# THE DESIGN OF A COLLEGE PREPARATORY BOARDING SCHOOL FOR THAILAND

by 6408

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Approved by:

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## I. INTRODUCTION

A large majority of the people in the developing countries, prior to the second world war, had very little, if any, formal school training. To these nations, it seems almost axiomatic that once they have passed through the first ordeal of development, usually through the establishment of the type of government they desire, the next main push is towards the cultivation of its people, at least of the primary and technical training that a population needs to enter the socially developed world. In this drive towards the cultivation of its people, there is an increasing awareness of the value of education as an avenue to better economic opportunities, improved living conditions, and on the whole, to a higher level of national development.

In view of the above, the government has undertaken educational programs that would cater to the needs of the people and contribute to the advancement of the country as well. However, while the government is cognizant of the need for educational facilities for all levels, its program is hampered by problems that beset higher institutions of learning, like financial difficulties and the lack of trained personnel. An approach towards the solution of these problems is the strengthening of the lower educational levels, which would prepare the individual

for higher learning at the university level and yet provide him with the basic training and skills necessary for him to make a living should he fail to go to the university for further training in the professions.

It is more in relation to this approach to the problem that this project for a college preparatory boarding school in the southeastern region of Thailand is proposed.

## II. THE GEOGRAPHICAL AND PHYSICAL BACKGROUND OF THAILAND

Thailand, situated in the heart of Southeast Asia, has an area of approximately 200,000 square miles, making it almost as large as France. The country has common frontiers with Loas on the north and east, with Burma on the north and west, and with Cambodia to the south and east. To the south of the Thai mainland and to the east of peninsular Thailand lies the Gulf of Siam. Peninsular Thailand is bounded on the south by Malaysia. (See map on page 11 and 12)

The country is tropical but presents a regionally varied landscape of forested mountains, relatively dry plateaus and fertile river plains. A broken mountain upland in the north rises above the low platform of the Khorat Plateau in the northeast. West of the plateau is the Central Plain, stretching from the mountains in the north some 300 miles to the Gulf of Siam and from the scarp of the Khorat Plateau on the east 150 miles to the foothills of the Western Mountains. The plain is the basin of the Chao Phraya River and its tributaries. The bulk of the country's staple food crop and principal export, rice, is produced in the fertile soil deposited by these rivers. The Chao Phraya River basin is the focus of national life.*

---

*Area Handbook for Thailand, June 1963, by George L. Harris and Jackson A. Giddens.

The national capital, Bangkok, is situated above the river mouth about 15 miles north of the Gulf of Siam. Peninsular Thailand is an extension of the mountain range to the west of the Central Plain.

Thailand can be divided into five main divisions: the Northern Region, the Northeastern Region (principally the Khorat Plateau), the Central Region (Chao Phraya River basin), the Southeastern Region, and the Southern Region (the Peninsula).

1. The Northern Region

The mountainous Northern Region, with an area of about 42,000 square miles, is drained by numerous streams. Those of the extreme north join the Mekong; those of the extreme west join the Salween. The majority, however, flow southward and eventually join the Chao Phraya. The terrain is marked by a series of parallel north-south mountain ridges and deep, narrow alluvial valleys. Except where scarred by the clearings of the mountaineers or interrupted by masses of bare rock, the ridges are covered with thick forests which yield valuable timber. Villages and towns are clustered in the valleys. The political and commercial center of the region is Chiengmai.

2. The Northeastern Region (Khorat Plateau)

The 66,000 square miles of the Northeastern Region is almost one-thind of the country's total area. Its long dry season and relatively scarce rainfall make it the least

favoured region in Thailand. Natural vegetation is limited to scrub forests, reeds and grasses. With its poor communications and impoverished mixed farming and stock raising, it poses a serious challenge to the national authorities in their economic planning.

3. The Central Region (Chao Phraya Basin)

The central region -- the basin of the Chao Phraya -- is the political and economic heart of the nation. Bangkok and adjacent Thon Buri constitute by far the largest urban area in the region, but there are other important centers such as Ayudhaya, Lop Buri and Rajburi. The low gradient of the river valley makes it a catch basin for the heavy monsoon rains which slowly drain off in the sluggish streams.

4. The Southeastern Region

To the east and southeast of Bangkok a small area of hills and mountains, some rising to 3,000 feet, is largely covered by a dry forest. Most of the valley, however, consists of wide expanses which are treeless or sparsely overgrown with tall palms and clumps of bamboo. There are many coastal views along the coast of the Gulf of Siam in this region.

5. The Southern Region (Peninsula)

Peninsula Thailand, with an area of about 30,000 square miles, was acquired in the expansion of the Thai Kingdom down the Malaysia Peninsula between the fifteenth

and the nineteenth centuries. The population is predominantly Moslem Malay, with small numbers of Thai and Chinese. The economy is based on tin mining, rubber and other tropical crops. The chief towns are Songkla, Puket, and Nakorn Srithamaraj.

## III. RELIGION IN THAILAND

Buddhism is the established religion of Thailand. The king, though protector of all religions, must be Buddhist. Other religions -- Brahmanism, Islam, Christianity, the Chinese religios complex and the animism of the hill peoples -- are represented in Thailand, but their followers make up less than 7 percent of the population, and none is expanding rapidly. There is, obviously, a close relationship between the monarchy, the government, the educational system and the Buddhist religion. The schools are required by law to set aside regular periods for religious holidays.

## IV. LANGUAGE IN THAILAND

More than 30 languages are spoken in Thailand, but of these, Thai is the native language of the majority of the people. Chinese languages and dialects are spoken by the next largest group of persons in the country. Although the size of the Chinese speaking community can only be estimated, it is likely that there are not less than 4 million ethnic Chinese in Thailand; most are concentrated in the Central Plain and in Peninsula Thailand. Malay, with an estimated 800,000 speakers, is the next most important language in Thailand. The Malaysia are concentrated in the four southernmost provinces of the Peninsula.

## V. ECONOMY OF THAILAND

Thailand has a prosperous agrarian economy which in

1962 had been growing for a decade at the rate of 5 percent a year. All sectors of the economy with the exception of forestry have shared in this expansion. Along with the gain in total output and an accompanying growth of exports, a significant diversification of economic activity has taken place. The principal exports are, as they have been throughout the modern period, rice, rubber, tin and teak. Rice continues to be the most important single product of the economy, however the largest recent increases in agricultural output have been in other crops, especially rubber, corn, tapioca, fibers and a variety of fruits, vegetables and livestock products. An industrial sector, though small, has expanded rapidly with the establishment of enterprises producing light industrial goods such as textiles, paper, cement, glass and sugar. Tin production has continued at peak levels while communications, transportation and construction have greatly increased their contribution to the national income.

## VI. FAMILY AND PATTERN OF LIVING IN THAILAND

Various types of families are found among the numerous ethnic minorities. The predominant type, that of 85 percent of the population -- which is rural Thai -- is the simple nuclear family of husband, wife and children. This family generally becomes a small extended family as a result of the temporary presence of a married older child and spouse, and by the permanent inclusion of the spouse

of the youngest child. The basic unit of village society, however, is not the nuclear family as such, but the household, which at times may contain more than one nuclear family. Except for the aristocracy, concentrated in Bangkok, which derives its status from its connections with the king through males, and except for occasional families of commoners with aristocratic or official antecedents, the majority of people in town or country show little interest in genealogies and feel strong bonds of sentiment only for kinsmen within the circle of grandparents, parents, aunts, uncles, brothers, sisters and cousins among whom they grew up and with whom they continue to associate. Condition of life in the town's constricted living place, high cost of living, and low level of income, greater frequency of individual rather than family enterprise and labor, tend to prevent many poorer urban households from including a married daughter or spouse.

The basic socioeconomic unit of rural Thailand is the household, which usually is the nuclear family of a married couple and their children. Each such family is regarded as an essentially independent unit in a widening circle of kinsmen on both maternal and paternal sides.

## VII. CLIMATE IN THAILAND*

The monsoonal alternation of wet and dry seasons characteristic of the general area is complicated in

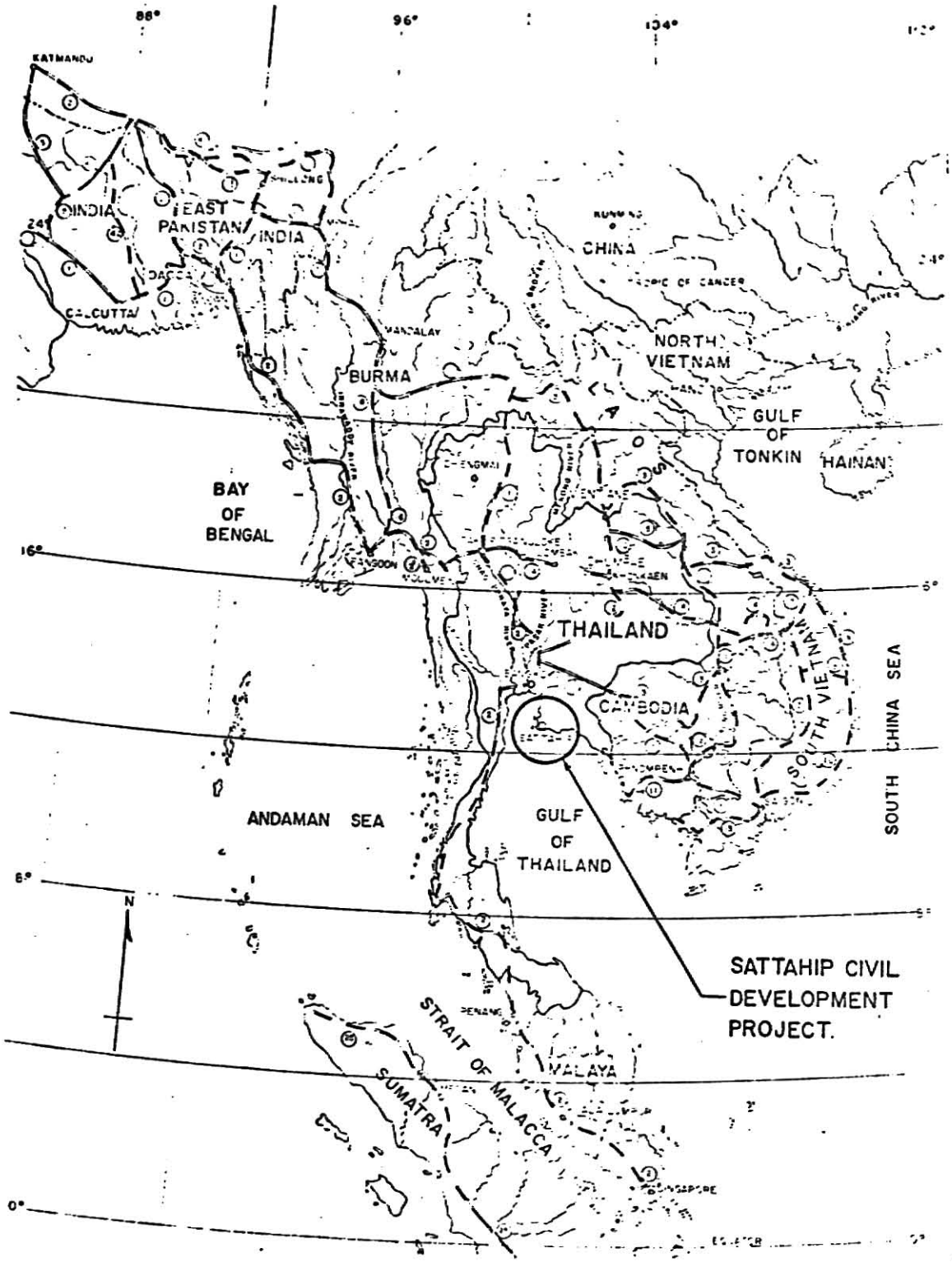
*Area Handbook for Thailand, 1963. George L. Harris, Jackson A. Giddens.

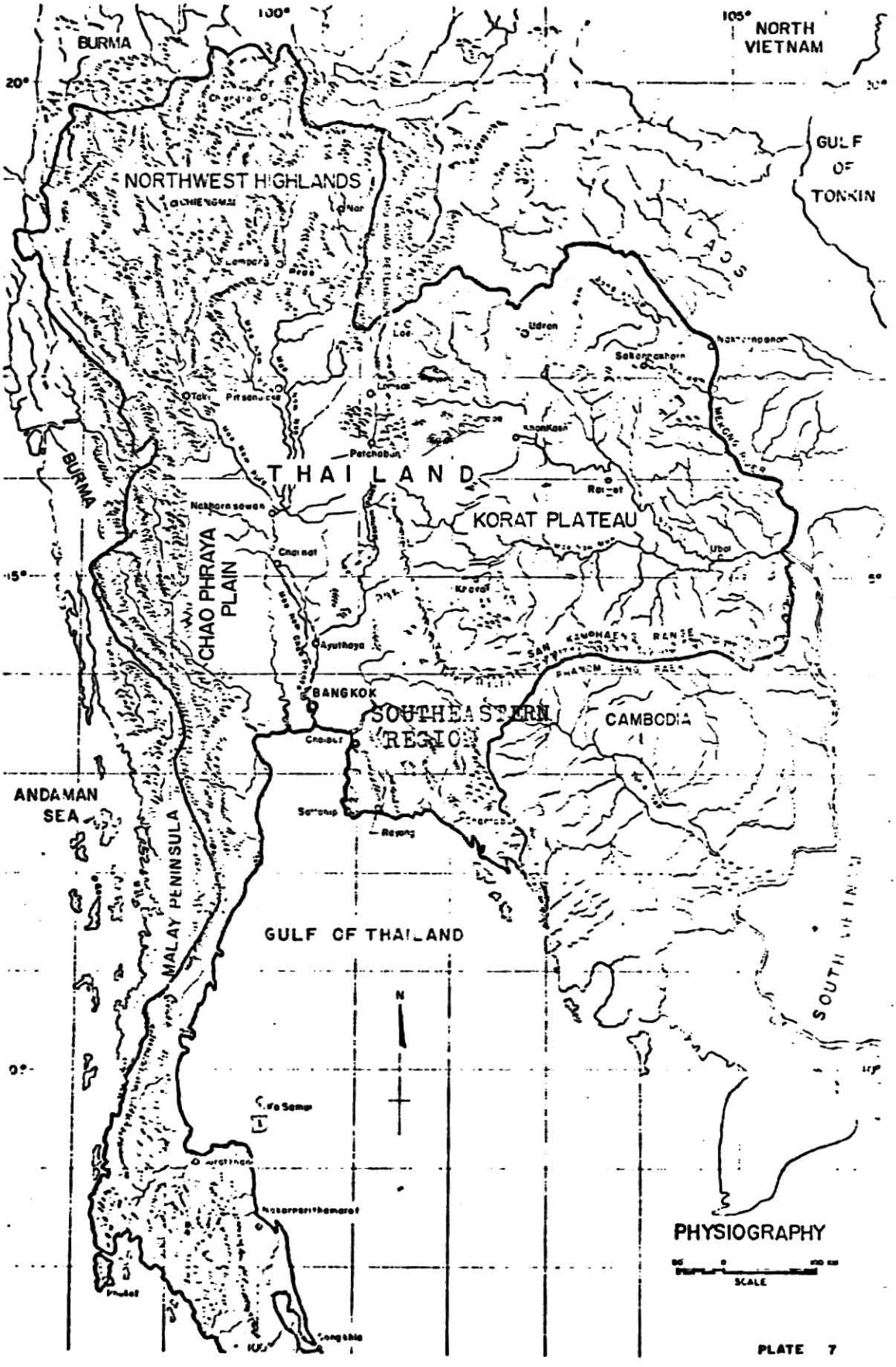
Thailand by topography. The basic pattern is determined by the moisture-laden southwest wind which blows in from the sea from about May to October and the dry northeast wind which comes down out of the continental land mass during the rest of the year. Although the two-season cycle prevails over most of the country, the narrow peninsula receives rain almost throughout the year, with the bulk of it falling between October and January. Conditions are similar in the southeast. By contrast the western part of the Central Region, and especially the western Khorat Plateau, receives little moisture and may experience actual drought during the dry seasons. The range of these local extremes in average annual rainfall is from 30 to 120 inches. Temperatures also vary regionally and with the season, from about 65 degrees F., in the cool months of December, January and part of February to as high as 100 degrees F during the hot months of March, April and May. The cool season occurs when the prevailing winds come over wintry lands to the northeast, and the warm season comes when the skies are cloudless and the sun is gaining in altitude.

Thunderstorms in the afternoon and early evening are common between May and October in the northern areas and between March and November in the south. Toward the end of the dry season and again at the end of the rainy season typhoons of considerable violence sweep across the

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88°
96°
104°
KATMANDU
INDIA
EAST PAKISTAN
INDIA
CALCUTTA
CHINA
TROPIC OF CANCER
MANDALAY
BURMA
NORTH VIETNAM
GULF OF TONKIN
HAINAN
BAY OF BENGAL
16°
THAILAND
CAMBODIA
SOUTH VIETNAM
SOUTH CHINA SEA
ANDAMAN SEA
GULF OF THAILAND
8°
N
SATTAHIP CIVIL DEVELOPMENT PROJECT.
PENANG
STRAIT OF MALACCA
MALAYA
SUMATRA
SINGAPORE
0°
LEGEND
PROPOSED ASIAN HIGHWAY NETWORK (ECAFE)
ROUTE NUMBER
SOUTHEAST ASIA
SCALE
96°
104°
PLATE 1


BURMA
NORTH VIETNAM
GULF OF TONKIN
NORTHWEST HIGHLANDS
LAOS
THAILAND
KORAT PLATEAU
CHAO PHRAYA PLAIN
BANGKOK
SOUTHEASTERN REGION
CAMBODIA
ANDAMAN SEA
MALAY PENINSULA
GULF OF THAILAND
PHYSIOGRAPHY
SCALE
PLATE 7

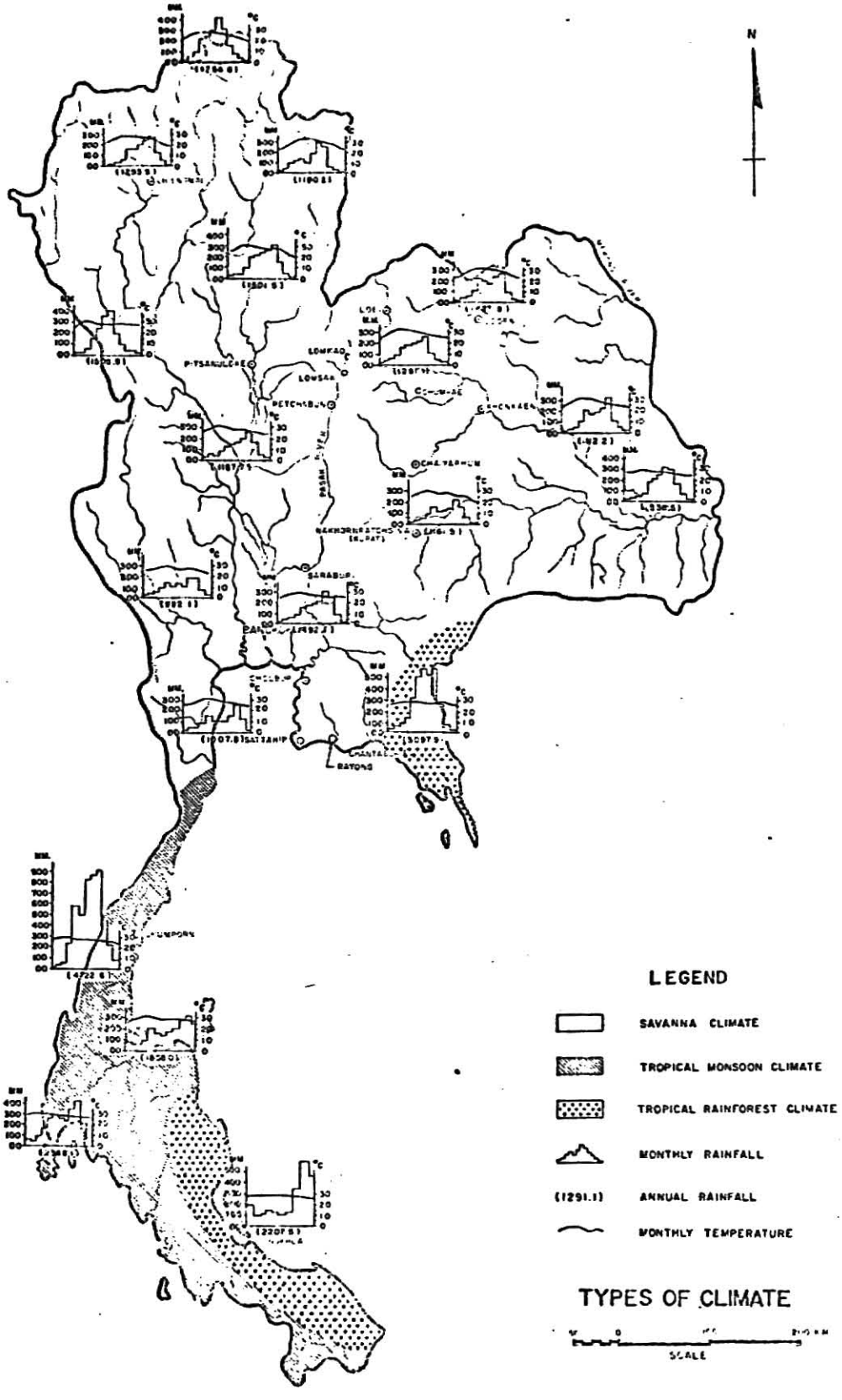
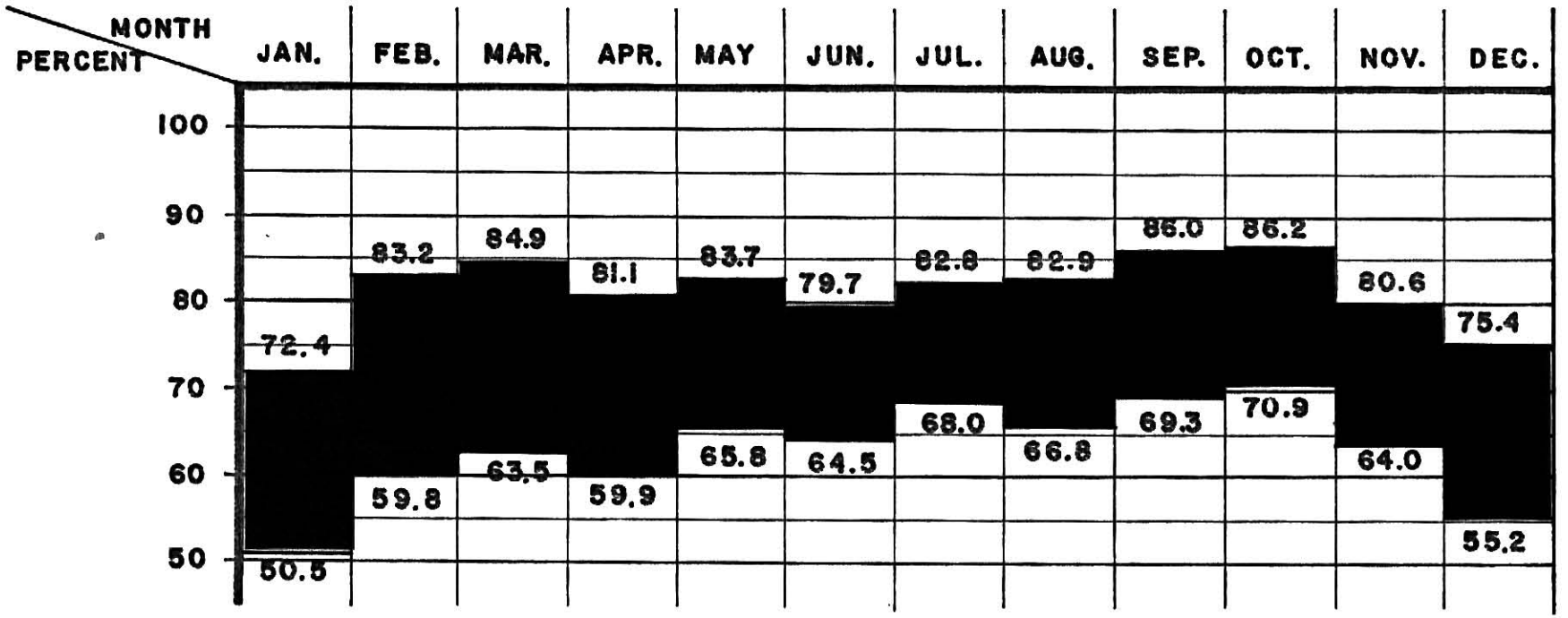

