25	
.12	"	" -PLASTIC 100 PCS/BOX (No.8)	BOX	12	
.13	"	FITTINGS FOR ROOFING TILE, HOOK BOLT FOR RIDGE SIZE 300MM	PC	1	40
.14	"	FITTINGS FOR ROOFING TILE, HOOK BOLT FOR RIDGE SIZE 400MM	"	1	60
.15	"	FITTINGS FOR ROOFING TILE, COACH SCREEN SIZE 62.5MM	"	-	60
.16	"	FITTINGS FOR ROOFING TILE, COACH SCREEN SIZE 100MM	"	-	80
.17	"	FITTINGS FOR ROOFING TILE, CLIP FOR SMALL CORR. A.C SHEET, SIZE 200MM	"	-	90
.18	"	FITTINGS FOR ROOFING TILE, CLIP FOR ROMAN TILE SIZE 200MM	"	1	
16.6	Xt7	HARDWARE WINDOW & DOOR			
.1	"	KNOB TYPE SCHLAGE, CHROMIUM SURFACE (No.625) SINGLE	PC	360	
.2	"	" YALE , " (No.BR5280) DOUBLE	"	295	
.3	"	" UNION , " (No.9928) DOUBLE	"	360	
.4	"	" RWIKSET, " (No.400B) DOUBLE	"	285	
.5	"	" ALFA , " DOUBLE	"	125	
.6	"	CONCEAL TYPE ABROY (No.2200)	"	580	
.7	"	" YALE (No.2013)	"	480	
.8	"	" UNION (No.2477/3)	"	480	
.9	"	LEVER HANDLE TYPE ABROY (No.2500)	"	160	
.10	"	UNION (No.692-24-95)	"	890	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.11	Xt7	LOCK FOR LAVATORY SET - ACME - PLASTIC	PC	165	
.12	"	STEEL HINGE, SIZE 101.6MM, 1MM THK	"	100	
.13	"	101.6 2MM THK W/NYLON BETWEEN JOINT	"	3	
.14	"	BRASS HINGE, SIZE 101.6MM, 2MM THK	"	5	
.15	"	WHITCO TYPE HINGE,SIZE 203.2MM (8") WHITCO BRAND	SET	25	
.16	"	" 304.8 (12") "	"	29	
.17	"	" 406.4 (16") "	"	33	
.18	"	" 203.2 (8") RED LEAF BRAND	"	40	
.19	"	" 254.0 (10") "	"	22	25
.20	"	" 355.6 (14") "	"	23	75
.21	"	" 203.2 (0") AGCO BRAND	"	26	25
.22	"	" 304.8 (12") "	"	23	
.23	"	" 406.4 (16") "	"	26	
.24	"	GALVANIZED BOLT, SIZE 152.4MM ϕ6MM	PC	31	
.25	"	BRASS " ϕ6	"	3	50
.26	"	ALUMINUM " ϕ9	"	10	
.27	"	STEEL HOOK, SIZE 152.4MM	"	18	
.28	"	BRASS " "	"	1	50
.29	"	GALVANIZED HANDLE, SIZE 127.0MM	"	7	
.30	"	BRASS "	"	3	
.31	"	ALUMINUM "	"	4	
.32	"	DOOR CLOSER - UNION (No.8820)	SET	3	
.33	"	CHOKE-UP WHITCO	"		
17	Y	PRODUCTION			
17.1	Yg1	WHITE CEMENT (WEIGHT 8 KG/BAG)	BAG	7	
17.2	Yq2	CEMENT			
.1	"	TIGER BRAND A (RETAIL PRICE FROM GENERAL SHOP)	BAG	51	50
.2	"	B (DELIVERY PRICE FOR JOB SITE IN BKK, WITHIN 50KM)	TON	1,030	
.3	"	COBRA BRAND A	BAG	51	50
.4	"	B	TON	1,030	
.5	"	EAGLE BRAND A	BAG	51	50
.6	"	B	TON	1,030	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.7	Yq2	ELEPHANT BRAND A	BAG	58	75
.8	"	B	TON	1,175	
.9	"	GREEN SERPENT A	BAG	58	75
.10	"	B	TON	1,175	
.11	"	DIAMOND BRAND A	BAG	58	75
.12	"	B	TON	1,175	
.13	"	CLUB BRAND A	BAG	58	75
.14	"	WHITE CEMENT, WHITE ELEPHANT BRAND (WEIGHT 40 KG/BAG)	BAG	180	
.15	"	" , KILANE BRAND (WEIGHT 40/BAG)	"	200	