N
LEGEND
SAVANNA CLIMATE
TROPICAL MONSOON CLIMATE
TROPICAL RAINFOREST CLIMATE
MONTHLY RAINFALL
(1291.1) ANNUAL RAINFALL
MONTHLY TEMPERATURE
TYPES OF CLIMATE
SCALE

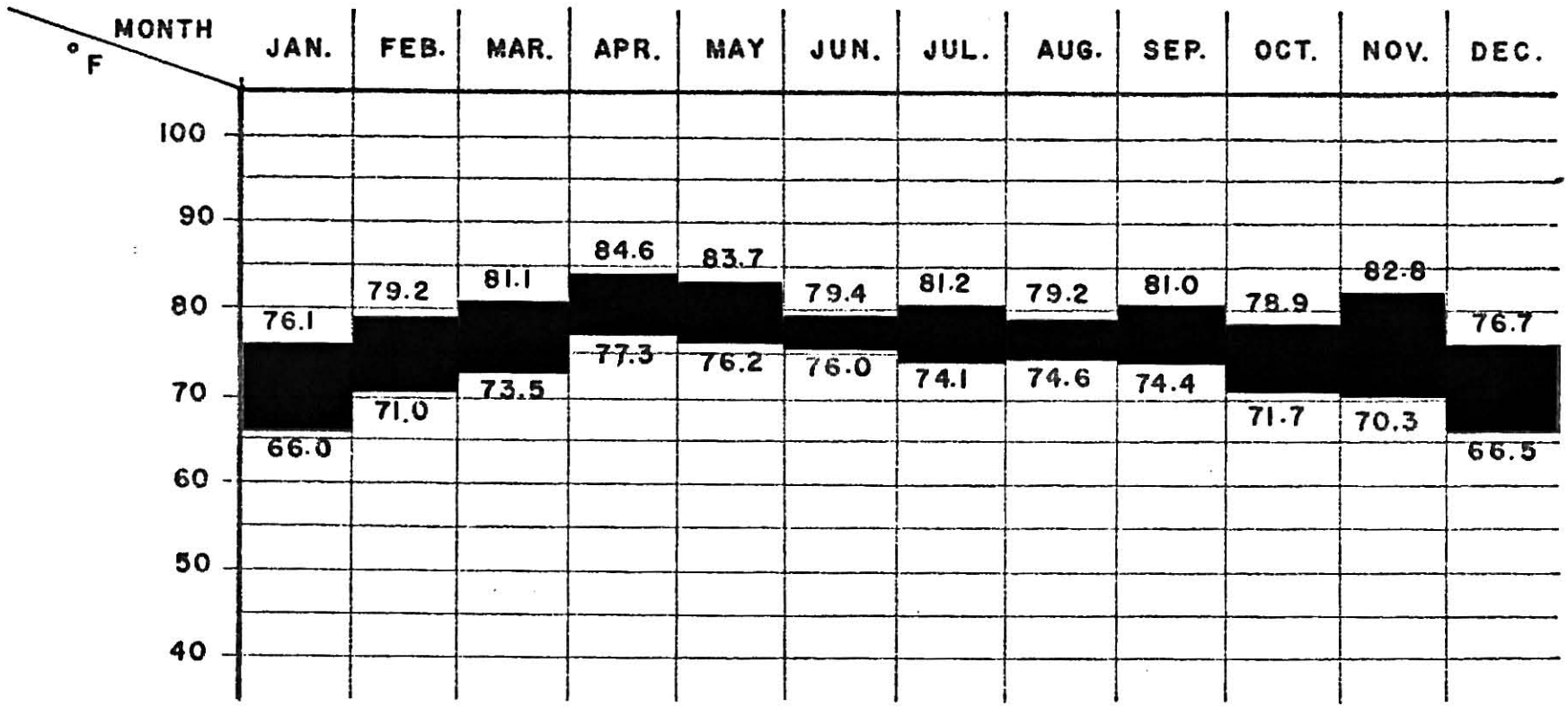
PLATE 3




PLATE 4

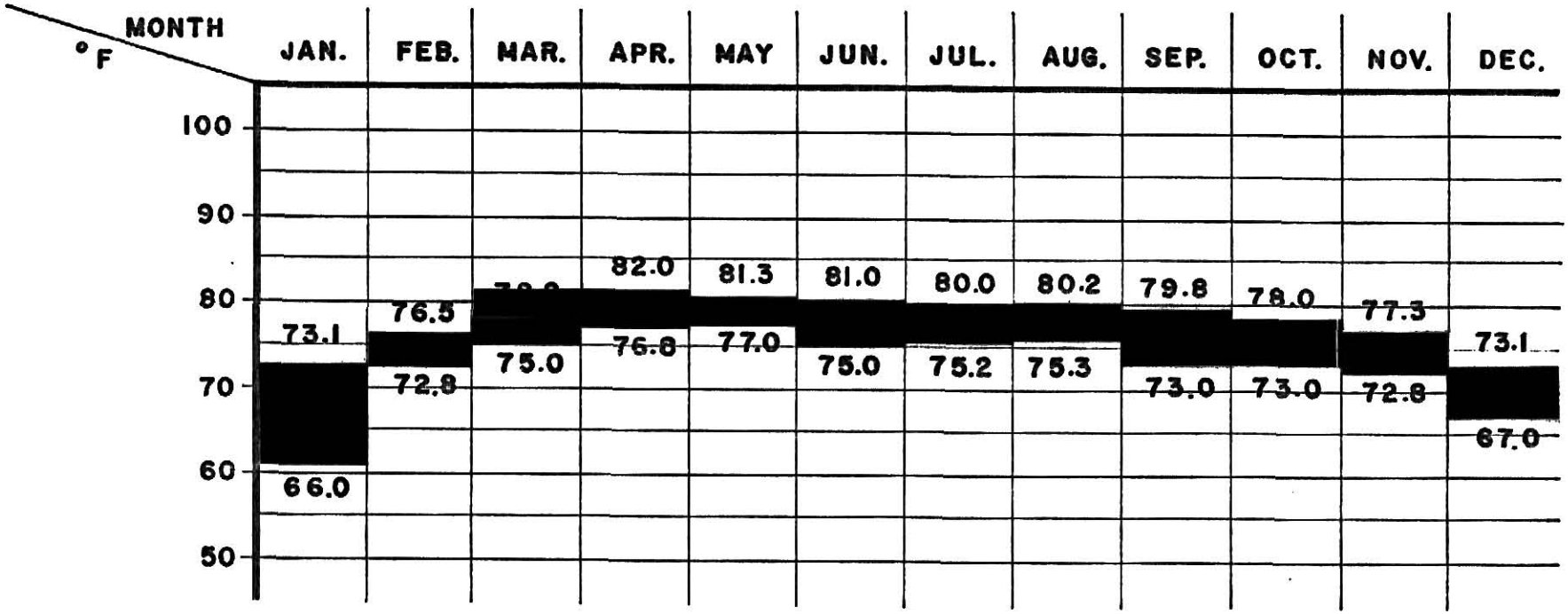



RELATIVE HUIMIDITY
AVERAGE MONTHLY



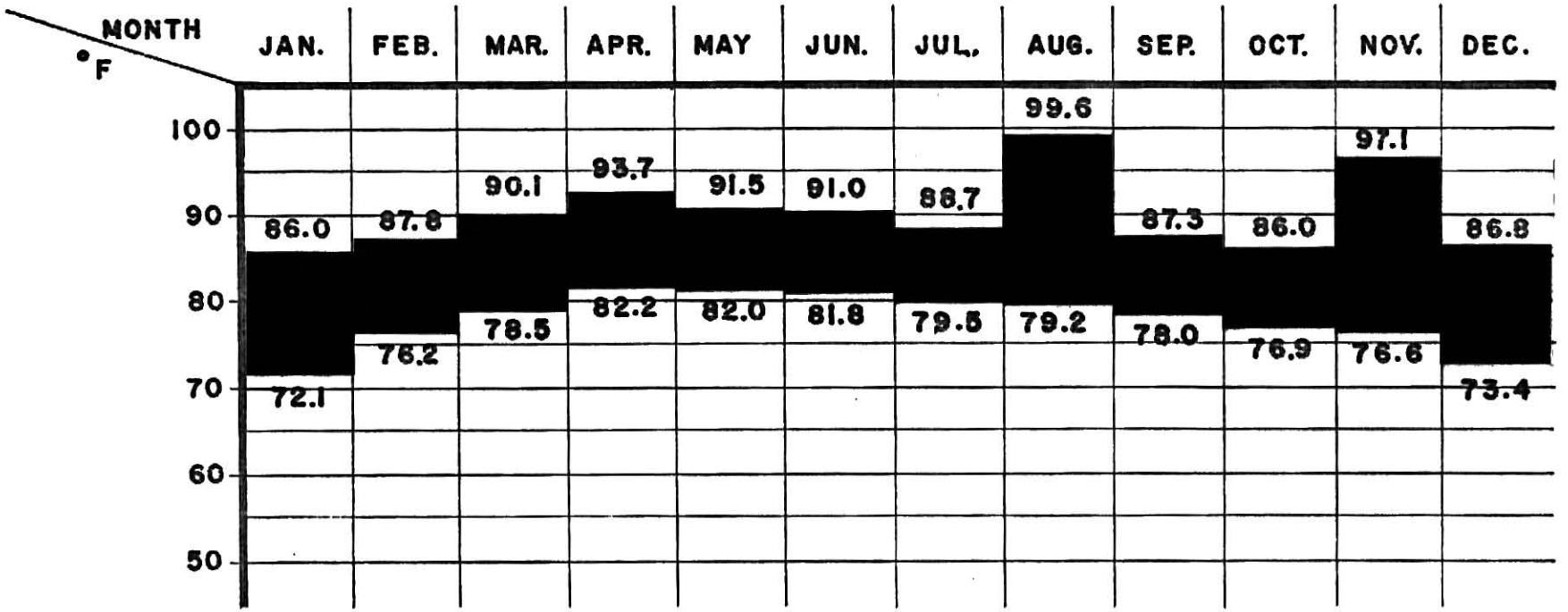

EFFECTIVE TEMPERATURE

AVERAGE MONTHLY



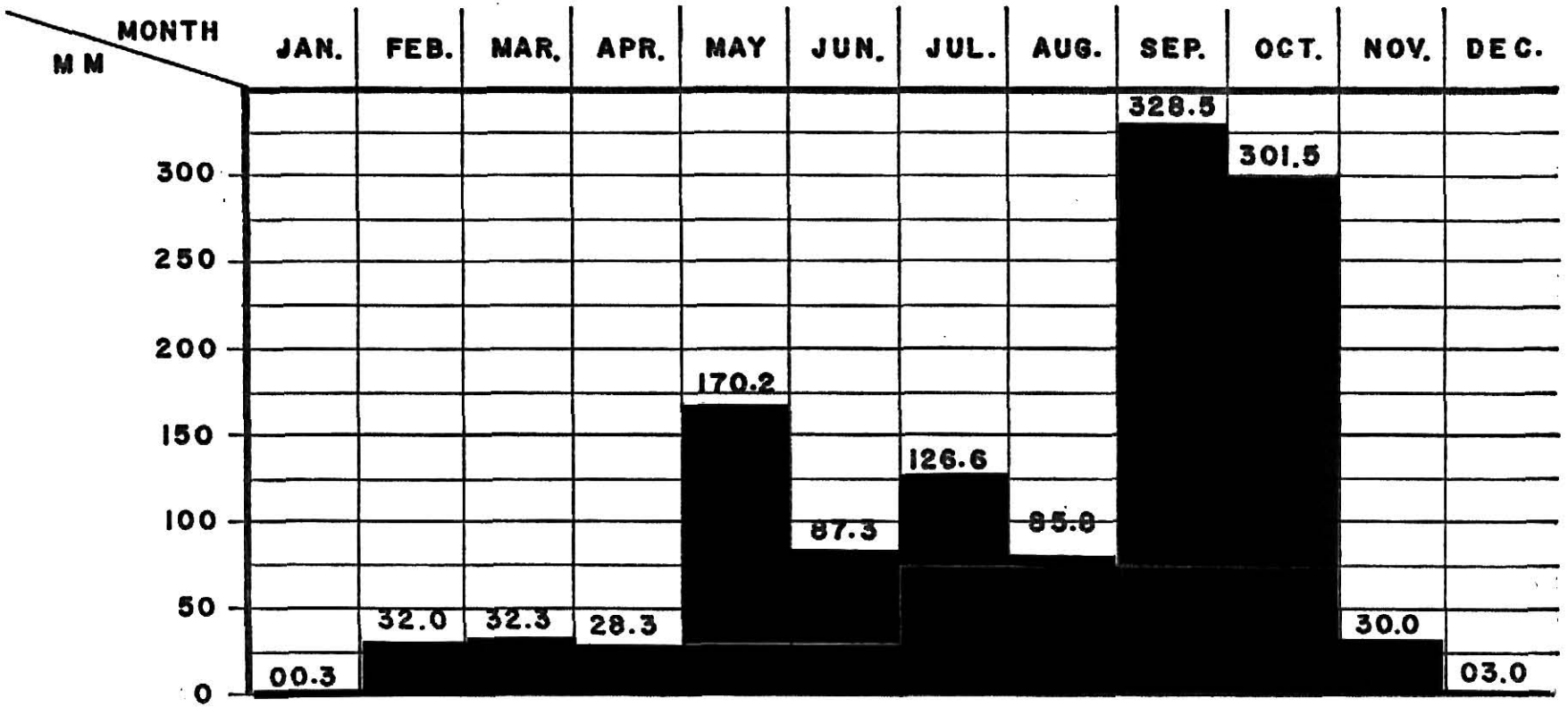

WET BULB TEMPERATURE

AVERAGE MONTHLY




DRY BULB TEMPERATURE

AVERAGE MONTHLY




RAIN FALL

AVERAGE NUMBER

OF DAYS OF RAIN PER YEAR

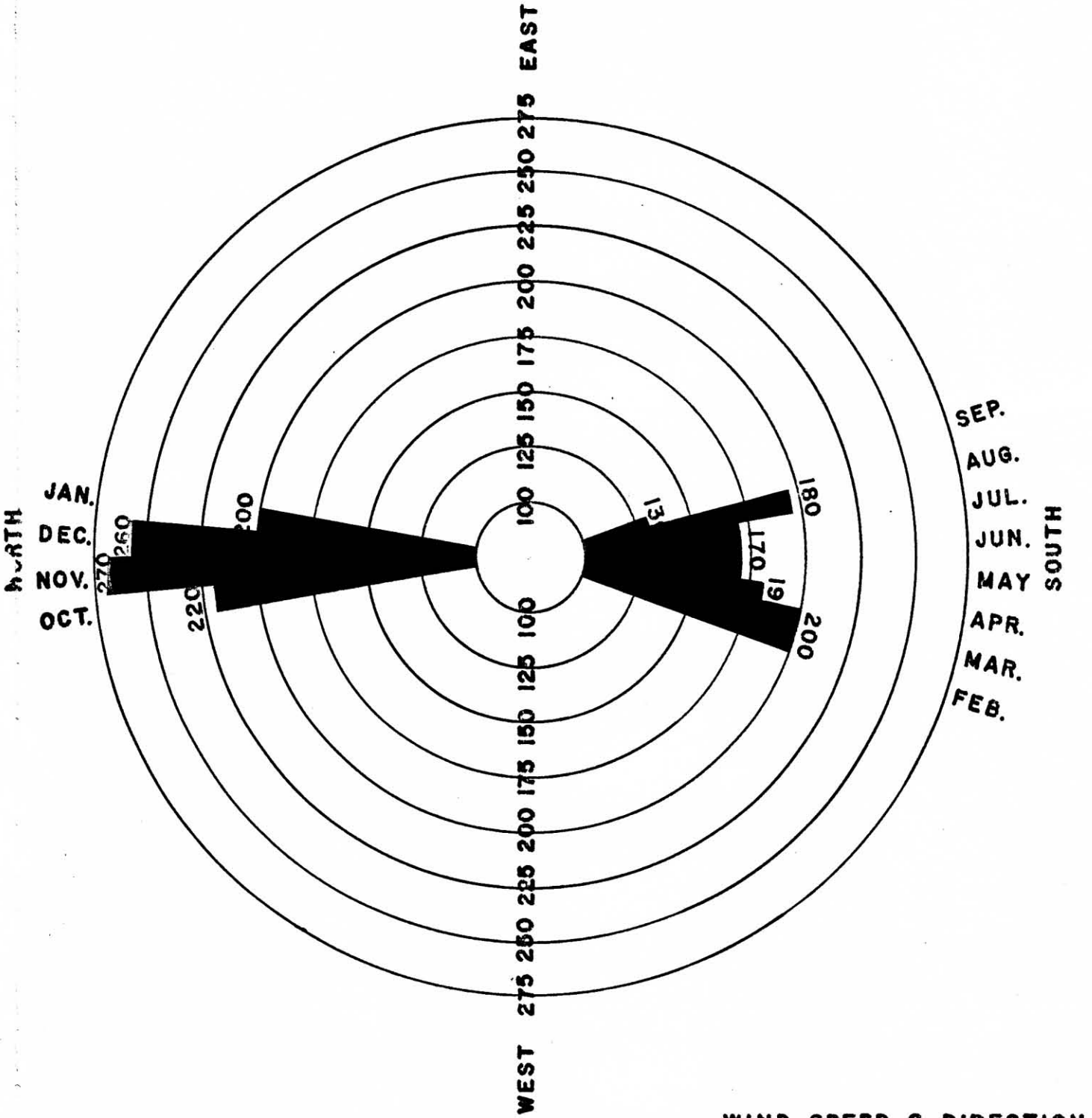
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| AM 7.00 | 66.2 | 71.2 | 74.0 | 77.6 | 76.5 | 76.2 | 74.5 | 74.5 | 74.9 | 71.8 | 70.8 | 66.7 |
| 8.00 | 68.8 | 73.0 | 75.8 | 79.2 | 78.5 | 77.1 | 76.0 | 75.8 | 76.0 | 73.2 | 73.5 | 68.5 |
| 9.00 | 70.9 | 74.9 | 77.4 | 80.8 | 80.0 | 77.8 | 77.8 | 76.5 | 77.8 | 74.8 | 76.3 | 70.9 |
| 10.00 | 72.7 | 76.7 | 78.8 | | 81.2 | 78.2 | 79.0 | 77.9 | 78.9 | 76.0 | 78.6 | 72.5 |
| 11.00 | 74.1 | 77.8 | 79.9 | | | 78.8 | 79.8 | 78.1 | 79.7 | 77.0 | 80.0 | 74.0 |
| 12.00 | 75.1 | 78.4 | 80.3 | | | 79.0 | 80.2 | 78.8 | 80.0 | 77.5 | | 75.0 |
| PM 1.00 | 75.8 | 78.9 | 80.8 | | | 79.2 | 80.6 | 79.0 | 80.7 | 78.1 | | 75.8 |
| 2.00 | 75.9 | 79.0 | 80.9 | | | 79.3 | 80.9 | 79.1 | 80.8 | 78.3 | | 76.0 |
| 3.00 | 76.0 | 79.1 | 81.0 | | | 79.4 | 81.0 | 79.2 | 80.9 | 78.5 | | 77.3 |
| 4.00 | 75.6 | 78.8 | 80.6 | | | 79.2 | 80.6 | 78.2 | 80.2 | 78.0 | | 75.8 |
| 5.00 | 74.5 | 78.0 | 80.0 | | | 78.9 | 80.0 | 77.6 | 79.7 | 77.2 | 80.7 | 74.6 |
| 6.00 | 73.0 | 77.0 | 79.1 | | | 78.5 | 79.2 | 77.0 | 79.1 | 76.4 | 79.0 | 73.2 |

EFFECTIVE TEMPERATURE
AT EVERY HOUR FROM SUN RISE TO SUN SET

COOL

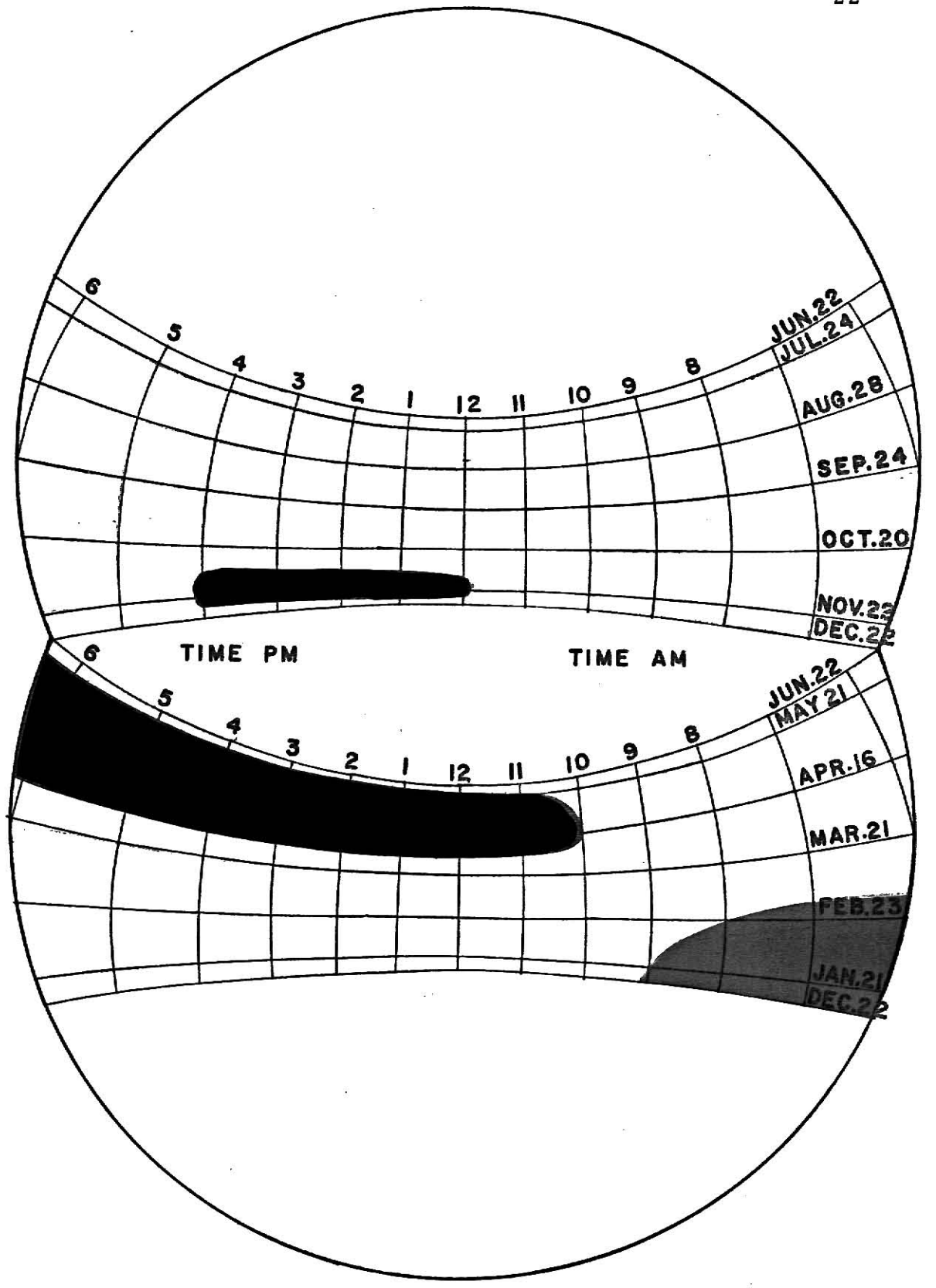
COMFORT

HOT




WIND SPEED & DIRECTION

FEET PER MINUTE




COLD (BELOW 71°F)
COMFORT ( 71°- 81°F )
HOT (OVER 81°F)

EFFECTIVE TEMPERATURE

Indochina peninsula from the south China Sea into Thailand. (See map on page 12)

## VIII. EDUCATION IN THAILAND

### 1. Brief History of Education in Thailand*

Before the establishment of the modern school system in Thailand, the task of providing formal education was chiefly the responsibility of the Buddhist monks. Because of this dominant role of the monks in education, instruction was therefore primarily religious in nature and was in accordance with Buddhist traditions.

The students under this traditional form of education fell into two categories: the novices and the temple boys. The novices, who were preparing for ordination as monks learned reading and writing Thai and Pali (the language of Tharavadi Buddhist writings), arithmetic, and above all, moral and religious precepts. The temple boys were primarily general servants to the monks. The enjoyed far less prestige and gained less merit than the novices, but were allowed to join the classes. Education under the Buddhist monks consisted mainly of writing out texts from the scriptures, memorizing them and later reciting them in unison.

The traditional temple schools, coupled with the group of monks dedicated and accustomed to the task of teaching facilitated the modernization of the educational system.

*Area Handbook for Thailand, 1963. George L. Harris, Jackson A. Giddens.

This process of modernization started in the later half of the nineteenth century upon the initiative of King Mongkut (1851-68) and was followed by his son, King Chulalongkorn (1868-1910). Their contact with the representatives of the Western powers, in a way, influenced their recognition of the need for changes in the Thai educational system. Their chief concern, however, was to increase the efficiency of the government and to train a group of officials to handle the country's relationships with the Western powers.

In 1871, the institution that marked the beginning of modern education in Thailand was founded by King Chulalongkorn -- a school in the palace for the children of the nobility. While providing the future civil servants with basic education, courses in the English language were also conducted. Many of the sons of the nobility who had started in this school proceeded to Europe for further studies. The King's concern for education was made more evident when he encouraged the establishment of private schools by Thai and foreign missionaries, and issued a decree that every temple should offer instruction to the children of its locality. The issuance of this decree marked the beginning of the government's program of education for the general population.

The central government assumed the responsibility of providing education for the people through the establishment of the Department of Education in 1887 (which became a

Ministry in 1928). Plans were later made for a system of national primary education under the leadership of Prince Damrong Rachanuphab. The Prince's British education and the presence of British advisers attached to the Ministry of Education were the major factors responsible for the patterning of the Thai program for national education after that of the British schools.

By the early twentieth century, the government had started a system of state schools and at the same time, had gained control over the existing temple schools. By 1921, 4,000 state schools had been established and the government continued to expand its supervision of schools by assigning education officers to the districts and then to the provinces. In 1917, Chulalongkorn University was founded, combining the existing Civil Service College and the Medical School. This procedure resulted in the expansion of facilities for higher education.

A royal decree of King Vajiravudh (1910-25) in 1921 provided for compulsory education of children between the ages of 7 and 14. The emphasis on widespread primary education gained momentum only after 1935 when a more systematic enforcement of the law throughout the country was started. A major reason for this consistent enforcement of the compulsory education law was the provision in the Constitution of 1932 which called for a fully elected parliament which would come into being as soon as half the

population had completed 4 years of primary education or within 10 years -- whichever accomplishment was sooner. Towards the close of the ten-year period, however, the national leaders shared the sentiment that the educational level of the population had not been raised sufficiently to permit the election of the National Assembly by popular suffrage.

### The Present Period (1932 - present)

In 1952, the 1932 Constitution was amended and contained the provision that, after 5 years, the people of any province could elect all their representatives in the National Assembly when 50 per cent of its population had completed primary education. In 1957, more than half of the population in each of the 14 provinces had completed primary education.

Until April 1, 1961, the educational program had been divided into four levels: the pre-primary level, varying from 1 to 3 years; the primary level, a four-year compulsory general course; the secondary level, which is an academic course in two 3-year stages; and the pre-university level, a 2-year course. Added to these were several kinds of higher education and vocational education at three levels: elementary, intermediate and advanced. Under this educational program, the major emphasis was placed on the elementary level. Like the other educational programs in developing nations, this program was not spared from the

problem of limited facilities, thus restricting the provision of secondary and higher education to only a small segment of the population.

In 1960, the country's first Six-Year Plan (1961-66) dealing with both economic development and educational reform was announced. The section dealing with education provided recommendations for a shift in emphasis in the curriculum and called for important changes in the educational cycle. The pre-primary level was to remain unchanged, but the primary stage was to be extended from 4 to 7 years and the secondary level was to cover a 5-year period. The higher levels within this 5-year period were to incorporate the 2-year pre-university course. The change was to become effective on April 1, 1961. This new plan involved a considerable reorganization of the educational system and therefore necessitated gradual implementation. The target date set for the over all change in the primary school system in the country from a 4 to a 7-year course is 1970.

With the growing involvement of the government in the educational program throughout the years, there has been a corresponding increase in the educational level of the population. Official figures show that in 1947, literacy was only 40 per cent among women and 67 per cent among men; whereas in 1960, the comparable rates were 61.8 per cent and 80.6 per cent respectively. The total

literacy rate for the whole kingdom, as reported in the 1960 census was 70.8 per cent. The census also revealed that whereas only 12 per cent of persons aged 45 years and over had completed primary school, 60 per cent of those aged 15 to 30 had done so.

## 2. Education System in Thailand

### a. Administration

Since its inception, the state school system has continuously exhibited the characteristic of a centrally controlled set-up. The line of authority descends from the Ministry of Education and from this line, the regional and provincial authorities, the administrators, supervisors and teachers all coordinate to fully implement the educational program and policies in order to achieve the fullest possible level of development of the Thai educational system.

Various means of control are exercised by the Ministry of Education. One of these is through the control of allocation of funds. It must be noted that the government budget is the source of nearly all funds spent on education, and therefore the government has direct control of educational funding. Added to this situation is the fact that the teaching and administrative staffs of all schools except those of the private ones are all considered employees of the Ministry. (See Figure 1 on page 37)

The Minister of Education, who enjoys cabinet rank,

exercises administrative control over the Ministry of Education. Directly under the Minister is the Undersecretary, whose work he supervises together with the work of the eight other departments, namely: Primary and Adult Education, Secondary Education, Teacher Training, Vocational Education, Physical Education, Educational Techniques, Fine Arts and Religious Affairs. The latter two departments were transferred to the Ministry of Education after the abolition of the Ministry of Culture in 1958. The office of the Undersecretary is the headquarters of the provincial administrative system which is based on the division of the country into provinces and districts, in each of which there is an education officer. Working through the provincial governor, this district education officer is responsible to the Undersecretary of the Ministry of Education in Bangkok regarding educational matters in his particular district.

The so-called local and municipal schools in the area are under the jurisdiction of the district educational officer. In contrast to the national government schools, these schools offer only primary level instruction. While the teachers are under the national government payroll, these schools are operated and partially supported by the local authorities. National government aid comes in the form of minimum equipments and partial grants intended for the construction of new buildings. In theory, such schools

are closely supervised by the district education officer, however, in practice, such officers have been unable to maintain close supervision over these schools. The pressure of other departmental duties is the major reason for this, thus depriving the officers the chance to make regular and thorough inspection of these schools.

In the case of the national government schools, the central government takes care of the entire cost of construction and maintenance. They fall under the jurisdiction of the provincial rather than the district education officer. While they were originally established as models for the local and municipal schools, they now offer secondary and vocational training as well as primary level instruction.

In the Central Region, the system of school supervision differs from that in effect in other parts of the country. Schools of all types in this particular region are supervised by the officials of the Ministry of Education in Bangkok, rather than by provincial or district education officers. Control in these schools is consequently somewhat more closely supervised than it is in the outlying areas.

3. School System in Thailand

The present school system in Thailand follows the provisions of the Education Acts Amendment of 1954 which called for the categorization of the school system into

four main levels. These four levels are: (See figure 2 page 38)

1. Pre-primary Education (kindergarten) ages 3-6 years
2. Primary Education (elementary) ages 7-13 years
3. Secondary Education ages 14-18 years
4. Higher Education ages 18, 19-23-24 years

a. Pre-Primary Education

This level of education is mainly provided by private individuals and organizations rather than by the government. More commonly known as kindergarten and nursery school, the preprimary program varies in length from 1 to 3 years during which time the pupils are drilled in the rudiments of reading and writing. These schools, even if training under them is not compulsory, assume an important place in the system for the main reason that a number of primary schools in the country accept only those students who have acquired some reading and writing ability.

b. Primary Education

With the passage of the Educational Compulsory Act in 1960, primary education became compulsory in Thailand, and affected children from 7-13 years of age. Until the early part of 1961, primary education covered a 4-year course of study wherein the curriculum gave emphasis to arithmetic and to reading and writing the Thai language. Geography, history, nature study, civics, morality, health

education, singing and drawing, handicrafts and physical education were also included in the curriculum.

After April of 1961, changes were introduced in the primary system of education, and these changes are now part of the present system. Primary education was extended from 4 to 7 years, with the course of study divided into a 4-year lower level and a 3-year upper level. The latter had been the lower secondary course. Both general academic and basic vocational knowledge and skills are emphasized in this new program.

In the new lower primary school curriculum, the main emphasis is placed on the Thai language and social studies, with 6 to 7 hours each week -- out of a total of 25 -- being devoted to them. Three hours are spent on basic science, mathematics, health education and art education. In the upper primary school, the practical arts receive the main emphasis, and 6 to 8 hours a week are allotted. In this level, English is introduced to the students.

Because of the persistent problem of lack of facilities, such as lack of textbooks, the system of instruction, in many instances, falls back to the traditional method of writing the teacher's words on the student's slate and having the pupils memorize them. This traditional temple type of education tend to exist under the circumstances.

c. Secondary Education

The secondary educational system offers a more advanced curriculum, which includes, among other subjects, the introduction of a study of a foreign language. Prior to 1961, this level of education was divided into two stages: lower and upper with three years in each stage. A two-year preparatory course was offered to those wishing to enter the university. Under the 1961 Six-Year Plan, the 3-year lower secondary course was redesignated as the 3-year upper primary course, the higher secondary course became the lower secondary course and the pre-university became the upper secondary course. This revised secondary education program provided for two branches: the general academic branch and the vocational training branch.

The general academic branch stresses academic instruction and provides the foundation for further studies in higher educational institutions. The vocational training branch, on the other hand, emphasizes vocational and related subjects. In both branches, the total time of instruction is thirty hours a week. Out of this total time of instruction, the lower secondary school curriculum apportions 2 to 3 hours for instruction in such subjects as mathematics, social studies, art education and health education. Thai language takes up 3 hours of instruction and English takes up 4 hours. In the general academic branch, 4 to 6 hours are devoted to practical art; while

in the vocational branch, 17 hours are used up for vocational and related subjects. In the upper secondary schools, similar subjects are taught with Thai, English, social studies and mathematics as core subjects. In this upper level, the vocational branch apportions 18 hours for vocational subjects.

d. Higher Education

Specialized training for the professions is a key objective in higher education. In line with this objective, Thailand's higher education program offers a variety of courses that would prepare the individual students for their chosen profession.

The universities offer 4 to 5 year curricula in many fields leading to bachelor degrees. Graduate level instruction is also provided for, leading to masters and doctorate degrees in medicine and law.

Added to the universities are several other institutions of higher learning which have an important place in the educational system. Among them is the Southeast Asia Treaty Organization (SEATO) Graduate School of Engineering which offers various aspects of civil engineering to both Thai and foreign students. Also, there are two Buddhist ecclesiastical colleges in Bangkok under royal patronage which offer programs of general and religious higher education for members of the Buddhist priesthood.

While the Thai educational system is not spared from the problems and difficulties that plague other systems, it can be noted that it has made considerable progress since the establishment of the first formal institution of learning. The government's dominant role in the educational developmental program has considerable increased the level of literacy in Thailand. An evidence of this is the Compulsory Education Act, plus the other programs and policies that the government has continuously adopted.

4. Boarding Schools in Thailand

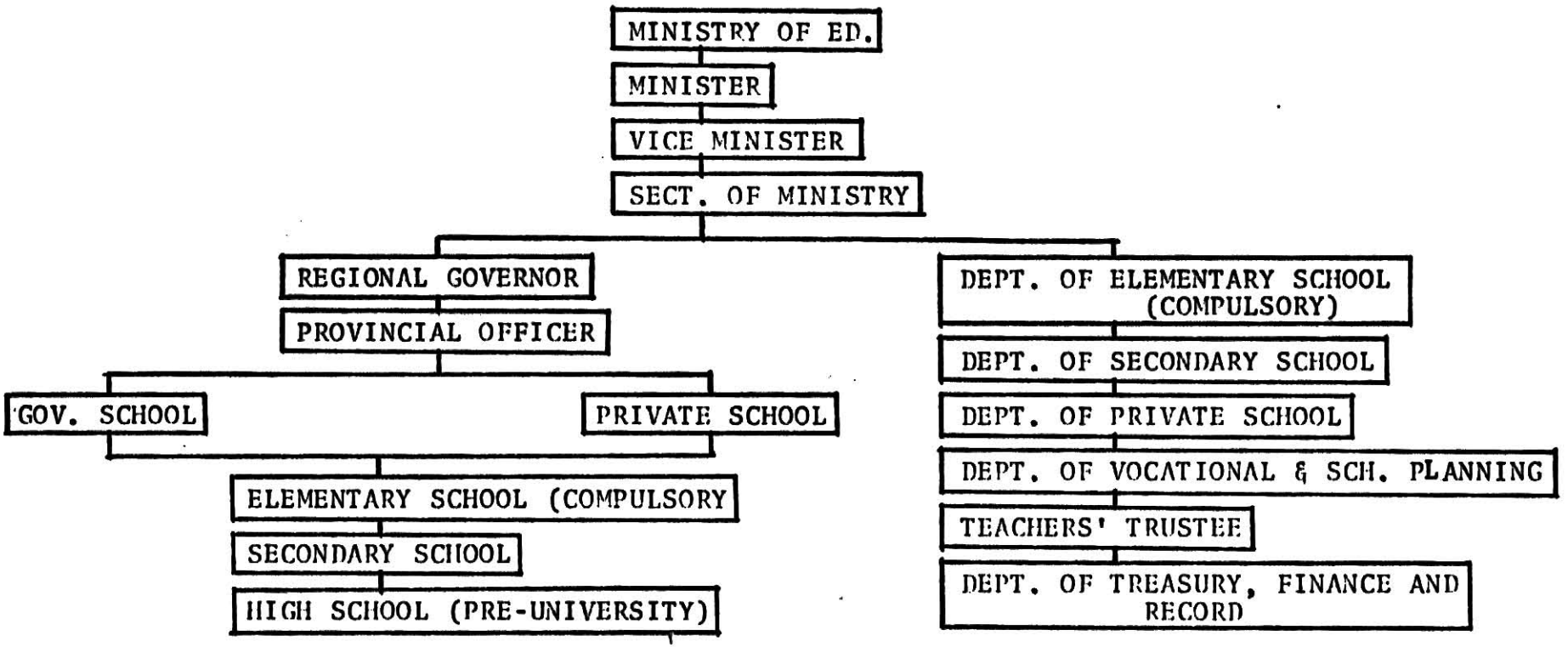
There are only a very few boarding schools throughout the country. The first in the country, Vajiravudh College, is the only boarding school in Bangkok, and was established by King Vajiravudh (King Rama VI) in 1921. It is modeled after English and American private schools, and has since achieved excellence accordingly. Because of lower property values in rural areas, later boarding schools have been established in provinces outside Bangkok. This procedure is becoming justified because of the shortage of daily commuting transportation in rural areas.

Most boarding schools are faithfully adhering to standards set by the Ministry of Education for their curriculum. The daily academic schedule, however, is set independently by each school. Although the academic phase of each boarding school is quite similar to that of most schools throughout Thailand, the extra-curricular

activities in such schools distinquish them from most day schools. Each student is taught to achieve excellence in both body and mind. By living together, each student learns to live with other people and thus learns to adapt readily to most social situations in the future.

In a recent survey made by the Ministry of Education, any new university to be established in regions outside of Bangkok requires living facilities for 85 percent of its students. Campus living is only a very recent phenomenon in Thailand. Because of the need in the future, the establishment of boarding schools in rural areas will ease the transition for each student faced with campus life in a university.

Fig. 1 EDUCATIONAL ADMINISTRATIVE SYSTEM IN THAILAND




MINISTRY OF EDUCATION, BANGKOK, THAILAND, 1964

FIG. 2 COMPARISON OF EDUCATIONAL SYSTEMS

| School | Pratom (G.) | Age | School | Grade | Age |
|---|---|---|---|---|---|
| Kindergarten | 1 | 3-4 | Nursery School | | 3-4 |
| | 2 | 4-5 | Kindergarten | 1 | 4-5 |
| Pre-Primary | 3 | 5-6 | | 2 | 5-6 |
| | 1st G. | 6-7 | | 1st G. | 6-7 |
| | 2 | 7-8 | | 2 | 7-8 |
| | 3 | 8-9 | | 3 | 8-9 |
| Primary School (Compulsory) | 4 | 9-10 | Grade School | 4 | 9-10 |
| | 5 | 10-11 | | 5 | 10-11 |
| | 6 | 11-12 | | 6 | 11-12 |
| | 7 | 12-13 | | 7 | 12-13 |
| | 1 | 13-14 | Junior High | 8 | 13-14 |
| Secondary School | 2 | 14-15 | | 9 | 14-15 |
| | 3 | 15-16 | | 10 | 15-17 |
| High School (Pre-University) | 4 | 16-17 | Senior High | 11 | 16-17 |
| | 5 | 17-18 | | 12 | 17-18 |

## IX. BASIC TOPOGRAPHY AND GEOGRAPHICAL FEATURES OF SATTAHIP

### 1. Climate and Meteorology *

Thailand lies within the monsoon region of Southeast Asia. The Northeast monsoon, blowing from November to mid-March, brings a comparatively dry air mass and moderate temperatures. In mid-May, the Northeast winds give way to the Southwest monsoon with its moist air and consequent heavy rainfall. This period lasts until October. Between the monsoons are transitional periods when the weather is uncharacteristic of either condition. Temperatures are highest during the spring transition period.