17.3	Yp	SAND, SOIL, STONE (DELIVERY CHARGE INCLUDED)			
.1	"	COARSE SAND, RETAIL SALE	CU.M	145 ∿155	
.2	"	WHOLE TRUCK SALE	"	130 ∿140	
.3	"	FINE SAND , RETAIL SALE	"	150 ∿160	
.4	"	WHOLE TRUCK SALE	"	135 ∿145	
.5	"	EMBANKMENT SAND "	"	90∿100	
.6	Ye	AGGREGATE No.1	"	150 ∿160	
.7	"	" 2	"	150 ∿160	
.8	"	STONE CHIP FOR TERRAZZO, WEIGHT 50 KG/BAG	BAG	22	
.9	Yg	LATERITE	CU.M	95∿100	
.10	"	SOIL	"	80∿90	
17.4	Yt	ADHESIVE & SEALING COMPOUND			
.1	"	DAP (STICK TYPE) LENGTH 15.24M	PACK	106	
.2	"	DAP (TUBE TYPE) CAPACITY 0.31 KG (11 OUNZE)	TUBE	50	
.3	"	WELDWOOD " " " "	"	45	
.4	"	GUMCRETE " 1.0 KG	CAN	80	
.5	"	SOLUTION FOR D-PLAST PIPE JOINING, CAPAC. 1.0 KG	"	175	
.6	Yt3	LATEX GLUE 3.785 LITRE	"	40	
.7	Yt	RUBBER GLUE 0.95 "	"	35	
.8	Yt3	SHELL FLINTKOTE (No.3) 3.785 "	"	48	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.9	Yt4	COMPRIBAND SIZE 9x9MM LENGTH 1803MM	STICK	12	
17.5	Yu2	CONCRETE ADMIXTURE			
.1	"	IMPERMD LIQUID TYPE, WATER PROOF & STRENGTHEN 3.785 LITRE/CEMENT 100KG (19 LITRE/BUCKET)	BUCKET	170	
.2	"	MANOL WATER-PROOF 0.5 KG/CEMENT 50 KG (18 KG/BUCKET)	"	420	
.3	"	POZZOLITH 100x12, WATERPROOF & STRENGTHEN 0.125 KG/CEMENT 50 KG (3.785 LITRE/CAN)	CAN	150	
.4	"	SIKA (PLASTOCRETE-N), WATERPROOF & STRENGTHEN 0.25 KG/CEMENT 50 KG (20 KG/BUCKET)	BUCKET	925	
.5	"	HYDROPROOF No.2, WATERPROOF & STRENGTHEN 1.0 LITRE/CEMENT 50 KG (19 LITRE/BUCKET)	"	420	
.6	"	BARA 56, WATERPROOF & STRENGTHEN 0.05 KG/CEMENT 50KG (20 KG/BUCKET)	"	1,120	
17.6	Yw	THINNER CAPACITY 3.785 LITRE	CAN	45	
17.7	Yw	ALCOHOL " 3.785 LITRE	"	33	
17.8	Yy	FLOOR SYSTEM (INSTALLATION & SURFACE MORTAR NOT INCLUDED)			
.1	"	SBP (BLOCK THK 120MM SIZE 415x250MM)	SQ.M	148	
.2	"	CM	"	160 ∿250	
.3	"	PR	"	130	
.4	"	SEACON	"	165 ∿200	
.5	"	THAI CEMENT	"	109 ∿123	
17.9	Yy	SAND PAPER	SOZEN	10	
17.10	Yy	FINE SAND PAPER	"	32∿35	
18	(5-)	MATERIAL & EQUIPMENT FOR PLUMBING, ELECTRICAL, SANITATION, AIR-CONDITION & VENTILATION			
18.1	(53)	PLUMBING EQUIPMENT			
.1	"	METER (JAPANESE MADE) NOMINAL SIZE 15MM	PC	320	
.2	"	" " " 20	"	550	
.3	"	" " " 25	"	755	
.4	"	BRASS VALVE (JAPANESE MADE) " 15	"	86	
.5	"	" " " 20	"	112	
.6	"	" " " 25	"	155	

			UNIT	UNIT PRICE	
				BAHT	SATANE
.7	(53)	CAST IRON VALUE (LOCAL MADE) NOMINAL SIZE 100MM (GATE VALVE) 150 LBS	PC	2,000	
.8	"	NOMINAL SIZE 150MM	"	3.450	
.9	"	" 200	"	5,500	
.10	"	BRASS FAUCET (LOCAL MADE) " 15 (HONGKONG TYPE)	"	20	
.11	"	NOMINAL SIZE 20 (HONGKONG TYPE)	"	26	
.12	"	BRASS W/CHROMIUM COATING FAUCET BRAND NAME (BRIGHT) NOMINAL SIZE 15MM (WALL TYPE)	"	70	