In the Sattahip area, the influence of the area causes some modification of this pattern, and rainfall is somewhat more evenly distributed throughout the year than it is in the inland provinces. The peaks of rainfall at Sattahip usually occur in May and in September or October. (See p. 44)

The principal statistics on temperature and rainfall at Sattahip are shown in Tables I-1, I-2, I-3 (p. 49,50,51) whereas general patterns of precipitation and evaporation throughout Thailand are shown in Plates 4 and 5. The heavy storms in the Sattahip area are the cyclonic type, and accompany the southwest monsoons.

### 2. Topography

In this southwest corner of Cholburi and Rayong Changwats, with the sea lapping the west and south sides

*Sattahip Civil Development Program, 1966. Louis Berger, Inc.

of the area, the terrain is characterized by numerous steep and fairly high hills thrusting out from an otherwise flat to rolling plain.

Several rocky islands lie offshore, the largest being Ko Khram Tai, approximately 14 sq. kms. in area.

The northern part of the Sattahip area consists of the shore of Ao Bang Sare and its hinterland, which climbs gently from the sea for four or five kilometers before encountering any hills, of which Khao Khrating is the most prominent (183 m.). Further south, the western shore is backed by a rugged range of hills extending from two to five kilometers inland. Khao Hat Yao (294 m) is the highest peak.

Along the southern coast line, the western end is hilly. Then at the town of Sattahip, the ground drops to a few meters above sea level and continues thus to the east end of Ao Sattahip, where a hilly peninsula, with peaks to 169 m. juts into the sea. Beyond the peninsula is a flat low coastal plain stretching as far as Rayong. The new U-Tapao air base is situated towards the western end of this coastal plain.

Inland, in the angle formed by the west and south coastal boundaries, lies an irregular pattern of flattish plains and steep hills. Further east is the valley of Klong Bang Phai, about five kilometers in width, forming the eastern boundary of the Sattahip area.

3. Hydography

The area is bordered on the west and south by the Gulf of Thailand and is dissected at frequent intervals by streams. Most of these streams flow continually only during the rainy season, however, some are fed by springs in the foothills and maintain flows for longer periods of time.

In the uplands and well drained terraces, the soils remain wet only during and shortly after periods of rain; hence water tables occur at considerable depths.

Some areas along the shoreline are influenced by tidal action and remain wet throughout the year, especially those depressed areas between the beach ridges. Some of these areas are connected with the sea and therefore are saline.

4. Geology

Thailand can be divided into three main physiographic regions, which in turn, can be subdivided into smaller, more distinctive sub-regions.

The Development Planning Area* is situated in the physiographic sub-region of the southeast cost, which is bounded on the west and south by the Gulf of Thailand, on

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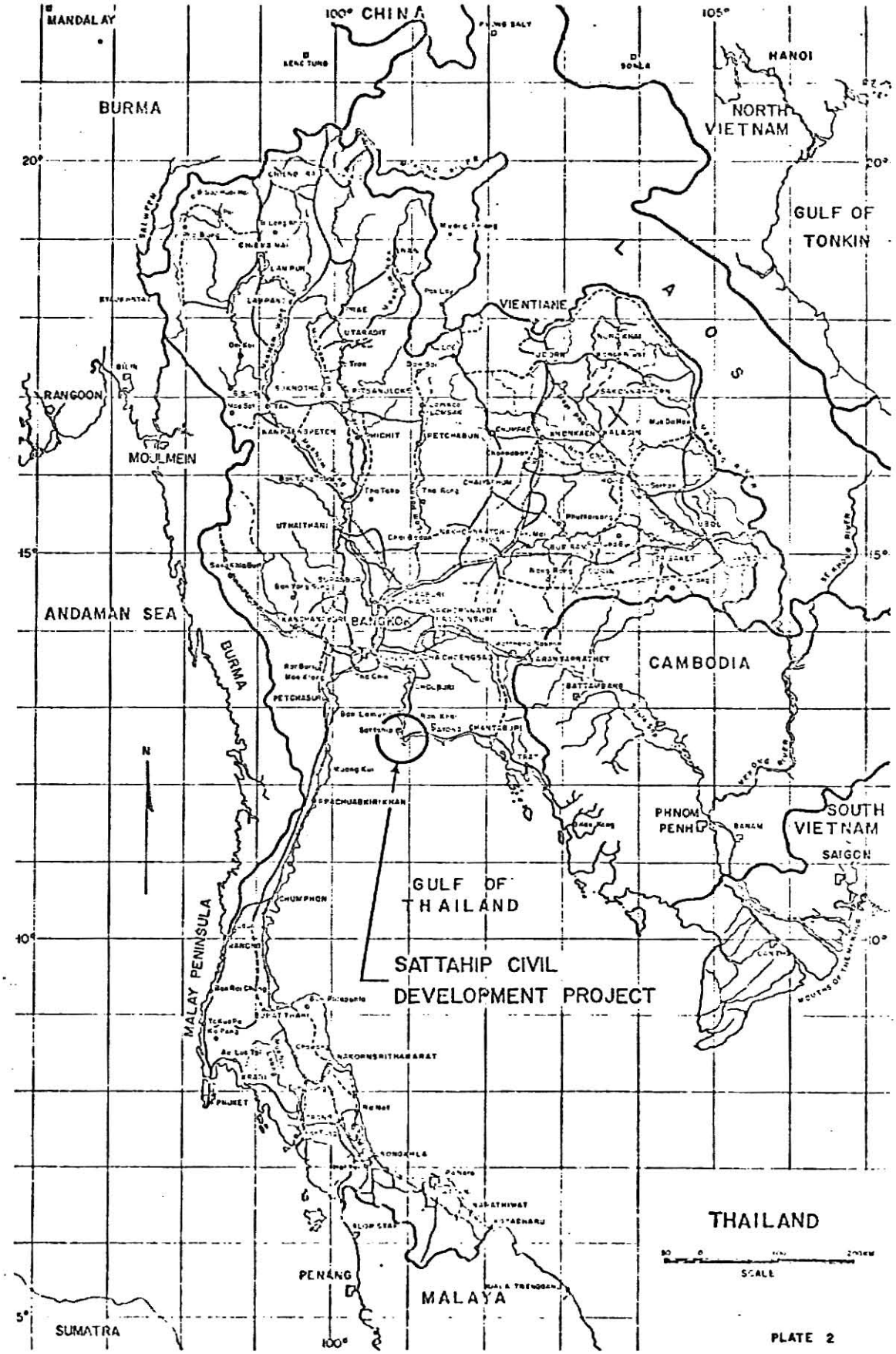
*Development Planning Area is the locale of a government project in the Southeastern region of Thailand. It covers most of Sattahip province, wherein the proposed site of this Boarding School complex is located. See map on p. 43.

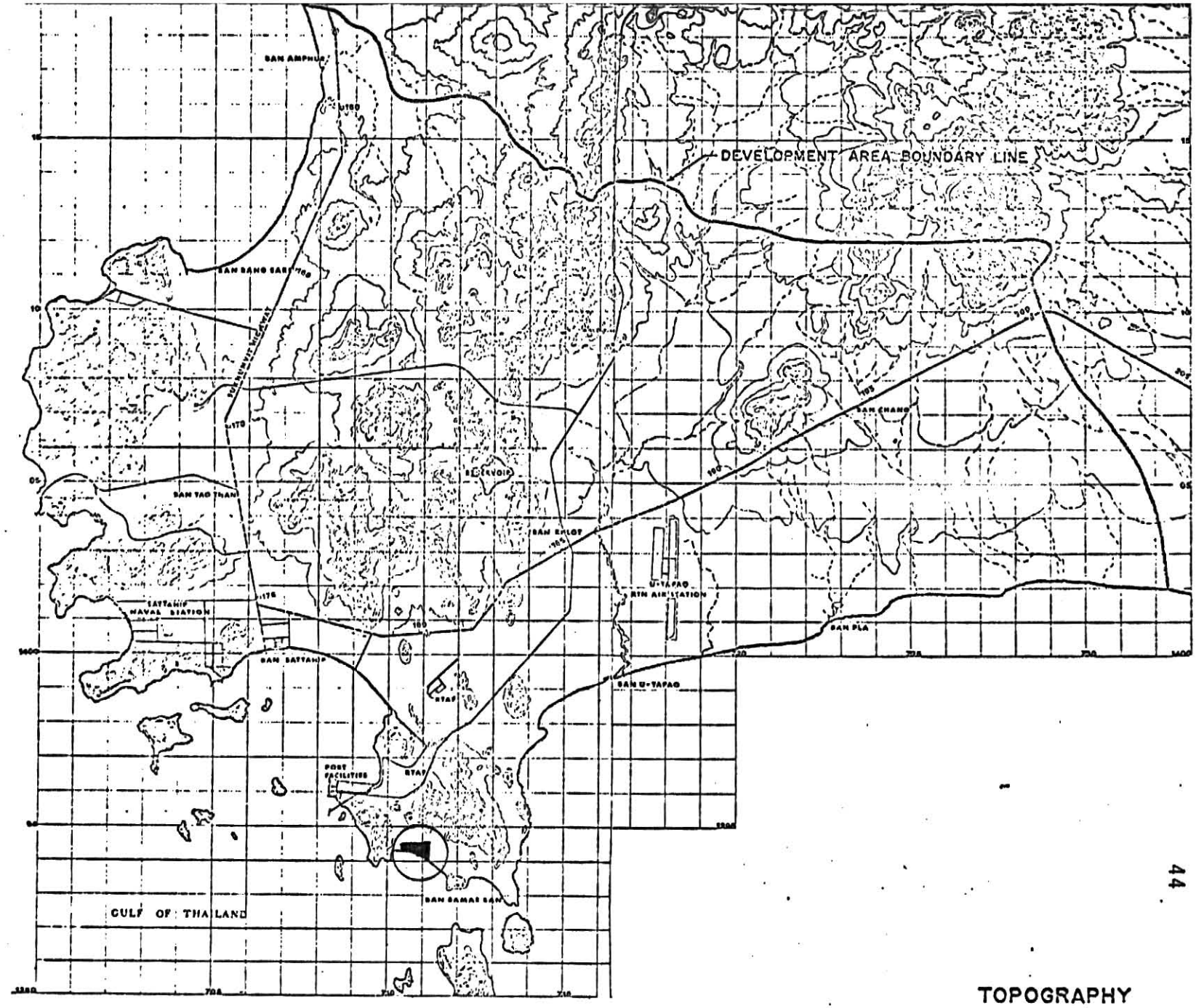
east by the flat-topped hills of the Ban-Thai Range, and on the north by the hills and mountains along the southern edges of the Prachin River valley.

The westernmost section of this region contains mountainous terrain that thins to shallow valleys and hills in the east. The central section is moderately rugged with steeply sloped hills rising to 300 meters above the relatively narrow alluvial valleys and flood plains. Low hills and broad valleys comprise the eastern-most section. The mountain ranges in this region all have north-south strikes which parallel the Chao Praya depression and the western edge of the Korat Plateau.

The flat coastal plains that seperate the hills from the Gulf of Thailand are criss-crossed by many gullies and ditches in dendritic drainage patterns. There are no large rivers or drainage basins along the southeast coast, but many small streams carry the drainage from the uplands to the sea. The two major outlets to the sea in the Sattahip area are the Klong Bang Phai and the Klong Huey Pong. The coast line is a sinking one, and the numerous islands lying off shore are peaks of drowned landscape.

To the west of the Klong Bang Phai are metamorphosed sedimentary rocks made up of shales, quartzites, clay-stones, limestones and sand-stones. The Klong Bang Phai appears to be the line of demarcation limiting the


MANDALAY
100° CHINA
105°
HANOI
BURMA
NORTH VIETNAM
20°
GULF OF TONKIN
LAOS
VIENTIANE
RANGOON
MOULMEIN
15°
ANDAMAN SEA
BANGKOK
CAMBODIA
BURMA
N
PHNOM PENH
SOUTH VIETNAM
SAIGON
GULF OF THAILAND
SATTAHIP CIVIL DEVELOPMENT PROJECT
MALAY PENINSULA
10°
THAILAND
SCALE
PENANG
MALAYA
5°
SUMATRA
100°
PLATE 2




## TOPOGRAPHY

GRAPHIC SCALE

SCALE 1 100,000

PLATE 17

intrusion of Triassic granite from the east of the Klong into the severly folded and fractured sedimentary rocks in the area since no evidence of intrusion is found to the west of the Klong.

The Chanthaburi granite in stocks, dikes and elongated batholiths extends eastward from the Klong. During the middle Paleozoic era, clastic sediments were deposited together with carbonate sediments in the depositional environment of the shallow sea with fluctuating water level. The interbedding of shale, limestone and some sandstone reflects the changing conditions near the shoreline and the varied relief of the sea's floor. After a long period of deposition, the sediments were affected by at least two periods of folding resulting from tectonic movements. These were followed by the intrusion of granite in the late Triassic period.

5. Population

The total 1966 population for the administrative units within the Development Planning Area was 53,000 including the Thai Military, as shown in Table I-4 (p. 53) Population densities are also indicated. As expected, the more rural areas have the lowest densities. There are no municipalities (classified as such) in the DPA; therefore it was not possible to distinguish between urban and rural population. Nor was it possible to get information concerning age, sex, occupation or education characteristics of the population.

For 1960 the official changwat census lists 34,699 persons for Amphur Sattahip including 21,300 male and 13,399 female. The Thai military is included in these figures.* Of 5,460 households, 2,701, slightly less than half, were listed as rural. Furthermore, the age group 20-24 represents about 25% of the total population at Sattahip while it is only 11 percent in Changwat Cholburi as a whole. Thus, the presence of military personnel in the Sattahip area makes it differ from other Thai communities.

## X. BASIC ECONOMIC FEATURES OF SATTAHIP

The present economy of the Development Planning Area is mainly based on agriculture. Approximately 70 per cent of the economically active population is engaged in primary agricultural activity, i.e., farming and fishing, and a large portion of those in manufacturing and commerce process, sell, and/or transport agricultural products. Most of the area is used for the production of tapioca with the remainder in sugar cane, rice, and some small areas of rubber, coconut, grains, beans, and a variety of fruits. Fishing comprises about 14 percent of value (in 1965) of DPA agricultural production, and 15 percent of Amphur Sattahip's economically active population. There

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*Thailand Population Census, Changwat Cholburi, N.E. B.D., 1960.

are sixty-one manufacturing establishments in the entire Development Planning Area, employing approximately 330 full-time workers and perhaps another 50 to 80 part-time workers (less than two percent of total workers in the DPA). Most of these facilities mill tapioca, rice, sugar, or process fish.

Of the total trades and services (accounting for 13.9 percent of the economically active population) in Amphur Sattahip, those which are not directly associated with agriculture, cater to either the military or civilian retail trade. The military demand is principally for various forms of entertainment, and a series of bars, nightclubs, restaurants and jewelry stores have been established along the Sukumvit Highway near the military centers. Though still only a small portion of the entire DPA economy, these establishments services represent the fastest growing segment of the local economy.

Two activities are volatile-construction and direct-hire military establishment. Their worth is difficult to evaluate particularly in terms of estimating their proportion of an annual economically active population. It is apparent, however, that the future economy of the Development Planning Area will depend on the magnitude of these two sectors and their consequent impact on trade and services.

A completely different complexion, however, would

taken on by the area in terms of commerce and industry, in the event that a second civilian port for Thailand were to be located at Sattahip.

## XI. EDUCATION IN SATTAHIP

Table I-8 on page 56 gives an indication of the literacy and the higher education achievements in the region and sub-region. As of 1960 the literacy rate was equivalent to Thailand's as a whole. However, when it comes to the number of persons with university degrees, only in Cholburi is the number equivalent to the Thai norm. All of the other provinces have less than half the national average number of graduates and undergraduates.

In Table I-9 on page 57 selected school data are shown. Here the sub-region and region conform to the average for Thailand as the percentage of schools, enrollments, and teachers is roughly the same as that of the area's percentage of population.

TABLE I-1

GENERAL CLIMATIC DATA

Sattahip Station

| JAN. | FEB. | MARCH | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | YEAR | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Monthly Maximum Temperature | | | | | | | | | | | | | |
| 93 | 94 | 94 | 94 | 92 | 91 | 91 | 91 | 91 | 90 | 90 | 91 | 92 | °F |
| 34 | 34 | 35 | 35 | 34 | 33 | 33 | 33 | 33 | 32 | 32 | 33 | 33 | °C |
| Mean Monthly Minimum Temperature | | | | | | | | | | | | | |
| 72 | 77 | 79 | 80 | 79 | 80 | 79 | 78 | 77 | 75 | 73 | 71 | 77 | °F |
| 22 | 25 | 26 | 27 | 26 | 27 | 26 | 26 | 25 | 24 | 23 | 22 | 25 | °C |
| Mean Monthly Relative Humidity | | | | | | | | | | | | | |
| 68 | 72 | 73 | 75 | 77 | 76 | 76 | 77 | 80 | 82 | 76 | 70 | 75 | % |
| Mean Monthly Evaportion | | | | | | | | | | | | | |
| 3.5 | 2.9 | 3.3 | 3.4 | 3.5 | 4.6 | 4.6 | 4.8 | 3.3 | 2.7 | 3.3 | 3.3 | 43.2 | Inches |
| 89 | 73 | 84 | 86 | 89 | 118 | 116 | 122 | 84 | 68 | 83 | 84 | 1096 | mm. |

Source: Meteorological Department

TABLE I-2

MONTHLY RAINFALL

(MM.)

Sattahip Station

| YEAR | JAN. | FEB. | MARCH | APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1944 | 10 | 17 | 52 | 119 | 185 | 67 | 76 | 112 | 233 | 234 | 113 | 34 | 1252 |
| 1945 | 5 | 116 | 91 | 150 | 68 | 82 | 45 | 106 | 207 | 83 | 84 | 34 | 1071 |
| 1946 | 0 | 1 | 22 | 91 | 376 | 30 | 17 | 45 | 379 | 175 | 31 | 0 | 1167 |
| 1947 | 21 | 41 | 50 | 364 | 121 | 21 | 79 | 241 | 151 | 257 | 100 | 11 | 1463 |
| 1948 | 25 | 98 | 157 | 94 | 177 | 44 | 9 | 194 | 94 | 232 | 39 | 4 | 1167 |
| 1949 | 79 | 10 | 52 | 103 | 391 | 32 | 54 | 82 | 117 | 233 | 42 | 10 | 1205 |
| 1950 | 18 | 20 | 14 | 231 | 162 | 135 | 30 | 240 | 170 | 265 | 177 | 0 | 1462 |
| 1951 | 50 | 10 | 7 | 31 | 237 | 132 | 295 | 95 | 119 | 172 | 95 | 2 | 1245 |
| 1952 | 65 | 5 | 96 | 56 | 151 | 55 | 32 | 80 | 51 | 855 | 98 | 5 | 1549 |
| 1953 | 54 | 134 | 82 | 29 | 95 | 92 | 148 | 86 | 155 | 118 | 159 | 3 | 1155 |
| 1954 | 0 | 85 | 83 | 57 | 368 | 48 | 142 | 102 | 174 | 221 | 11 | 1 | 1292 |
| 1955 | 1 | 2 | 58 | 89 | 115 | 87 | 140 | 107 | 182 | 180 | 111 | 6 | 1078 |
| 1956 | 30 | 7 | 8 | 157 | 118 | 113 | 54 | 73 | 286 | 150 | 94 | 6 | 1096 |
| 1957 | 3 | 15 | 53 | 141 | 10 | 106 | 206 | 107 | 253 | 638 | 36 | 27 | 1595 |
| 1958 | 46 | 25 | 1 | 101 | 72 | 87 | 75 | 151 | 259 | 213 | 6 | 0 | 1036 |
| 1959 | 0 | 39 | 167 | 61 | 164 | 34 | 141 | 46 | 180 | 351 | 44 | 29 | 1256 |
| 1960 | 2 | 22 | 4 | 51 | 174 | 6 | 133 | 42 | 206 | 531 | 70 | 1 | 1242 |
| 1961 | 3 | 70 | 52 | 84 | 240 | 104 | 20 | 33 | 53 | 148 | 95 | 13 | 915 |
| 1962 | 1 | 11 | 117 | 5 | 176 | 14 | 65 | 198 | 338 | 220 | 2 | 0 | 1147 |
| 1963 | 0 | 3 | 12 | 41 | 363 | 52 | 61 | 52 | 265 | 202 | 39 | 20 | 1110 |
| 1964 | 60 | 73 | 0 | 25 | 158 | 73 | 130 | 91 | 173 | 222 | 10 | 0 | 1015 |
| 1965 | 59 | 134 | 58 | 57 | 164 | 56 | 48 | 205 | 474 | 213 | 40 | 3 | 1511 |
| Mean | 23 | 50 | 64 | 109 | 164 | 81 | 92 | 104 | 218 | 275 | 98 | 17 | 1295 |

Source: Meteorological Department

TABLE I-3

DURATION OF RAINFALL

Sattahip Station

| DATE | 3 Hours | 6 Hours | 12 Hours | 24 Hours |
|---|---|---|---|---|
| October 22, 1944 | 45 | 79 | 80 | 80 |
| April 13, 1945 | 74 | 84 | 84 | 84 |
| May 28, 1946 | 220 | 221 | 221 | 221 |
| September 29, 1946 | 102 | 162 | 171 | 172 |
| October 5, 1946 | 79 | 97 | 98 | 98 |
| April 18, 1947 | 23 | 44 | 67 | 78 |
| August 9, 1948 | 61 | 75 | 76 | 76 |
| October 4, 1948 | 63 | 68 | 74 | 76 |
| May 26, 1949 | 103 | 105 | 105 | 105 |
| April 30, 1950 | 87 | 116 | 119 | 119 |
| August 23, 1950 | 125 | 125 | 126 | 126 |
| July 21, 1951 | 76 | 108 | 154 | 154 |
| October 14, 1952 | 81 | 81 | 81 | 81 |
| October 22, 1952 | 251 | 280 | 298 | 298 |
| July 22, 1953 | 64 | 79 | 80 | 80 |
| May 2, 1954 | 38 | 42 | 51 | 81 |
| April 3, 1956 | 99 | 101 | 101 | 101 |
| April 4, 1957 | 47 | 79 | 79 | 80 |
| September 5, 1957 | 58 | 63 | 80 | 80 |
| October 6, 1957 | 51 | 80 | 108 | 132 |
| October 9, 1957 | 39 | 45 | 80 | 114 |
| October 2, 1960 | 28 | 47 | 86 | 121 |
| October 3, 1960 | 25 | 37 | 60 | 104 |
| October 5, 1960 | 53 | 68 | 102 | 161 |
| May 8, 1961 | 50 | 55 | 55 | 106 |
| August 24, 1962 | 74 | 82 | 82 | 126 |
| May 20, 1963 | 250 | 265 | 265 | 265 |
| September 23, 1963 | 66 | 87 | 103 | 111 |
| February 27, 1965 | 81 | 89 | 89 | 113 |
| September 19, 1965 | 79 | 102 | 103 | 117 |

Source: Meteorological Department

TABLE I-4

POPULATION AND DENSITIES

Sattahip Development Planning Area

1966

| Amphur | Muban | Area Sq. Km. | Population[a] | Density Persons Per Sq. Km. |
|---|---|---|---|---|
| Sattahip | 1 | 12.67 | 12,665 | 1000 |
| | 2 | 53.87 | 8,836 | 164 |
| | 3 | 5.83 | 1,253 | 215 |
| | 4 | 31.37 | 3,102 | 99 |
| | 5 | 4.95 | 1,126 | 227 |
| | 6 | 25.25 | 534 | 21 |
| | 7 | 22.87 | 1,567 | 69 |
| Nachomtien | 3 | 11.00 | 1,684 | 153 |
| | 4 | 2.50 | 1,533 | 613 |
| | 5 | 30.05 | 1,920 | 64 |
| | 6 | 38.75 | 1,832 | 47 |
| | 7 | 7.62 | 405 | 53 |
| | 8 | 8.80 | 3,196 | 363 |
| | 9 | 16.12 | 373 | 23 |
| | 10 | .87 | 865 | 994 |
| Cholburi Total | | 272.52 | 40,891 | 151 |
| Pla | 1 | 7.62 | 600 | 79 |
| | 2 | 5.57 | 600 | 108 |
| | 3 | 10.02 | 2,604 | 260 |
| | 4 | 29.12 | 650 | 22 |
| | 5 | 28.62 | 1,150 | 40 |
| | 6 | 3.25 | 800 | 246 |
| Samnak Krathon | 1 | 26.87 | 3,500 | 130 |
| | 3 | 9.43 | 360 | 38 |
| | 4 | 7.87 | 1,051 | 134 |
| Huay Pong | 2,3,7 | 12.00 | 758 | 63 |
| Tayong Total | | 140.37 | 12,073 | 86 |
| Development Planning Area Total | | 412.89 | 52,964 | 128 |

[a]Includes Thai Military

Source: Compiled by Louis Berger, Inc. from Nai Amphur and Ministry of Interior records.

TABLE I-5

ESTIMATED POPULATION

Region and Sub-Region

1966

| | Population (000) | Area Sq. Km. | Density (pop.per sq. km.) |
|---|---|---|---|
| Subregion | | | |
| Cholburi | 521 | 4,480 | 116 |
| Rayong | 191 | 3,307 | 58 |
| Total (2) | 712 | 7,787 | 91 |
| +Region | | | |
| Chachoengsao | 367 | 5,420 | 68 |
| Chanthaburi | 184 | 6,052 | 30 |
| Nakorn Nayok | 174 | 2,413 | 72 |
| Prachinburi | 402 | 11,795 | 34 |
| Trad | 79 | 2,919 | 27 |
| Total (7) | 1,919 | 36,386 | 53 |
| Thailand Total | 31,798 | 514,000 | 62 |
| Cholburi % of Thailand | 1.64% | 0.87% | |
| Subregion " | 2.24 | 1.51 | |
| Region " | 6.03 | 7.08 | |

Source: Based on Thailand Population Census, 1947 and 1960 Changwat Series (Ministry of Interior and National Statistical Office).

TABLE I-6

ANNUAL PER CAPITA INCOME

Eastern Region and Bangkok - Thonburi

1963

| | Total Income | Money Income | Income in Kind= |
|---|---|---|---|
| Eastern Region (1963) | Baht 1,728 | Baht 1,354 | 374 |
| Towns (5.1) | 2,686 | 2,454 | 232 |
| Villages (5.6) | 1,533 | 1,131 | 402 |
| Bangkok - Thonburi (1962) (5.5) | 3,314 | 3,314 | - |

Note: Number in parenthesis shows average household size.
Source: National Statistical Office, "Household Expenditure Surveys", 1963.

MONTHLY HOUSEHOLD EARNINGS AND THEIR DISTRIBUTION

Eastern Region and Bangkok - Thonburi

1963

| | Household Earings per Mon. | | |
|---|---|---|---|
| Eastern Region | | | |
| (a) Towns | to $1,000 | $1,000 - 1,500 | over 1,500 |
| (percent of households) | 68% | 15% | 17% |
| (b) Villages | to 250 | 250 - 1,000 | over 1,000 |
| | 35% | 55% | 10% |
| Bangkok - Thonburi | to 1,000 | 1,000 - 3,000 | over 3,000 |
| | 52% | 37% | 11% |

Source: National Statistical Office, "Household Expenditure Surveys", 1963.

TABLE I-7

FAMILY MONTHLY INCOME AND EXPENDITURES

Town, Villages in Eastern Region and Bangkok/Thonburi

1963

| | Towns | | Villages | | Bangkok / Thonburi 1962 | |
|---|---|---|---|---|---|---|
| | Baht | % | Baht | % | Baht | % |
| Total Outlay | 1,139 | 100.0 | 776 | 100.0 | 1,438 | 100.0 |
| Total Expenditure | 1,060 | 93.0 | 741 | 95.4 | 1,386 | 96.4 |
| Food & Beverages | 449 | 39.4 | 304 | 39.2 | 646 | 44.9 |
| Clothing & Materials | 168 | 14.8 | 141 | 18.2 | 128 | 8.9 |
| Housing & Furnishings | 104 | 9.1 | 58 | 7.4 | 110 | 7.6 |
| Household Operations | 67 | 5.9 | 26 | 3.4 | 124 | 8.6 |
| Medical & Personal CAre | 104 | 9.1 | 56 | 7.2 | 95 | 6.7 |
| Transportation | 35 | 3.1 | 32 | 4.1 | 92 | 6.4 |
| Reading, Education Recreation | 61 | 5.4 | 24 | 3.1 | 79 | 5.5 |
| Tobacco & Alcoholic Drinks | 46 | 4.0 | 31 | 4.0 | 66 | 4.6 |
| Musc. | 25 | 2.2 | 68 | 8.8 | 46 | 3.2 |
| Gifts and Contributions | 72 | 6.4 | 33 | 4.3 | 36 | 2.5 |
| Taxes | 7 | 0.6 | 2 | 0.3 | 16 | 1.1 |
| Total Money Income | 1,055 | 100.0 | 612 | 100.0 | 1,519 | 100.0 |
| Wages & Salaries | 293 | 27.7 | 135 | 22.1 | 785 | 51.7 |
| Self Employment | 617 | 58.5 | 337 | 55.0 | 564 | 37.1 |
| Other Sources | 133 | 12.6 | 56 | 9.1 | 170 | 11.2 |
| Rice Drawn from Storage | 12 | 1.2 | 85 | 13.8 | - | - |

Source: National Statistical Office, "Household Expenditure Surveys".

TABLE I-8

LITERACY RATES AND HIGHER EDUCATION ACHIEVEMENTS

Cholburi - Rayong Subregion and Eastern Region

| | | # Degrees | |
|---|---|---|---|
| | Population % Literate | Under Graduate | Graduate[a] |
| Subregion | | | |
| Cholburi | 75.2 | 300 | 45 |
| Rayong | 78.4 | 53 | 7 |
| Total (2) | 76.0 | 353 | 52 |
| Region | | | |
| Chachoengsao | 75.1 | 133 | 15 |
| Chanthaburi | 77.2 | 69 | 7 |
| Nakomnayok | 75.0 | 40 | 1 |
| Prachinburi | 73.8 | 104 | 21 |
| Trad | 78.0 | 29 | 5 |
| Total (7) | 75.5 | 728 | 101 |
| Thailand Total | 70.8 | 23,477 | 3,563 |
| % of Thailand | | | |
| Cholburi | 1.6 | 1.3 | 1.3 |
| Subregion | 2.2 | 1.5 | 1.4 |
| Region | 6.4 | 3.1 | 2.8 |

[a]All Graduate Degrees, including those in medicine.

Source: National Statistical Office, 1960 Thailand Population Center, Changwat Series.

TABLE I-9

NUMBER OF SCHOOLS, SCHOOL ENROLLMENT, AND TEACHERS

Cholburi - Rayong Subregion and Eastern Region

1960

| | School | School Enrollment | Teachers |
|---|---|---|---|
| Subregion | | | |
| Cholburi | 368 | 69,624 | 2,222 |
| Rayong | 139 | 24,867 | 753 |
| Total (2) | 507 | 94,491 | 2,975 |
| Region | | | |
| Chachoengsao | 296 | 56,239 | 1,790 |
| Chanthaburi | 209 | 25,603 | 1,020 |
| Nakornnayok | 197 | 27,129 | 1,010 |
| Prachinburi | 412 | 56,098 | 1,675 |
| Trad | 117 | 11,462 | 463 |
| Total (7) | 1,738 | 271,022 | 8,933 |
| Thailand Total | 27,110 | 4,355,118 | 139,688 |
| % of Thailand | | | |
| Cholburi | 1.4 | 1.6 | 1.6 |
| Subregion | 1.9 | 2.2 | 2.1 |
| Region | 6.4 | 6.2 | 6.4 |

Source: National Statistical Office, Changwat Amphur Statistical Directory, 1965.

1. Background and Current Status*

Considerable emphasis has been placed on the education requirements for the Sattahip Civil Development Program. This serves to (1) prove an example of the complexity of the issues when systematic comprehensive planning is attempted and (2) show the need for appropriate data and their collection and maintenance on a regular basis. While important data gaps remain in the field of educational statistics (e.g., absenteeism rates), relatively more detail is available than for other economic and social indicators. Consequently a more intensive investigation of educational planning requirements follows.

Reporting Systems for school administrations vary. The Ministry of Education relies on the National Statistical Office to provide processed data. These are two years old before they are published. In the Development Planning Area, it was necessary to get up-to-date enrollments, for example, for the Sattahip portion by means of a questionnaire. For Rayong portion, however, the local education officer had kept accurate up-to-date information.

During the past three years, and more, the area around Sattahip has been undergoing rapid and erratic changes. Both the overall population and the school-going population

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*Pages 58-91, taken from "Sattahip Civil Development Program" by Louis Berger Inc. 1966.

have varied over this period. The aggregate population influctuations have been abnormal not only in terms of absolute numbers, but also in terms of composition. There is no way, at the moment, short of a special survey, of determining the age-sex breakdown of the general population base, the families of transient construction workers (if they have brought their families), or of the others who have come to settle in the Sattahip area for employment purposes.

What is known is that the 1960 Census disclosed an abnormal population profile for Amphur Sattahip as against the rest of Changwat Cholburi (see Table A-1 p.60 ). The most obvious distortion is in the age-groups 20-24 and 25-29. While it is not possible to readjust the composition of the civilian population in Amphur Sattahip for 1960, by deleting the military personnel counted in the Census, by age-group, the subtraction of overall military strength at Sattahip from Amphur and Changwat figures does provide a means for computing the civilian school-aged population, (5-19) for elementary and secondary levels, and their relationship to the non-military populace. The school-aged percentages thus calculated are compatible with those of the other changwats in the Eastern Region, which range between 34.2% and 38.2% averaging 36.5%. The school-aged component of population in these administrative divisions is projected

TABLE A-1

Population Profiles, by Age Group, Males

Amphur Sattahip & Changwat Cholburi

1960

| Age Group | Total Changwat Male | Amphur Sattahip Male | Pop. of C. Cholburi except A. Sattahip | % Composition | % Com. A. Sattahip |
|---|---|---|---|---|---|
| Under 5 | 30,596 | 2,609 | 27,987 | 15.29 | 12.25 |
| 5-9 | 29,061 | 2,092 | 26,969 | 14.73 | 9.82 |
| 10-14 | 22,063 | 1,348 | 20,715 | 11.32 | 6.32 |
| 15-19 | 20,714 | 1,456 | 19,258 | 10.52 | 6.83 |
| 20-24 | 23,899 | 6,880 | 17,019 | 9.30 | 32.30 |
| 25-29 | 17,297 | 2,313 | 14,984 | 8.19 | 10,86 |
| 30-34 | 14,121 | 1,346 | 12,775 | 6.98 | 6.32 |
| 35-39 | 10,579 | 860 | 9,719 | 5.31 | 4.04 |
| 40-44 | 8,608 | 678 | 7,930 | 4.33 | 3.18 |
| 45-49 | 7,269 | 546 | 6,723 | 3.67 | 2.56 |
| 50-54 | 5,993 | 408 | 5,585 | 3.05 | 1.91 |
| 55-59 | 4,718 | 290 | 4,428 | 2.42 | 1.36 |
| 60-64 | 3,488 | 202 | 3,286 | 1.79 | 0.95 |
| 65-69 | 2,247 | 103 | 2,144 | 1.17 | 0.49 |
| 70 and over | 3,128 | 110 | 3,018 | 1.66 | 0.53 |
| Unknown | 556 | 59 | 497 | .027 | 0.28 |
| Total | 204,337 | 21,300 | 183,037 | 100.00% | 100.00% |

Source: Thailand Population Census, 1960, Changwat Series, Bangkok: Central Statistical Office, National Economic Board, 1962.

TABLE A-2

School-Aged Population to Total Population

Amphur Sattahip and Changwats Comprising the Eastern Region

1960, 1967 and 1970

| Administrative Unit | School-Aged[1] Group (5-19) 1960 | Total Pop.[1] 1960 | % School-aged 1960 | School-Aged[2] (5-19) 1967 | School-aged[2] (5-19) 1971 |
|---|---|---|---|---|---|
| A. Sattahip Aggregate | 9,515 | 34,699 | 27.42 | 28.39 | 28.97 |
| Civilian | 9,015 | 25,055 | 35.98 | 37.26 | 38.01 |
| C. Cholburi Aggregate | 139,594 | 392,025 | 35.61 | 36.98 | 37.01 |
| Civilian | 139,094 | 382,381 | 36.38 | 37.67 | 38.43 |
| C. Rayong | 54,483 | 147.713 | 36.88 | 38.19 | 38.96 |
| C. Chanthaburi | 147,803 | 54,025 | 34.24 | 35.46 | 36.17 |
| C. Trat | 66,328 | 23,655 | 35.66 | 36.93 | 37.67 |
| C. Chachoengsao | 322,660 | 120,273 | 37.28 | 38.60 | 39.38 |
| C. Prachinburi | 334,895 | 123,301 | 36.82 | 38.13 | 38.90 |
| C. Nakhonnayok | 153,683 | 58,579 | 38.18 | 39.54 | 40.33 |

Notes: [1]Aggregate School-aged population for Amphur Sattahip and Changwat Cholburi is as reported in the 1960 census. Civilian school-aged population was calculated by subtracting 500 Naval Rating School students from the 15-19 year old group in the Census figures and totaling the remainder with the age-groups 5-9 and 10-14 to arrive at a composite for 5-19. Total civilian population for Amphur Sattahip & Changwat Cholburi was computed by subtracting the number of active duty military personnel (9644) in Sattahip from the Census population figures.

[2]A 0.5% per annum estimated increase in the proportion of school-aged population to total population was utilized for the Eastern Region. Cf. Halvor Gille and Thip Chalothorn, "The Demographic Outlook of Thailand & Some Implications," (revised), 1963, Appendix II, Table A, Projections I and III.

Basic Data Sources: Thailand Population Census, 1960, Changwat Series, Bangkok: Central Statistical Office, National Economic Board, 1962.
Director, Naval Personnel Department, Royal Thai Navy
Directorate of Personnel, Royal Thai Air Force

TABLE A-3

MASTER TABULATION OF ENROLLMENTS & GRADUATES, BY GRADE

Amphur Sattahip

1964 - 1966

| PUBLIC SCHOOLS | | | |
|---|---|---|---|
| Grade | 1964 | 1965 | 1966 |
| G1 | 901 | 969 | 1156 |
| G2 | 655 | 634 | 693 |
| G3 | 589 | 649 | 709 |
| G4 | 450 | 495 | 619 |
| Grade G4 | 407 | 433 | - |
| G5 | 97 | 114 | 142 |
| G6 | 63 | 80 | 108 |
| G7 | 57 | 53 | 71 |
| Grade G7 | 57 | 53 | - |
| Enrolled | 2812 | 2994 | 3498 |

| PRIVATE SCHOOLS | | | |
|---|---|---|---|
| Grade | 1964 | 1965 | 1966 |
| G1 | 842 | 1044 | 1337 |
| G2 | 396 | 461 | 494 |
| G3 | 365 | 378 | 407 |
| G4 | 316 | 341 | 373 |
| Grade G4 | 136* | 162* | - |
| G5 | 274 | 332 | 373 |
| G6 | 233 | 272 | 337 |
| G7 | 196 | 184 | 212 |
| Grade G7 | 23* | 40* | - |
| G8 | 183 | 227 | 227 |
| G9 | 148 | 181 | 209 |
| G10 | 138 | 141 | 166 |
| Grade G10 | 9* | 2* | - |
| G11 | 60 | 71 | 119 |
| G12 | 23 | 24 | 45 |
| Grade G12 | * | * | - |
| Enrolled | 3174 | 3656 | 4299 |

*Note: Graduate indicated represent totals for only six of the seven private schools responding.

Source: EducationaOfficer, Sattahip District Office (from returned questionnaire)

TABLE A-4

MASTER TABULATION OF GRADUATES AND ENROLLMENTS, BY YEAR, BY GRADE

Rayong Portion of Sattahip Development Area

1964-1966

| PUBLIC SCHOOLS | | | |
|---|---|---|---|
| Grade | Year | | |
| | 1964 | 1965 | 1966 |
| G1 | 558 | 503 | 546 |
| G2 | 448 | 495 | 474 |
| G3 | 402 | 416 | 474 |
| G4 | 291 | 324 | 321 |
| Grade | | | |
| G4 | 273 | 316 | - |
| G5 | 44 | 44 | 39 |
| G6 | 25 | 34 | 37 |
| G7 | 18 | 22 | 32 |
| Grade | | | |
| G7 | 17 | 22 | - |
| Enrollments | 1786 | 1838 | 1919 |

| PRIVATE SCHOOLS | | | |
|---|---|---|---|
| Grade | Year | | |
| | 1964 | 1965 | 1966 |
| G1 | 219 | 198 | 212 |
| G2 | 29 | 73 | 58 |
| G3 | 13 | 29 | 49 |
| G4 | 2 | 14 | 32 |
| Grade | | | |
| G4 | 2 | 7 | - |
| Enrollments | 263 | 314 | 351 |

Source: Education Section, Amphur Muang Rayong

TABLE A-5

PERCENTAGE COMPOSITION OF ENROLLMENTS,
ELEMENTARY & SECONDARY LEVELS

Amphur Sattahip and Rayong Portion of Development Area

1966

| Level | Amphur Sattahip[1] | Rayong Part of Dev. Area | National Aggregate |
|---|---|---|---|
| Lower Primary, G1-4 | 82.32% | 95.24% | 88.74% |
| Upper Primary, G5-7 | 17.68% | 4.76% | 11.26% |
| Total | 100.00% | 100.00% | 100.00% |
| Lower Secondary, G8-10 | 78.59% | | 76.00% |
| Upper Secondary, G-11-12 | 21.41% | | 24.00% |
| Total | 100.00% | 2 | 100.00% |

Notes: [1]Figures include military dependents.

[2]There are no Secondary Level Schools in the Rayong portion of the Sattahip Development Area.

Source: Louis Berger, Inc.: computed on basis of subject matter discussed in Text and Appendix VIIA.

to 1967, and 1971, the short-run target date for planning purposes. (See Table A-2 page 61)

As was pointed out previously, the presence of the Thai military establishment in Sattahip has drastically affected the population profile and the educational structure. The most desirable delineation of the educational system would be civilian enrollment, by grades, to be preferably compared with the civilian population.

2. Pupil/Teacher and Pupil/Classroom Ratios, 1966

The 1966 pupil/teacher and pupil/classroom ratios, derived from field investigation data, for Amphur Sattahip and the Rayong portion of the Development Area (Tables A-9-12 p.69-72) are obviously divergent from the norm of 30:1 estimated by N.E.D.B. in 1966 -- the close of the First Development Plan -- for the Kingdom.

There are two striking aspects to the comparison: (1) the public schools in both Amphur Sattahip and Rayong portion of the Development Area have had a conspicuously higher pupil/teacher ratio than the private schools, and the same may be said of pupil/classroom ratios; (2) there is a far more intensive utilization of classroom space and teachers in Sattahip than in the Rayong section.

What does not show up in the aggregate data is the unused capacity which characterizes private school operations and the excess utilization of the public school plant. In 1966, there were 94 rooms in use by Sattahip

TABLE A-6

PERCENTAGE COMPOSITION OF ENROLLMENTS, BY TYPE OF SCHOOL

Amphur Sattahip and Rayong Portion of Development Area

1966

| Type of School | Amphur Sattahip[1] | Rayong Part of Dev. Area | National Aggregate |
|---|---|---|---|
| Public (Government) | 44.86% | 84.54% | 81.03% |
| Private | 55.14% | 15.46% | 18.97% |

Notes: [1]Figures include military dependents.

[2]Approximately o.94% of total enrollments in the national enrollment totals: comprised by Junior College, University and Teacher Training Students; were excluded from the National Aggregate for the sake of maintaining a comparative base of primary and secondary levels.

Source: Louis Berger, Inc.; computed on basis of subject matter discussed in Text and Appendix VIIA.