.13	"	NOMINAL SIZE 20MM (LAV. TYPE)	"	80	
18.2	(51)	SEWAGE AERATION TREATMENT SYSTEM W/FITTINGS (INSTALLATION NOT INCLUDED)			
.1	"	SATS GK.100 MODEL INCLUDED W/FITTINGS (FOR 10 PERSONS)	SET	12,800	
.2	"	SATS MA 576 (FOR 50 PERSONS)	"	44,800	
18.3	(51)	CEMENT PIPE			
.1	"	READY-MADE CEMENT PIPE, HOLLOW, HEIGHT=400MM, ϕ800MM	PC	45	
.2	"	" " HEIGHT=400MM, ϕ1000MM	"	60	
.3	"	COVER FOR " , ϕ800MM	"	35	
.4	"	" , ϕ1000MM		45	
18.4	(52)	WATER PUMP			
.1	"	FIDDLE TYPE FOR PIPE-25.4MM, MOTOR 1/3 H.P INCLUDED W/STAINLESS AIR TANK 20 LITRE		2,300	
.2	"	SNAIL TYPE FOR PIPE 25.4MM	SET	3,700	
18.5	(53)	WATER TANK			
.1	"	GALVANIZED STEEL WATER TANK SIZE 1.17x1.17x1.17M (STEEL PLATE No.14 THK 1.0MM)	TANK	1,520	
.2	"	GALVANIZED STEEL WATER TANK SIZE 1.17x1.17x1.17M (STEEL PLATE No.10 THK 1.2MM)	"	1,710	
.3	"	GALVANIZED STEEL WATER TANK SIZE 0.80x0.80x0.80M (STEEL PLATE No.18 THK MM)	"	1,180	
.4	"	WATER TANK (FRP), CAPACITY 2600 LITRES	"	5,200	
.5	"	PLASTIC TANK, CYLINDER CAPACITY 2000 LITRES	"	4,400	

			UNIT	UNIT PRICE	
				BAHT	SATANE
18.6	(57)	ELECTRICAL FAN, AIR-CONDITIONED			
.1	"	VENTILATING FAN (JAPAN) SIZE 203MM (8")	EQUP	920	
.2	"	" (") 305 (12")	"	1,250	
.3	"	AIR-CONDITION (U.S.A.) 10,000 BTU	"	13,875	
.4	"	" (") 12,000 "	"	15,000	
.5	"	" (") 24,000 "	"	22,125	
19	(6-)	MATERIAL & DQUIPMENT FOR ELECTRICAL WORK			
19.1	(61)	ELECTRICAL WIRE (ROUND COPPER), LOVERED W/ INSULATOR & OUTER SKIN-PNA. (100M/ROLL)			
.1	"	PVC 60°, 250 VOLT, DOUBLE CORE SIZE 2x4.0 SQ MM	ROLL	857	
.2	"	" " " 2x2.5 "	"	548	
.3	"	" " " 2x1.5 "	"	359	
.4	"	" " " 2x1.0 "	"	258	
.5	"	PVC 60°, 750 VOLT, SINGLE CORE SIZE 1x4.0 "	"	349	
.6	"	" " " 1x2.5 "	"	232	
19.2	(63)	ELECTRICAL FITTINGS & LIGHTING FIXTURE			
.1	"	SWITCH (SINGE) 3 LINE, WALL CONCRETE TYPE (VETO)	PC	25	
.2	"	" (") " " (TICHINO)	SET	80	
.3	"	" (") " " (UROPA)	"	75	
.4	"	PLUG (") WALL CONCEAL TYPE (VETO)	PC	20	
.5	"	" (") " (TICHINO)	SET	83	
.6	"	" (") " (UROPA)	"	78	
.7	"	EGG SAAPE SWITCH (VETO)	PC	12	
.8	"	SHORT CUT SWITCH, 25 AMPERE (TICHINO)	"	235	
.9	"	CIRCUIT BREAKER 1 P, SIZE 10-25 AMPERE	"	75	
.10	"	SWITCH PANEL 12 PARTS	PANEL	630	
.11	"	BALLAST 40 WATTS (PHILLIPS)	PC	48	
.12	"	STARTER 40 " (")	"	8	
.13	"	FLUORESCENT LAMP 40 " (")	"	37	
.14	"	STEEL FIXTURE W/EXTENSIONING FOR FLUORESCENT LAMP (2x40 WATT)	SET	120	
.15	"	SQUARE, GLASS CEILING FIXTURE SIZE 200x200MM	"	75	
.16	"	ELECTRICAL LAMP 60 WATT	LAMP	9	
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			UNIT	UNIT PRICE	
				BAHT	SATANE