TABLE A-7

PERCENTAGE ENROLLMENT BY GRADE, FOR THE CIVILIAN POPULATION

In Rayong Portion of Development Area

1964

| Grade | Enrollment | Composition(%) | %to GI Profile | % to 14,449 Population |
|---|---|---|---|---|
| 1 | 777 | 37.92 | 100.00 | 5.38 |
| 2 | 477 | 23.28 | 61.39 | 5.30 |
| 3 | 415 | 20.25 | 53.41 | 2.87 |
| 4 | 293 | 14.30 | 37.71 | 2.03 |
| 5 | 44 | 2.15 | 5.66 | .30 |
| 6 | 25 | 1.22 | 3.22 | .17 |
| 7 | 18 | .88 | 2.32 | .12 |
| 1-7 | 2049 | 100.00 | | 14.18 |

1965

| Grade | Enrollment | Composition(%) | %to GI Profile | % to 15,507 Population |
|---|---|---|---|---|
| 1 | 701 | 32.58 | 100.00 | 4.52 |
| 2 | 568 | 26.39 | 81.03 | 3.66 |
| 3 | 445 | 20.68 | 68.48 | 2.87 |
| 4 | 338 | 15.71 | 48.22 | 2.18 |
| 5 | 44 | 2.04 | 6.28 | .28 |
| 6 | 34 | 1.58 | 4.85 | .14 |
| 7 | 22 | 1.02 | 3.14 | .14 |
| 1-7 | 2152 | 100.00 | | 13.88 |

1966

| Grade | Enrollment | Composition(%) | %to GI Profile | % to 16,967 Population |
|---|---|---|---|---|
| 1 | 758 | 33.39 | 100.00 | 4.47 |
| 2 | 532 | 23.44 | 70.18 | 3.14 |
| 3 | 519 | 22.86 | 68.47 | 3.06 |
| 4 | 353 | 15.55 | 36.57 | 2.08 |
| 5 | 39 | 1.72 | 5.15 | .23 |
| 6 | 37 | 1.63 | 4.88 | .22 |
| 7 | 32 | 1.41 | 4.22 | .19 |
| 1-7 | 2270 | 100.00 | | 13.38 |

Source: Louis Berger, Inc.; computed on basis of subject matter discussed in text and Appendix VII-A.

TABLE A-8

TOTAL ENROLLMENT IN AGGREGATE POPULATION BY GRADE, BY PERCENTAGE COMPOSITION

Amphur Sattahip

1964

| Grade | Enrollment | | | Composition (%) | | | % to G1 Profile | | | % to Population[a] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1964 | 1965 | 1966 | 1964 | 1965 | 1966 | 1964 | 1965 | 1966 | 1964 | 1965 | 1966 |
| | 1743 | 2013 | 2493 | 29.12 | 30.97 | 100.00 | 100.0 | 100.0 | 100.0 | 4.67 | 5.12 | 5.98 |
| 2 | 1051 | 1095 | 1187 | 17.56 | 16.47 | 15.22 | 60.30 | 54.40 | 47.61 | 2.82 | 2.78 | 2.85 |
| 3 | 954 | 1027 | 1116 | 15.94 | 15.44 | 14.31 | 54.73 | 51.02 | 44.765 | 2.56 | 2.61 | 2.68 |
| 4 | 766 | 836 | 992 | 12.80 | 12.57 | 12.72 | 43.95 | 41.53 | 39.79 | 2.05 | 2.13 | 2.38 |
| 5 | 371 | 446 | 515 | 6.20 | 6.71 | 6.61 | 21.285 | 22.155 | 20.66 | .99 | 1.13 | 1.23 |
| 6 | 296 | 352 | 445 | 4.94 | 5.29 | 5.71 | 16.98 | 17.49 | 17.85 | .79 | .89 | 1.07 |
| 7 | 253 | 237 | 283 | 4.23 | 3.56 | 3.63 | 14.515 | 11.77 | 11.35 | .68 | .60 | .68 |
| 8 | 183 | 227 | 227 | 3.06 | 3.41 | 2.91 | 10.50 | 11.28 | 9.105 | .49 | .58 | .54 |
| 9 | 148 | 181 | 209 | 2.47 | 2.72 | 2.68 | 8.49 | 8.99 | 8.38 | .40 | .46 | .50 |
| 10 | 138 | 141 | 166 | 2.30 | 2.12 | 2.13 | 7.92 | 7.00 | 6.66 | .37 | .36 | .40 |
| 11 | 60 | 71 | 119 | 1.00 | 1.07 | 1.53 | 3.44 | 3.54 | 4.77 | .16 | .18 | .29 |
| 12 | 23 | 24 | 45 | 0.38 | 0.36 | .58 | 1.32 | 1.19 | 1.805 | .06 | .06 | .11 |
| 1-12 | 5986 | 6650 | 7797 | 100.00 | 100.00 | 100.00 | | | | 16.04 | 16.90 | 18.71 |

[a]Population in 1964 = 37,323
Population in 1965 = 39,333
Population in 1966 = 41,675

Source: Louis Berger, Inc., computed on basis of subject matter discussed in text and Appendix VII-A.

TABLE A-9

PUBLIC SCHOOLS: PUPIL-TEACHER AND PUPIL-CLASSROOM RATIOS

Amphur Sattahip

1966

In 8 of 13 Schools one teacher handles one grade and one classroom.

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 |
|---|---|---|---|---|---|---|---|
| Enrollment | 913 | 562 | 589 | 504 | 142 | 108 | 71 |
| Teachers | 18 | 13 | 14 | 12 | 5 | 5 | 4 |
| Pupil-Teacher Ratio | 51:1 | 43:1 | 42:1 | 42:1 | 29:1 | 22:1 | 18:1 |

Pupil-Classroom Ratios are the same as Pupil-Teacher Ratios except for Grade 4. In 1 of the 8 schools, a teacher handles 2 classes and it might be assumed that this doubling-up is an aberration and there would normally be another teacher. Hence, 504/13=39:1.

In 5 of 13 Schools one teacher handles one or more grades.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Enrollment | 234 | 131 | 120 | 115 | - | - | - |
| Teachers | 4 | 3 | 3 | 3 | - | - | - |
| Pupil-Teacher Ratio | 61:1 | 44:1 | 40:1 | 38:1 | | | |

Pupil-Classroom Ratio, one partition = 1 classroom.

| | | | | |
|---|---|---|---|---|
| Enrollment | 243 | 131 | 120 | 115 |
| Classrooms | 6 | 26 | 5 | 5 |
| Pupil-Classroom Ratio | 41:1 | 26:1 | 24:1 | 23:1 |

Source: Basic Data from Individual Schools in Amphur Sattahip.

TABLE A-10

PRIVATE SCHOOLS: PUPIL/TEACHER AND PUPIL/CLASSROOM RATIOS

Amphur Sattahip

1966

For Sattahip School, Number of Teachers for each grade is not available.
Total Number of Teachers 94 Pupil-Teacher Ratio = $\frac{2410}{94}$ = 26:1

Pupil Classroom Ratio

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | G10 | G11 | G12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 410 | 223 | 209 | 213 | 225 | 222 | 168 | 210 | 202 | 164 | 119 | 45 |
| | 11 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 3 | 2 |
| | 37:1 | 45:1 | 42:1 | 43:1 | 45:1 | 45:1 | 42:1 | 42:1 | 41:1 | 41:1 | 40:1 | 23:1 |

Sophonvithaya School - One Teacher has to handle one of more grades:

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 |
|---|---|---|---|---|---|---|---|
| Pupil-Teacher Ratio | (78 | 22) | (16 | 13) | (10 | 4 | 1) |
| | 1 | | 1 | | 1 | | |
| Pupil-Classroom Ratio | 78/2 | 22/1 | 16/1 | 13/1 | 10/1 | 4/1 | 1/1 |
| | 39:1 | 22:1 | 16:1 | 13:1 | 10:1 | 4:1 | 1 |

For the Other 4 Schools

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | G10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Pupil-Teacher | 791 | 249 | 182 | 147 | 138 | 111 | 43 | 17 | 7 | 2 |
| | 26 | 7 | 6 | 6 | 5 | 5 | 2 | 1 | 1 | 1 |
| Ratio | 36:1 | 36:1 | 30:1 | 25:1 | 28:1 | 22:1 | 17:1 | 7:1 | 7:1 | 2:1 |

Note: There are 7 private schools in Amphur Sattahip. Data for Kahjonvithaya School are incomplete.
Source: Basic Data from individual schools in Amphur Sattahip.

TABLE A-11

PUBLIC SCHOOLS: PUPIL-TEACHER AND PUPIL-CLASSROOM RATIOS

Rayong Portion of Sattahip Development Area

1966

In 2 of 9 schools, one teacher will handle one grade and one classroom.

| | G1 | G2 | G3 | G4 |
|---|---|---|---|---|
| Pupil Enrollments | 124 | 91 | 102 | 70 |
| Teacher | 3 | 2 | 3 | 2 |
| Pupil-Teacher Ratio | 41:1 | 46:1 | 37:1 | 35:1 |

Pupil-Classroom ratios are the same as pupil-teacher ratios.

In 7 of 9 schools, one teacher handles one or more grades.

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 |
|---|---|---|---|---|---|---|---|
| Public Enrollments | 422 | 383 | 368 | 241 | 39 | 37 | 32 |
| Teacher | 8.5 | 8.5 | 8 | 6 | 1 | 1 | 1 |
| Pupil-Teacher Ratio | 50:1 | 45:1 | 36:1 | 42:1 | 39:1 | 37:1 | 32:1 |

Pupil-classroom ratio, one partition - 1 classroom

| | G1 | G2 | G3 | G4 | G5 | G6 | G7 |
|---|---|---|---|---|---|---|---|
| Pupil Enrollments | 422 | 383 | 368 | 251 | 39 | 37 | 32 |
| Classrooms | 15 | 12 | 12 | 8 | 1 | 1 | 1 |
| | 28:1 | 32:1 | 31:1 | 31:1 | 39:1 | 37:1 | 32:1 |

Source: Basic Data from Education Section, Amphur Auang Rayong.

TABLE A-12

PRIVATE SCHOOLS: PUPIL-TEACHER AND PUPIL-CLASSROOM RATIO

Rayong Portion of Sattahip Development Area

1966

| | G1 | G2 | G3 | G4 |
|---|---|---|---|---|
| Pupil Enrollments | 212 | 58 | 49 | 32 |
| Teacher | 7 | 3 | 2:5* | 2:5* |
| Pupil Teacher Ratio | 30:1 | 19:1 | 20:1 | 13:1 |

* In one of 3 schools one teacher handles grade 3 and grade 4 classes of 20 and 6 pupils for each grade respectively.

| | G1 | G2 | G3 | G4 |
|---|---|---|---|---|
| Pupil Enrollments | 212 | 58 | 49 | 32 |
| Classrooms | 7 | 3 | 3 | 3 |
| Pupil-Classrooms Ratio | 30:1 | 19:1 | 17:1 | 11:1 |

Source: Basic Data from Education Section, Amphur Muang Rayong

public schools, although only 78 rooms officially were available. Counterposed to this, 125 rooms were in use in the private schools, out of 162 available. In the Rayong section, 60 classrooms were employed, when 40 were available at public schools. Although data are not available on the number of classrooms existent in the private schools in this locale, it is quite probable that not all of them were in use, and that the 16 which were used represented approximately 80 percent of the classrooms which might have been available.

Nor, for that matter, is the type of classroom which houses students really defined -- since, in many cases, classrooms covered areas partitioned into several parts. However, we should define each classroom as a space, partitioned or otherwise, housing a class for the purpose of recitation.

3. Projection of School Enrollments to 1971

A projection of the tendencies in enrollment-to-population for the Rayong portion of the Development Area would naturally result in a portrayal of a cumulative deterioration. If, however, we assume that Second Educational Plan enrollment increases are effected, then the elementary system will appear as shown in Table A-13 page 74)

TABLE A-13

PROJECTIONS OF ENROLLMENTS ACCORDING TO SECOND EDUCATIONAL PLAN INCREASES

Rayong Portion of Development Area

1971

| | 1966 Enrollment | 2nd Plan Increases | 1971 Enrollment | Percent Composition | 2nd Plan[a] Targets |
|---|---|---|---|---|---|
| Lower Elem. G1-4 | 2,162 | 12.34% | 2,429 | 90.63% | 86.36% |
| Upper Elem. G5-7 | 108 | 39.83% | 151 | 9.37% | 13.64% |
| Total | 2.270 | 13.66% | 2,580 | 100.00% | 100.00% |

Note: [a]Although the Second Educational Plan states that 15.3% is a target for the upper elementary level relative to total elementary enrollments, absolute enrollment projections for the kingdom represent a percentile composition which is 86.36% lower elementary and 13.64% upper elementary.

Source: Louis Berger, Inc.; computed on basis of subject matter discussed in Text and Appendix VII-A.

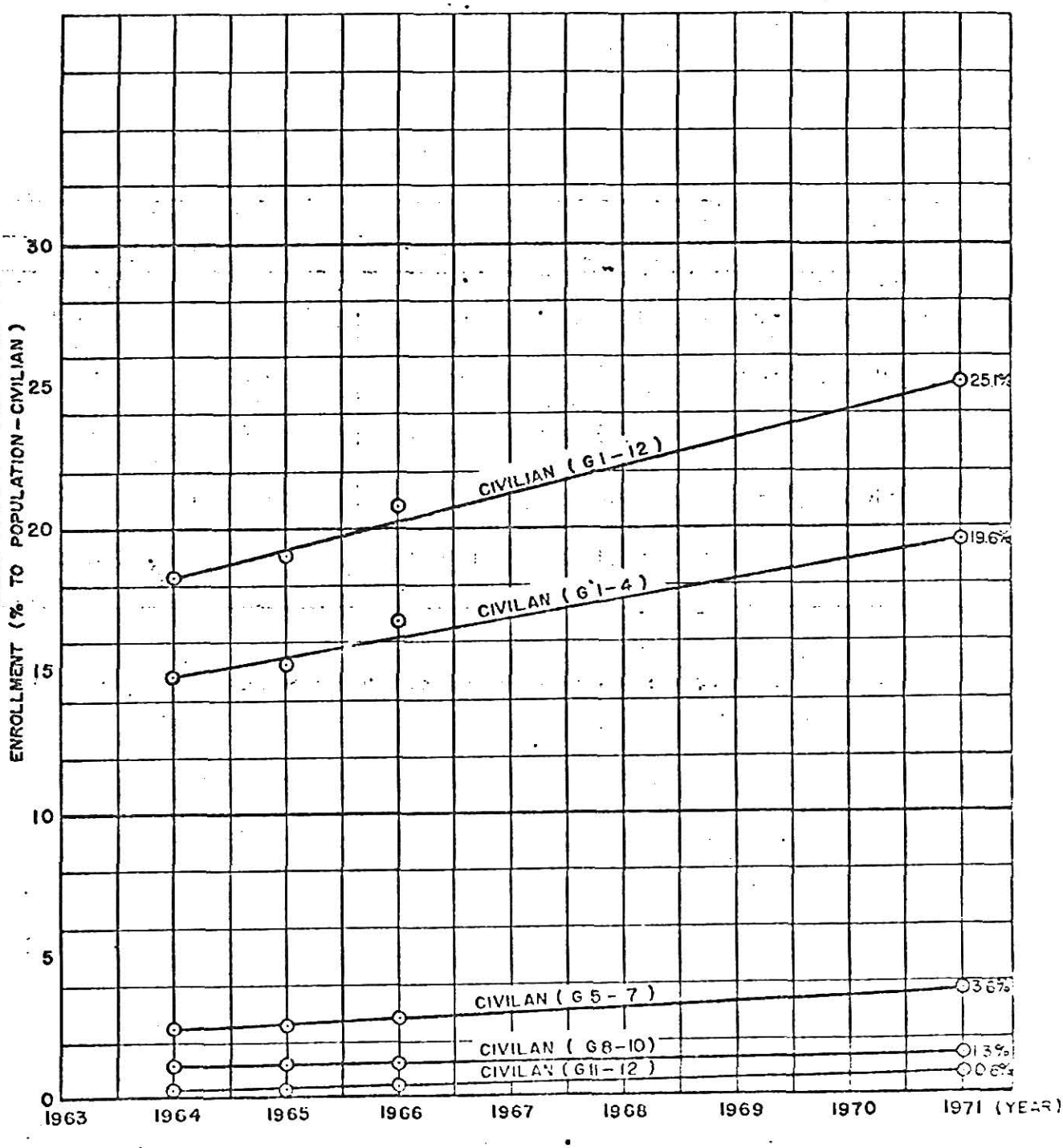
There is no justification for attempting to arrive at a projection of school-going population premised upon an incremental "flow through", by grade; but a simple linear projection of the tendencies in school-going percentages of both total and civilian populations in Amphur Sattahip is both feasible and warranted. The projection of civilian school-going population to civilian population would indicate that in 1971 approximately 25.1% of the civilian population in Sattahip might be school-going (see Figure II-1 page 76)

The essential significance of this proportion is to be seen in the context of school-aged population. In 1964, 18.3% of the civilian population who were enrolled in primary and secondary schools in Amphur Sattahip represented 50.00% of the school-aged population. This figure increased to 19.06% of civil population and 51.6% of school-aged population in 1965; and, in 1966, the relationships were 20.86% and 56.27% respectively. The 1971 projection of 25.1%, based on tendency, corresponds to 66.04% of school-aged population (as previously projected) and represents and 10% increase in 5 years, or 2% per annum.

A check on this figure, using total enrollments-to-aggregate population (including military personnel), confirms the 25.1% projected for 1971, implying that the presence of the military establishment with dependents will not be too dissimilar in composition to the general

# FIGURE II - 1

## PROJECTIONS OF ENROLLMENT TENDENCIES BY GRADE LEVEL, AS A PERCENTAGE OF CIVIL POPULATION AMPHUR SATTAHIP (1964-1971)




SOURCE: LOUIS BERGER, INC., COMPUTED ON BASIS OF SUBJECT MATTER DISCUSSED IN TEXT.

population. (See Figure II-2 page 78 ).[1]

The enrollment mixture, however, is somewhat different for the two projections (Table A-14 p 81 ). The inclusion of military dependents in the various service and service sponsored schools has resulted in a prognostication which is much closer to the Second Educational Plan targets than to the civilian profile, particularly in the secondary school range, where the former surpasses the Plan objective for Grades 11-12.

There is perhaps more of a prospect for realization of the aggregate projection composition, since the Thai military establishment at Sattahip has formulated the following plans for educational development under its own auspices:

1. Navikayotin School, the private school, owned by the Marine Corps, had planned to expand enrollments to 1,000 students in order to meet the demands of Marine Corps dependents.

2. Kled Keo School is a public school, but the Naval Rating School is its sponsor. Plans have been formulated

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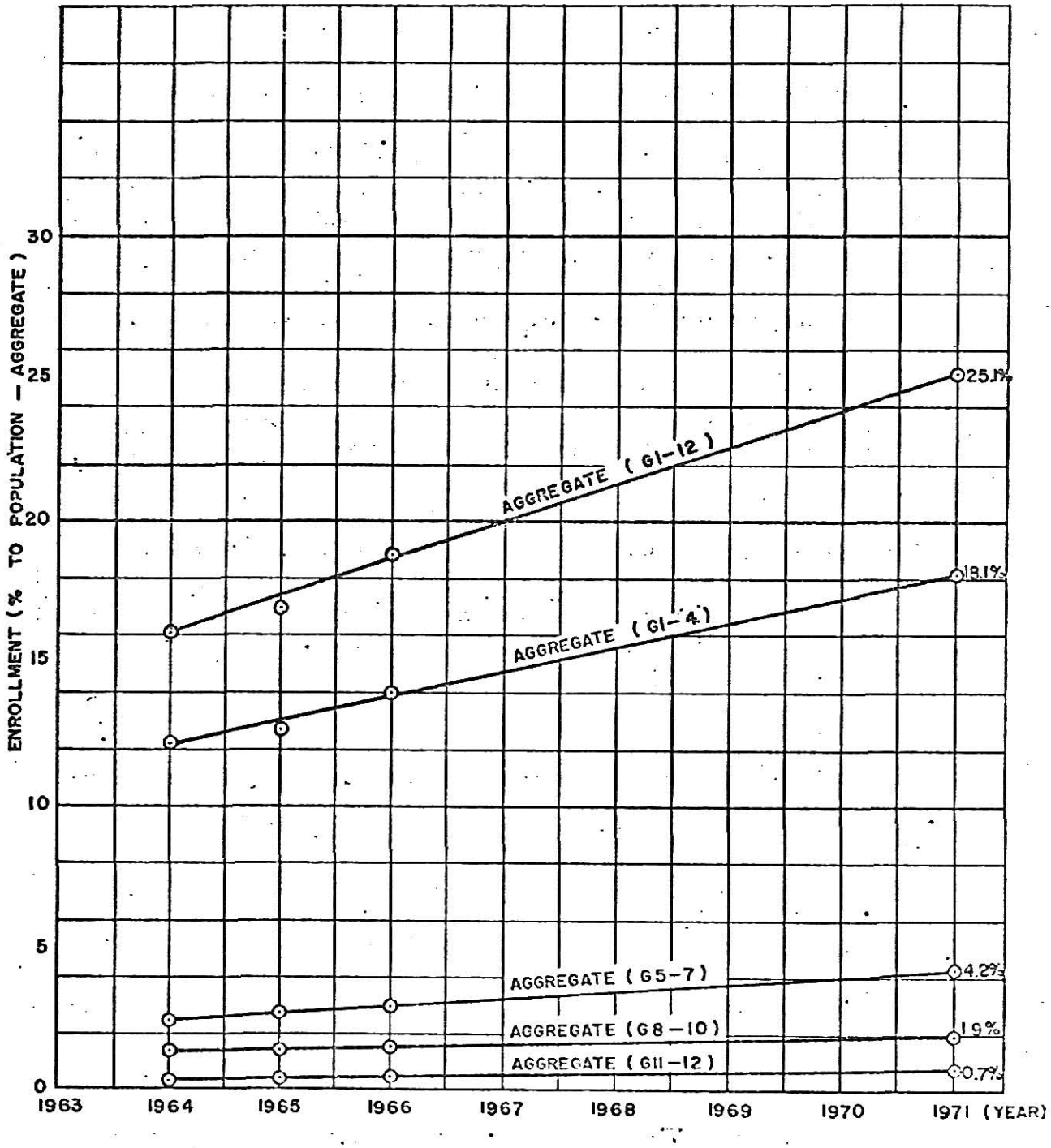
[1] In response to questions submitted on 17 November, 1966, the Commandant of the Sattahip Naval Station indicated that the composition of the families of Sattahip naval personnel, by age-groups, is as follows: Children (aged 1-15) approximately 50%
Adults (aged 15-60) approximately 30%
Elderly (aged 60-up) approximately 20%

FIGURE II - 2

PROJECTIONS OF ENROLLMENT TENDENCIES BY GRADE LEVEL, AS A PERCENTAGE OF AGGREGATE POPULATION.

AMPHUR SATTAHIP

(1964-1971)




SOURCE: LOUIS BERGER, INC., COMPUTED ON BASIS OF SUBJECT MATTER DISCUSSED IN TEXT.

to increase enrollments to 400 students in order to meet the demands of Naval Rating School and Recruit Training School Dependents.[1]

3. Sattahip School is owned by the Naval Station and has current enrollments of close to 2,500 students, from kindergarten to 12th grade. It is planned to expand classroom facilities and increase the number of teachers in order to meet the anticipated needs of Royal Fleet dependents. Enrollment composition, now about 50-50% is expected to change to a possible enrollment of 70-30%, military to civilian, within the next five years, while student population would double.

Additional civilian student capacity would thus increase perhaps 300 spaces over the period 1966-1971 as a result of military planning, and no apparent demands would be made on the civilian system. What is required, therefore, is an intentionally planned interference with enrollment tendency mix for the civilian community which will bolster and enhance the composition by grade level, as shown in Table A-15 page 82.

The opportunity to employ a planned community as leverage, in order to influence more adequately the pattern

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[1]Amphur Sattahip provides a headmaster and 4 teachers; Sattahip Naval Welfare Section, 2 additional teachers; and the Naval Rating School, 2 enlistees with 10th grade educational background, to teach here.

of elementary and secondary level education is one rarely presented. It is more often the case that a compromise would have to be made between constraints within the existing system and the desired targets.

By internalizing Second Educational Plan objectives, a planned town at Sattahip may augment both desired increases in the current system enrollments and those spaces which might become available by 1971 at the Sattahip School. (2)

Table A-16 p. 84 depicts the effect, in terms of aggregate enrollments by grade level, that planned educational sub-systems would have on the Amphur-wide system; exerting leverage from urban concentrations of 15,000 and 20,000 people, respectively, at alternative sites.

Second Educational Plan targets for enrollment composition as indicated previously, are: Lower Elementary, 77.18%; Upper Elementary, 12.19%; Low Secondary, 8.17% and, Upper Secondary, 2.46%. The composition effected by the planned impetus of the sub-systems very closely approximates Second Plan objectives (See Table A-16 p 84) but a lever, working from a port community base of 43,000 population, could accomplish even more at the priority

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(2) See Appendix VIIB for Technical Notes and Adjustment Calculations relating to the total system and to individual town sites by size of population.

TABLE A-14

PROJECTIONS OF ENROLLMENT TENDENCIES, 1964-1966 BY GRADE LEVEL, AS A PERCENTAGE OF CIVIL & AGGREGATE POPULATION

Amphur Sattahip

1971

| Grade Level | Civilian % Population | Civilian % Composition | Aggregate % Population | Aggregate % Composition |
|---|---|---|---|---|
| Lower Elementary (G1 - G4) | 19.6 | 78.09 | 18.1 | 72.11 |
| Upper Elementary (G5 - G7) | 3.6 | 14.34 | 4.2 | 16.73 |
| Lower Elementary (G8 - G10) | 1.3 | 5.18 | 1.9 | 7.57 |
| Upper Elementary (G11 - G12) | 0.6 | 2.39 | 0.9 | 3.59 |
| Overall | 25.1 | 100.00 | 25.1 | 100.00 |

Source: Louis Berger, Inc., computed on basis of subject matter discussed in Appendix VII-A.

TABLE A-15

IMPLICATIONS OF ENROLLMENT INCREASES ACCORDING TO SECOND EDUCATION PLAN TARGETS, BY GRADE LEVEL

Amphur Sattahip

1966-1971

| Level | 1966 Enrollments | Overall % Composition | % Increase 2nd. Ed. Plan | 1971 Enrollment |
|---|---|---|---|---|
| Lower Primary G1-4 | 4,764 | 80.13 | 12.34% | 5,352 |
| Upper Primary G5-7 | 786 | 13.22 | 39.85% | 1,099 |
| Lower Secondary G8-10 | 314 | 5.29 | 64.38% | 516 |
| Upper Secondary G11=12 | 81 | 1.36 | 56.63% | 127 |
| Total | 5,945 | 100.00 | 19.33% | 7,094 |

| Level | % Composition by Ed. Level | 2nd Plan Ed. Targets | Overall % Composition | 2nd Plan Ed. Targets |
|---|---|---|---|---|
| Lower Primary G1-4 | 82.96 | 86.36 | 75.44 | 77.18 |
| Upper Primary G5-7 | 17.04 | 13.64 | 15.50 | 12.19 |
| Total | 100.00 | 100.00 | | |
| Lower Secondary G8-10 | 80.25 | 76.88 | 7.27 | 8.17 |
| Upper Secondary | 19.75 | 23.12 | 1.79 | 2.46 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |

Source: Louis Berger, Inc., computed on basis of subject matter discussed in text and Appendix VII=A.

secondary level (See Table A-17 page 85)

4. Projected Classroom and Teacher Requirements, 1971

An intentional interference with the tendencies examined earlier, in order to effect the Second Educational Plan enrollment increases, would result, as well, in a derived demand for classrooms and teachers.

Given the framework of educational planning ratios below:[1]

| Educational Level | Pupil/Teacher Ratio NEDB (2nd Plan) | Pupil/Teacher Ratio Min. of Ed. | Pupil/Classroom Min. of Ed. |
|---|---|---|---|
| Primary | | 35:1 | 35:1 |
| Prathom 1-4 | 35:1 | | |
| Prathom 5-7 | 25:1 | | |
| General Secondary | 25:1 | 30:1 | 35:1 |

A schedule of requirements for teachers and classrooms can be set up, based on projected enrollments for 1971 at upper and lower elementary level in the Rayong section (Table A-18 page 86)

There has been no attempt, either in the foregoing tabulation of teacher and classroom needs for the Rayong portion of the Sattahip Development Area or in the tabulations below (Tables A-19 and A-20 page 88-90) of the

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[1] See Appendix VIIB for a full set of Educational Planning Ratios from primary through university levels, including estimated 1966 relationships at the end of the NEDB First Development Plan..

TABLE A-16

PROJECTED ENROLLMENTS AND PERCENTAGE DISTRIBUTION BY GRADE LEVEL, ACCORDING TO LOCATION AND SIZE OF PLANNED COMMUNITY WITHOUT CIVIL PORT DEVELOPMENT
(Using Second Education Plan Composition as a Target)

Amphur Sattahip

1971

| Level | Planning Site#1 | | | | Planning Site #2 & 5 | | | |
|---|---|---|---|---|---|---|---|---|
| | 15,000 Pop. in Plan Comm. | | 20,000 Pop. in Plan Comm. | | 15,000 Pop. in Plan Comm. | | 20,000 Pop. in Plan Comm. | |
| Lower Elementary, G1-4 | 6027 | 75.58% | 6208 | 76.01% | 6000 | 75.60% | 6171 | 76.03% |
| Upper Elementary, G5-7 | 1128 | 14.15% | 1112 | 13.62% | 1122 | 13.13 | 1104 | 13.60 |
| Lower Elementary, G8-10 | 642 | 8.05 | 660 | 8.08 | 639 | 8.05 | 656 | 8.08 |
| Upper Elementary, G11-12 | 177 | 2.22 | 187 | 2.29 | 176 | 2.21 | 186 | 2.29 |
| Total | 7974 | 100.00 | 8167 | 100.00 | 7936 | 100.00 | 8117 | 100.00 |

Source: Louis Berger, Inc., computed on basis of Subject matter discussed in class text and Appendix VII-A.

TABLE A-17

PROJECTED ENROLLMENTS BY GRADE LEVEL, WITH A PLANNED COMMUNITY ORIENTED TOWARDS CIVIL PORT ACTIVITIES (planning Sites 4 or 5)

1971

| Level | Port Community | Total System | % Composition | % Composition by Grade Level |
|---|---|---|---|---|
| Lower Elementary G1-4 | 8,330 | 14,059 | 75.48 | 84.31 |
| Upper Elementary G5-7) | 1,316 | 2,617 | 14.05 | 15.69 |
| | | | | 100.00 |
| Lower Secondary G8-10) | 882 | 1,529 | 8.21 | 78.41 |
| Upper Secondary G11-12 | 265 | 421 | 2.26 | 21.59 |
| Total | 10,793 | 18,626 | 100.00 | 100.00 |

Source: Louis Berger, Inc., computed on basis of subject matter discussed in Text and Appendix VII-A.

TABLE A-18

PROJECTED CLASSROOM AND TEACHER REQUIREMENTS

Rayong Portion of Sattahip Development Planning Area

1971

| Level | 1971 Enrollment | Classrooms Required | Teachers | |
|---|---|---|---|---|
| | | | NEDB 2nd Plan | Min. Ed. |
| Lower Elem G1-4 | 2,162 | 62 | 62 | 62 |
| Upper Elem G5-7 | 108 | 3 | 4 | 3 |
| Total | 2,270 | 65 | 66 | 65 |

Source: Louis Berger, Inc., Computed on basis of subject matter discussed in text and Appendix VII-A.

Alternative classroom and teacher needs for 1971 for Amphur Sattahip, to calculate a specific gap between the classrooms required and the classrooms actually constructed and the gap between teachers required and teacher supply, for these are imponderables for four years hence.

It should be emphasized, however, that the gestation period for building and/or enlarging the physical plant is relatively short, particularly as compared with the time necessary to prepare a new group of qualified teachers.

Assuming that 51.46% of the Second Educational Plan increases in enrollments and there is 96% graduation of senior year classes, there would be 110 teachers coming out of the Bangsan College of Education in 1971. Surely, only a portion of them would be going to Sattahip, since the institution is a regional center. Moreover, the 12th

Grade graduates from Sattahip necessary to supply intake two years prior, in 1969, would be perhaps 10, even if it is assumed that 45% of all Grade 12 graduates in Sattahip -- on the basis of planned increases in the current system's graduation capacity would be motivated to take teacher training and return to the area. (See Table A-21 page 91)

While it is uncertain which one of the community alternatives and corresponding derived demand schedules for teachers and classrooms will come to fruition, it may be likely that there will be a deficiency between 1971 teacher needs which would be generated in Sattahip and the capacity of Bangsan College of Education to supply teachers for all levels.

TABLE A-19

ESTIMATED CLASSROOM AND TEACHER REQUIREMENTS
ASSUMING NO PLANNED COMMUNITY
(SECOND EDUCATIONAL PLAN INCREASES IN ENROLLMENT ITERNALIZED)

Amphur Sattahip

1971

| | 1971 (est.) Civil Enroll. A. Sattahip | Class-rooms (Min. of Ed.) | Teachers NEDB 2nd Plan | Teachers Min. of Ed. |
|---|---|---|---|---|
| Lower Elementary (G1-4) | 5,352 | 153 | 153 | 153 |
| Upper Elementary (G5-7) | 1,099 | 31 | 44 | 31 |
| Lower Secondary (G8-10) | 516 | 15 | 21 | 17 |
| Upper Secondary (G11-12) | 127 | 4 | 5 | 4 |
| Total | 7,094 | 203 | 223 | 205 |

WITH A PLANNED COMMUNITY OF 15,000 POPULATION OR 20,000 POPULATION - At Planning Site #1 (With Civilian Port)

| | Est. 1971 Pop. 15,000 | Enr. Pop. 20,000 | Class-rooms Pop. 15,000 | 20, | Teachers NEDB 2nd Plan 15, | 20, | Teachers Min. of Ed. 15, | 20, |
|---|---|---|---|---|---|---|---|---|
| L.U., G1-4 | 6027 | 6208 | 172 | 177 | 172 | 177 | 172 | 177 |
| U.E., G5-7 | 1128 | 1112 | 32 | 32 | 45 | 45 | 32 | 32 |
| L.S., G8-10 | 642 | 660 | 18 | 19 | 26 | 27 | 21 | 22 |
| U.S., G11-12 | 117 | 187 | 5 | 5 | 7 | 8 | 6 | 6 |
| Total | 7974 | 8167 | 227 | 233 | 250 | 257 | 231 | 238 |

TABLE A-19 (contd.)

WITH A PLANNED COMMUNITY OF 15,000 POPULATION OR 20,000 POPULATION
At Planning Sites #2 or 5 (Without Civilian Port)

| | Est. 1971 Pop. | Enroll. Pop. | Class-rooms | | NEDB 2nd Plan | | Min. of Ed. | |
|---|---|---|---|---|---|---|---|---|
| | 15, | 20, | 15, | 20, | 15, | 20, | 15, | 20,+ |
| L.E., G1-4 | 6000 | 6171 | 172 | 176 | 171 | 176 | 171 | 176 |
| U.E., G5-7 | 1122 | 1104 | 32 | 32 | 45 | 44 | 32 | 32 |
| L.S., G8-10 | 639 | 656 | 18 | 19 | 26 | 27 | 21 | 22 |
| U.S., G11-12 | 176 | 186 | 5 | 5 | 7 | 8 | 6 | 6 |
| Total | 7936 | 8117 | 227 | 232 | 249 | 255 | 230 | 236 |

Source: Louis Berger, Inc., computed on basis of subject matter discussed in text and Appendix VII=A.

TABLE A-20

PROJECTED CLASSROOM AND TEACHER NEEDS FOR A PLANNED COMMUNITY (ESTIMATED POPULATION OF 43,000), AND FOR THE COMBINED SYSTEM ACCORDING TO EDUCATIONAL PLAN INCREASES
Planning Sites #4 or 5 (with a civilian port)

Planned Peninsula Community

| Level | Estimated Enrollment | Classrooms | Teachers | |
|---|---|---|---|---|
| | | | NEDB 2nd Plan | Min. of Ed. |
| Lower Elementary, G1-4 | 8330 | 238 | 238 | 238 |
| Upper Elementary, G5-7 | 1316 | 38 | 45 | 38 |
| Lower Secondary, G8-10 | 882 | 25 | 35 | 29 |
| Upper Secondary, G11-12 | 265 | 8 | 11 | 9 |
| Total | 10793 | 309 | 329 | 314 |

Combined System

| Level | Est. Total Enrollment[a] | Total Classrooms | Total Teachers | | % Composition | |
|---|---|---|---|---|---|---|
| | | | NEDB 2nd P. | Min. | Comb. | Ed. Target |
| Lower Elementary, G1-4 | 14059 | 401 | 401 | 401 | 75.48 | 77.18 |
| Upper Elementary, G5-7 | 2617 | 75 | 105 | 75 | 14.05 | 12.19 |
| Lower Secondary, G8-10 | 1529 | 44 | 61 | 51 | 8.21 | 8.17 |
| Upper Secondary, G11-12 | 421 | 12 | 17 | 14 | 2.26 | 2.46 |
| Total | 18626 | 532 | 584 | 541 | 100.00 | 100.00 |

Notes: [a]Includes 300 additional places for civilian students created by the enlargement of Sattahip School, assuming the alteration in enrollment balance between military dependents & civilians from 50-50% to 70-30%, and the retention of current grade level composition proportions.

Source: Louis Berger, Inc., computed on basis of subject matter discussed in text and Appendix VII-A.

TABLE A-21

ESTIMATED GRADUATES BY GRADE LEVEL WITH CURRENT EDUCATIONAL SYSTEM

(1) Amphur Sattahip

1965 & 1971

| Grade Level | 1965 Grad.[a] (Estimated) | % Comulative[b] Average Inc. | Estimated 1971 Grad. |
|---|---|---|---|
| G-4 | 740 | 2.44 | 855 |
| G-7 | 130 | 7.33 | 197 |
| G-10 | 135 | 1.41 | 147 |
| G-12 | 22 | 1.31 | 24 |
| Total | 1,027 | | 1,223 |

(2) Rayong Portion of Sattahip Planning Area

| Grade Level | 1965 Graduates | % Average[b] Cumulative Interest | Estimated 1971 Graduates |
|---|---|---|---|
| G-4 | 323 | 2.44 | 373 |
| G-7 | 22 | 7.33 | 33 |
| G-10 | | 1.41 | |
| G-12 | | 1.31 | |
| Total | 345 | | 306 |

Notes: [a]Data on graduates for one of the private schools included in the totals for 1965, by grade level, was unreliable; necessitating an estimate according to the graduation pattern for terminal grade enrollments in other schools.

[b]Graduation to enrollment in the Second Educational Plan =96%. This relationship was retained in the estimates by deriving an average cumulative increase per annum in enrollment & graduates from the projections 1967-1971, & applying this on a six year frame to 1965 figures.

Source: Louis Berger, Inc., computed on basis of subject matter discussed in text and Appendix VII=A.

## XII. BUILDING MATERIALS

### 1. Availability of Building Materials in Thailand, Wood

This common material has been used extensively in building construction in hot-humid countries, especially in Thailand. The qualities of woods are categorized into three grades: A, B, and C.

Teak has the highest quality which is in Grade A, but at the present time it is quite expensive because the supply is low while the demand is high.

Redwood, Takien and Teng are in Grade B; their qualities are relatively good and may be used for the major structure members. Although cheaper than Teak, their strength is more or less close to that of Teak.

Yang is cheap yet reasonably strong; it is placed in Grade C. However, it shrinks every often and is easily destroyed by termites and moisture. It is therefore used only for temporary buildings.

### Concrete

Concrete and cement products are becoming more and more extensively used for building construction in Thailand. Cement and cement products are being produced by the large cement factories in the country.

Reinforced concrete in very popular because of new techniques and methods in production. Pre-cast concrete, prefabricated concrete, shell concrete, long span prestressed

concrete beams, floating concrete, and concrete blocks are used extensively in most structures.

Bricks

There are two kinds of bricks which have been used in Thailand for years. The standard size is: 5" wide, 10" long, and 1 1/2-2" thick.

1. Bang-boa-tong has a fine and beautiful texture and furthermore this kind of brick will stand up to a relatively high pressure.
2. Morn-Bricks have lower quality than Bang-Boa-Tong bricks in terms of both beauty and capacity; but the price is cheaper. They are used for lighter construction works.

Concrete blocks

This kind of material is very useful in the hot-humid tropical countries for sun control, ventilation, protection from rain, and are simple and economical to produce.

Roofing materials

1. Asbestos cement sheets are used commonly in the tropics if there is a high amount of precipitation.
2. Continuous Waves Cement Tile and Double Waves Cement Tile are made in 3 x 6 feet and 4 x 8 feet by one of the cement factories. They are cheap and satisfactory for use in the tropics.

3. Aluminum sheets are generally used for houses and other contemporary buildings.

2. Imported Materials

Rubber Tiles

Most of the rubber tiles used in construction are imported from Japan, U.S.A. and Germany.

Paints

Most of the paints are imported from foreign countries. Locally-made paints are not desirable in terms of quality.

Aluminum Products

The aluminum window and door frames, grills and other products are used extensively in modern Thai architecture.

Steel Rods

High tension and special quality steel rods are very high in demand in the market, and are imported from Japan and Taiwan.

Building Hardwares and Sanitary Equipments

The locally-made products are not as good in quality and beauty as are the imported products. Their low prices do not compensate for their poor qualities; and hence, they are not used in contemporary constructions. The better quality building hardwares are imported from England, Belgium and Japan.

REFLECTIVITY OF MATERIAL

| Color | Material | Solar reflections |
|---|---|---|
| White | Plaster | 93 |
| | Paint | 75 |
| | Cardboard or paper | 64-70 |
| | Asbestos cement | 58 |
| | Steel sheet | 57 |
| | Mable | 45 |
| Light Buff | Brick | 48 |
| Dark Buff | Brick | 40 |
| Sand | Sandstone | 31 |
| Red | Asbestos cement | 31 |
| | Clay tile | 38 |
| Dark red | Brick | 30 |
| | Steel sheet | 19 |
| Cream | Brick (Gault) | 64 |
| | Paint | 60 |
| Blue | Brick (Stafford) | 11 |
| Light Green | Paint | 50 |
| Green | Steel sheet | 24 |
| | Mable | 34 |
| | Vegetation | 25 |
| Dark Green | Grass | 6 |
| Brown | Concrete tile | 15 |
| Light gray | Slate | 21 |
| Gray | Paint | 25 |
| Dark gray | Slate (Smoth | 11 |
| | Slate | 8 |
| Black | Paint | 7 |
| | Concrete tile | 9 |
| | Matt fin. | 3 |

## XIII. THE DESIGN FOR A BOARDING SCHOOL, SATTAHIP, CHOLBURI, THAILAND

### 1. The Purpose of Project

Despite tremendous programs in recent years in the educational system in Thailand, the existing situation is still far from satisfactory. The major portion of high quality education is mainly concentrated in Bangkok, the capital of Thailand. Rural areas and small towns, on the other hand, are still in need of sound educational development, especially in the secondary school level.

With a population of 53,000, and with its centrally and strategically located position, Sattahip is considered the military, political, and transportation center of the country's southeastern region. It is important, therefore, to emphasize the quality of facilities available for education in the long range planning for this town in particular and for the entire southeastern region in general. Furthermore, the success of the educational system of this region will have a strong influence for the success of the educational program in the other regions in Thailand.

There are only a few universities in Thailand, and they are mainly concentrated in the capital city of Bangkok. In the immediately future, the existing university facilities throughout the country will no longer satisfactorily meet the demand for higher education. However,

the immediate need in the rural areas is in the college preparatory level institutions. This need should immediately be given primary consideration. The main purpose at this time is to increase and up-grade the secondary school system throughout the country. Hopefully, more high school graduates will cause a greater demand for higher education in the future.