20	(7-)	EQUIPMENTS - FACILITIES			
20.1	(74)	TOILET FIXTURE WATER CLOSET (W/SEAT & TANK FITTINGS)			
.1	"	W.C. EASTERN STYLE, PAIL-FLUSH TYPE, WHITE VITREOUSCHINA (No.TF-100)	PC	130	
.2	"	W.C. EASTERN STYLE, PAIL-FLUSH TYPE, WHITE VITREOUSCHINA (SQUAT 2)	"	140	
.3	"	W.C. EASTERN STYLE, PAIL-FLUSH TYPE W/PEDESTAL WHITE VITREOUSCHINA (No.TF-100P)	"	500	
.4	"	W.C. EASTERN STYLE, PAIL-FLUSH TYPE W/PEDESTAL WHITE VITREOUSCHINA (SQUAT 1)	"	500	
.5	"	W.C. EASTERN STYLE, FLUSH TYPE, WHITE VITREOUSCHINA (No.TF-100F)	"	320	
.6	"	W.C. EASTERN STYLE, FLUSH TYPE, WHITE VITREOUSCHINA (SQUAT 2F "S")	"	280	
.7	"	W.C. EASTERN STYLE, FLUSH TYPE W/PEDESTAL, WHITE VITREOUSCHINA (No.TF-100FT)	"	650	
.8	"	W.C. EASTERN STYLE, FLUSH TYPE W/PEDESTAL, WHITE VITREOUSCHINA (SQUAT 1F FLUSH)	"	650	
.9	"	W.C. WESTERN STYLE, W/TANK, WHITE VITREOUSCHINA (No.TF-2106)	SET	1,600	
.10	"	" " " (No.C73)	"	1,300	
.11	"	" " COLOR VITREOUSCHINA (No.TF-2106)	"	1,850	
.12	"	" " " (No.C73)	"	1,600	
.13	"	W.C. EASTERN STYLE, PAIL FLUSH TYPE W/PEDESTAL-TERRAZZO	PC	60	
20.2	(74)	TOILET FIXTURE URINAL, BIDET (FITTINGS NOT INCLUDED)			
.1	"	URINAL, WALL TYPE, WHITE VITREOUSCHINA (No.TF412)	SET	380	
.2	"	" " " (No.U2987)	"	380	
.3	"	BIDET " " (No.TF5002)	"	880	
.4	"	" " " (No.B62)	"	810	

			UNIT	UNIT PRICE	
				BAHT	SATANE
20.3	(74)	TOILET FIXTURE LAVATORY (FITTINGS NOT INCLUDED)			
.1	"	LAVATORY, WHITE VITREOUS CHINA, SIZE 410x510MM (No.TF-911)	SET	300	
.2	"	" " SIZE 420x510MM (No.B01)	"	280	
.3	"	" " SIZE 330x510MM (No.TF-910)	"	180	
.4	"	" " SIZE 305x510MM (No.B02)	"	180	
.5	"	" COUNTER TOP, COLOR VITREOUS CHINA, SIZE 430x510MM (No.TF-476)	"	880	
.6	"	" COUNTER TOP, COLOR VITREOUS CHINA; SIZE 450x560MM (No.B07)	"	830	
20.4	(74)	TOILET FIXTURE - CAST IRON BATH TUB - WHITE, WITHOUT HAND RAIL SIZE 800x1700MM, FITTINGS INCLUDED (BRITISH)	SET	5,800	
20.5	(74)	TOILET FIXTURE - SOAP DISH, PAPER HOLDER, SHELF			
.1	"	SOAP DISH - COLOR VITREOUS CHINA, SIZE 106x222MM (No.TF-9000)	PC	65	
.2	"	" " (No.A48)	"	65	
.3	"	PAPER HOLDER " SIZE 146x151MM (No.TF-9001)	"	65	
.4	"	" " (No.A66)	"	65	
.5	"	SHELF " SIZE 510MM (No.TF-9075)	"	225	
20.6	(74)	SHOWER HEAD, HARD CORE & BRASS COATED W/CHROMIUM FLANGE (BRIGHT)	SET	85	
20.7	(74)	TANK FITTINGS (FLUID MASTER)	"	395	
20.8	(71)	ALUMINUM BLIND (PST)			
.1	"	SIZE 35MM	SQ.M	335	
.2	"	SIZE 50MM	SQ.M	310	
		CONSTRUCTION MATERIAL PRICE LIST - OCTOBER 1979 BY BUILDING RESEARCH DEPT. (INSTITUTE OF SCIENTIFIC RESEARCH & TECHNOLOGY OF THAILAND)