In the town of Sattahip, there is a great demand for secondary education, especially at college preparatory level. As indicated in Table A-9 and A-10 (p. 69 & 70) the student to teacher ratio in Grades 1-7 is 39:1, and the students per classroom ratio is about 30:1. In Grades 8-12 the student to teacher ratio is 35:1, and the students per classroom ratio is 27:1. In terms of enrollment figures, however, secondary school enrollments (Grades 8-12) consists of only 766 out of the total 4299 students from Grades 1-12 (See Table A-3 p. 62 ). Out of the 766 secondary school enrollments, 78.59 percent makes up the enrollments in Grades 8-10; however, only 21.41 percent makes up Grades 11-12. (See Table A-5 p. 64)

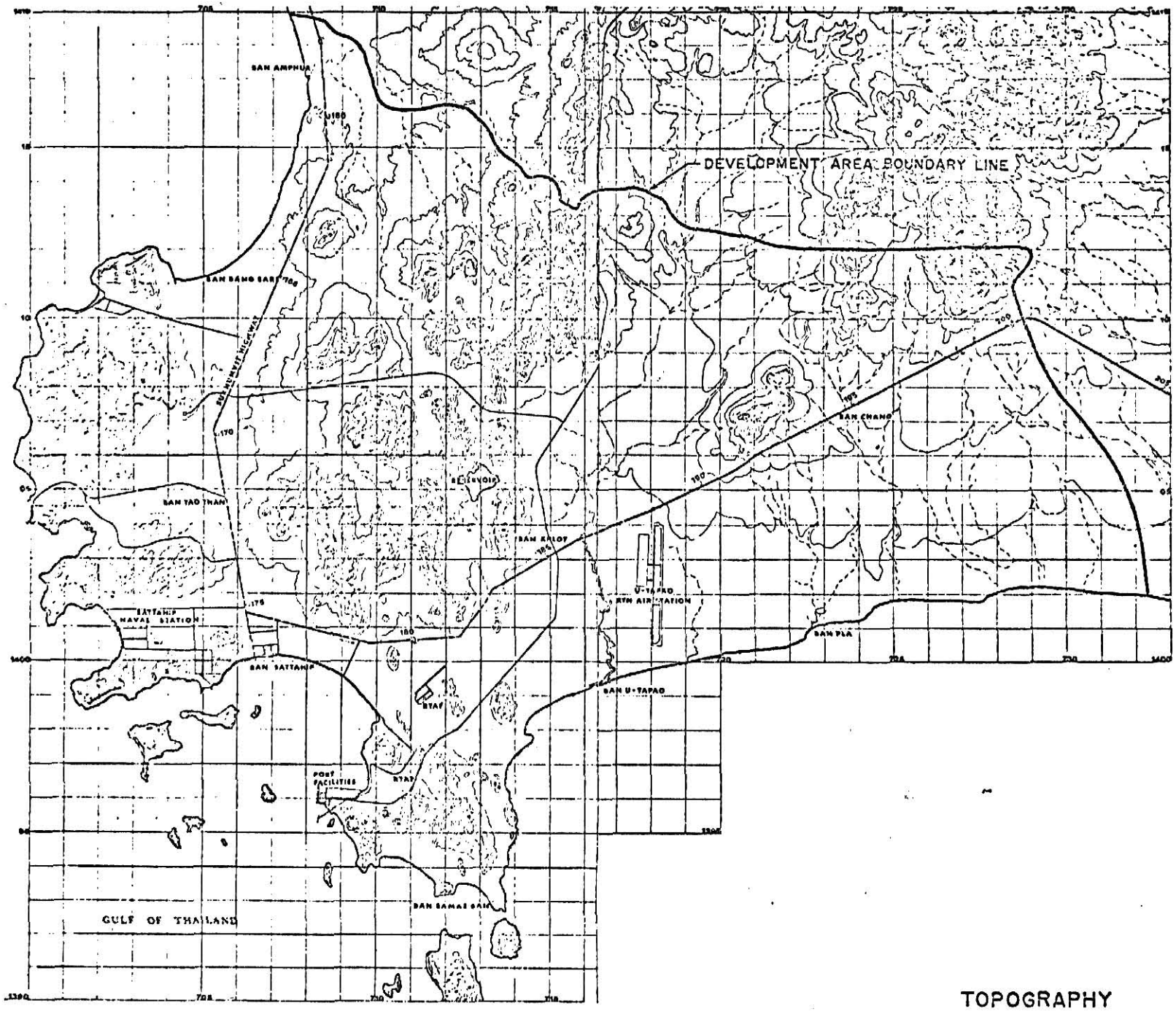
The reason for the low enrollment figure in the secondary school level is mainly due to the lack of facilities and the lack of qualified teachers. It is therefore extremely important to propose plans for providing more facilities and for training more qualified teachers in order to meet the requirement of the town.

In general, citizens in a rural town such as Sattahip, the cost of the inconvenience in obtaining adequate transportation is a major problem. It is necessary, therefore, the provide a boarding school. In terms of the regional living standard, the cost for supporting boarding and living quarters in a school well offsets the cost of transportation.

Socially the people in Thailand do not object to coeducational boarding schools. They are therefore socially acceptable if the boarding schools are designed mainly for one sex. Presently, the need for good education is greater for boys. Future considerations, however, should be given to boarding students of both sexes with equal opportunities in their pursuit of quality education.

2. Location

The location of this school will be 5 miles southeast of Sattahip C.B.D. The school area comprises about 1 square mile of flat and gently sloping land. The south side of the location faces the sea, and the remaining sides are surrounded by small hills. The area may be reached by taking the road which winds along the shore from the Sattahip C.B.D. This road is further extended by the Sukumvit Highway, a major highway to Bangkok. The scattered small islands in the sea provide an interesting view and offer a momentary relief from the monotony of routine schoolwork. This locality is a low density



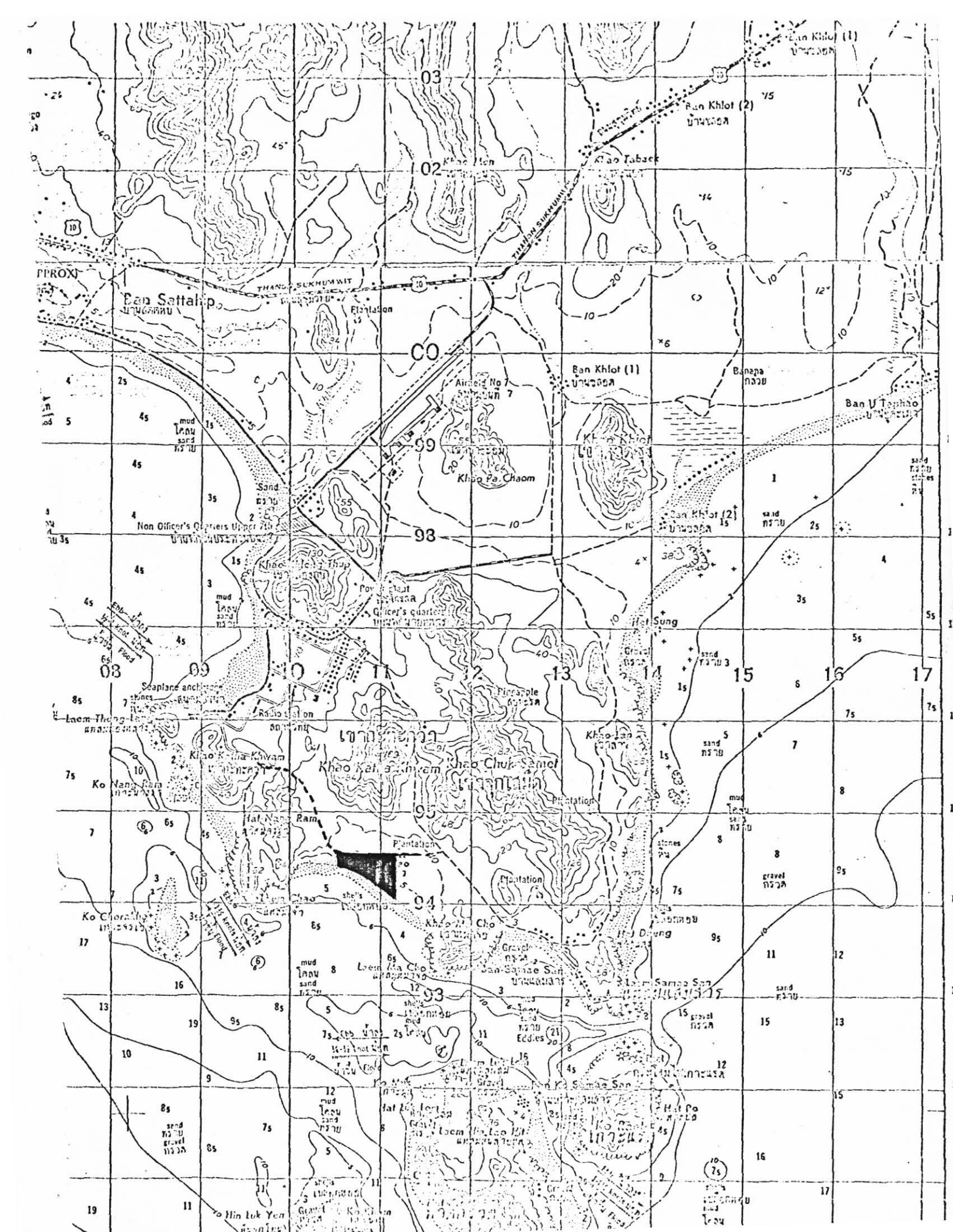

## TOPOGRAPHY

GRAPHIC SCALE

0 0.5 1 2 3 4 5 KM

SCALE 1 : 100,000

PLATE 17


Ban Khlot (1)
Ban Khlot (2)
Khao Tabaek
THANON SUKHUMVIT
Ban Sattahip
Plantation
Airfield No 7
Khao Pa Chaom
Banapa
Ban U Taphao
Non Officer's Quarters Upper
Khao Kha Khwam
Khao Kha Khwam
Khao Chuk Samet
Hat Nang Ram
Ko Nang Ram
Ko Chorakhe
Hat Sung
Hat Dueng
Laem Samae San
Ko Samae San
Hat Po
Ko Phai
Laem Thong
Pineapple
Radio station
Officer's quarters
Seaplane anchorage
Eddies
Flood
Ebb
mud
sand
gravel
stones
shells
Plantation
03
02
01
00
99
98
95
94
93
08
09
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16
17

residential area with fishermen settled along the beach which fringes this area. (See maps on pages 99 & 100)

3. The Space Requirements for the School

This project will provide education for boys in Grades 11 to 12, ages 17 to 18. This college preparatory, boarding school will be planned to enroll 400 boys. The school will be designed as a complex for the boys in this level of education. New systems and techniques for teaching have been introduced for use in this school. The buildings will be scattered and furthermore, separate by open spaces, gardens and common areas. The requirements of this school will consist of the following:

Administration:

- principal's office
- vice-principal's office
- main office
- storage
- first-aid room
- meeting room
- rest rooms
- waiting area

Class-rooms:

- main concourse
- teacher's quarters
- rest rooms
- general classrooms

- special classrooms
    - Chemistry laboratory
    - Biology laboratory
    - Language laboratory
    - Physics laboratory
    - Arts and crafts laboratory
    - Ceramics laboratory
    - Mechanical laboratory
    - Audio-visual
    - Seminar rooms

Cafeteria

- Kitchen area
    - Main storage area
    - Dietician's office
    - Frozen storage areas
    - Baking area
    - Mechanical room
    - Preparation area
    - Cooking area
    - Pantry
    - Dish washing area
- eating area
- Rest rooms

Auditorium

- Band room
- Instrument storage area
- Mechanical room
- Dressing rooms

- Workshop
- Rest rooms
- Projection room

Gymnasium:

- Locker rooms
- Basketball court
- Badminton courts
- Bleachers

Outdoor sports:

- Swimming pool
- Soccer fields
- Tennis courts
- Basketball courts
- Field tracks

Library:

- Science section
- Art section
- Rest rooms
- Storage rooms

Dormitories:

- Double rooms
- Information office
- Reception hall
- Study hall
- Linen room
- Bath rooms
- Faculty rooms

4. Academic Instruction of the School

The daily schedule of the school is more or less similar to that of the daily schedule of the college preparatory boarding school for boys in the United States, but it will be patterned after that of Vajiravudh College which is the most famous boarding schools for boys in Thailand. The daily schedule (Monday through Saturday) follows:

| | |
|---|---|
| 6:30 | Rising |
| 7:00 | Class |
| 8:00 | Breakfast |
| 8:30 | Assembly |
| 9:00 - 10:50 | Classes |
| 10:50 - 11:10 | Break |
| 11:10 - 1:00 | Classes |
| 1:00 | Luncheon |
| 2:00 | Study, Music, Arts and Crafts |
| 3:00 | Free House |
| 4:00 | Sports |
| 6:00 | Dinner |
| 7:00 | Study |
| 9:00 | Retire |

This school will follow the curriculum prescribed by the Ministry of Education for that of the 2-year college preparatory level.

## XIV. THE DESIGN CONCEPT

### 1. Study Location

Even though the proposed site is close to the sea, the Mean Sea Level is relatively high. This area is a flat plain bounded by small hills on the three sides, but it will not be necessary to grade the whole site and raise the schoolground to a higher elevation.

The drainage system will be designed to enable water to drain away as fast as possible. The drainage pipes underground will control the rain drainage which will be drained to the sea. Septic tanks will be used for the sewage disposal which can be removed when they are full.

Sun control is one of the main problems which has to be considered. Cantilever construction, sun screens and sun louvers will be generously used in this design to provide shade wherever necessary.

The wind direction in this location is from the south-west or from the sea during the day time and from the north or from the mountains at night. In designing the buildings, wind directions have to be considered in order to profit from available natural ventilation. Good ventilation is required in the buildings in the hot-humid tropics. Air-conditioning systems are necessary for some of the principal buildings such as the auditorium and the administrative office. (According to the Educational Development Acts of 1964, the necessary expenditures for the

government schools are limited.)

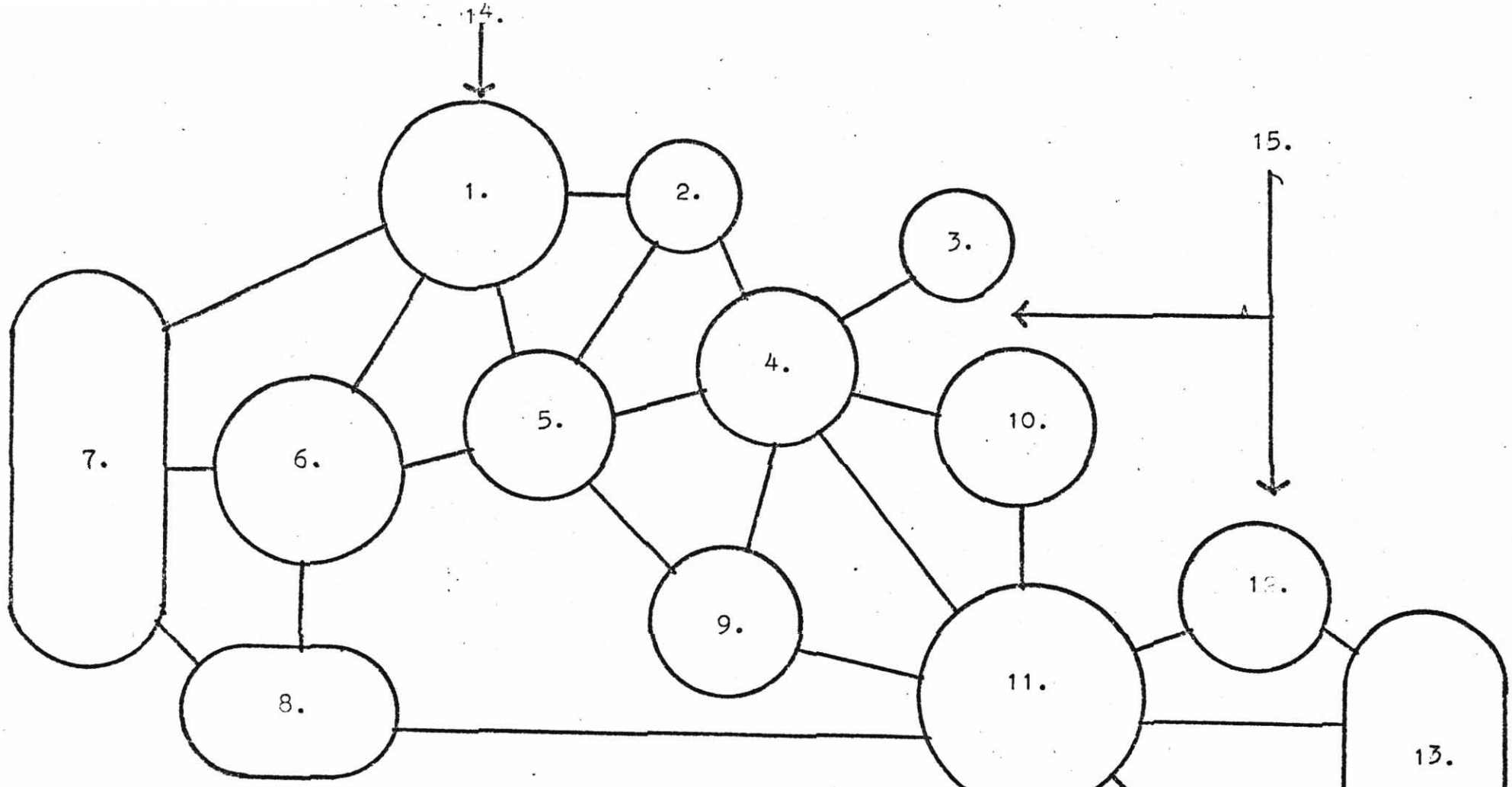
2. Relationship of the Buildings in the School Complex

Because of the openess of the campus location, the campus itself should be relatively open so as not to intrude upon the environment. However, relative distances between buildings should be suitable for human usage. Since the students necessarily consider this their second home, the closeness between buildings will provide visual intimacy similar to that of their own homes. The two considerations in planning this campus are to allow enough open spaces in relation to its natural environment, and to keep distances between buildings in reasonable closeness in order to provide easy walking distances between buildings and yet to provide an atmosphere of intimacy, closely approximating the atmosphere of a home.

There are two basic functions which will be served by this campus; education and living. The aesthetic aspect of the design, therefore, is separated into two basic defining functions. Since the educational functions are further divided into classrooms, and living areas in three separate zones. Once the zones are well defined, the relationships between buildings will be found to be in close proximity with their functions.

3. Campus Traffic

Since the distances between buildings are determined for the human scale, only pedestrian traffic is considered




1. Parking areas.
2. Administration.
3. Crafts rooms.
4. Classrooms.
5. Auditorium.
6. Gymnasium.
7. Soccer field with tracks.
8. Swimming pool.
9. Library.
10. Cafeteria.
11. Dormitories.
12. Tennis and basketball courts.
13. Practice fields.
14. Main entrance.
15. Service way.

for the campus. The vehicular traffic terminates at parking lots and service ways around the campus. Furthermore, such arrangements will minimize accidents which are due to careless drivers. Two parking lots are provided for the visitors; one is located on the north part of the campus, and another parking lot is located close to the dormitories on the east side of the campus.

4. Materials

In selecting the materials for this project, local materials and products will be given preference for the following reasons:

- to conform with the organic concept of relating design with nature;
- to eliminate import costs and thereby keeping the capital costs low;
- to help support local industries;
- to use local materials which are easily available.

5. Structure

The main structural material that will be used for the construction of this complex is reinforced concrete. Precast concrete will be used for the long roof spans of the auditorium. The basic post and lintal method will be used for classrooms, cafeteria, library and dormitories, however, a rigid frame system will be necessary for use in the gymnasium.

6. Factors to be considered in the Design of Buildings in the Hot-Humid Tropics.

1. Humid tropics demand heavy shade externally provided by sunshade devices and large overhangs which give protection from both the rain and sun.
2. An open plan and wall spread out layout, takes advantage of the prevailing breezes.
3. A light-framed structure allows maximum openings for the walls that should be thin and have large openings for maximum air movement.
4. The building should expose its greatest length and its open side to the prevailing breeze.
5. The building should preferably be only one room thick to ensure cross-ventilation.
6. Heavy rainfall and excessive run-off will influence the locations of the buildings.
7. It is prefereable to raise the building on stilts in order to remove them from ground radiation and to allow them to take up cool night temperatures from all sides.

The factors listed above should be the design criteria for hot-humid tropical houses or buildings. This kind of design takes full advantage of natural conditions, and hence, should be the most desirable.

7. Auditorium (Dwg. No. 5 & 6 p. 131 & 132)

The auditorium is one of the main buildings in this complex, for it will be frequently used as a center for school affairs. It should be so designed and equipped that it may be used effectively by all groups. The use of this facility will extend over a wide range of purposes including concerts, plays, motion pictures, and other forms of presentations.

The form of this auditorium takes into consideration the functions and acoustical requirements of the building, and at the same time, it is based on the environment, the site, and the other buildings in the complex, in order to provide a good relationship to the campus and yet to retain its attractiveness. The auditorium assumes the structural form of a shell to blend with the seaside location.

Pre-cast concrete will be used for the structure of the long-curve spans of the roof. Reinforced concrete will be used for the main structures of the building. Local materials, stones, and wood will be used for exterior and interior decoration in the auditorium.

The stage provides the setting for both the performing arts and other educational activities. It is therefore designed to allow freedom of movement for the performers and at the same time to facilitate the task of moving the sets vertically for horizontally behind the proscenium. To bring about the participation between the audience and

the performers, the stage is designed to be close to the audience. The balcony is used to reduce the distance from stage to the audience.

Natural lighting is avoided in the auditorium, since absolute light control is essential for good performances. Stage lighting should be flexible and simple enough to permit amateurs to operate the equipment effectively.

Good seating arrangement of the auditorium will help the acoustical value and traffic circulation of the hall. With these factors in mind, the free arrangement has been considered as suiting the purpose well. While allowing easy flow of traffic, this arrangement also gives the audience a good view of the stage.

Improper ventilation tends to distract an audience, hence an air-conditioning system is therefore necessary for this building.

The school auditorium will comfortably seat about 564 students. The lobby provides ample circulation space immediately outside the seating area. The areas that support production, such as stage craft, band room, storage, dressing rooms, and mechanical room are located at the back of the building.

The proximity of the auditorium to all other buildings on the campus will emphasize the idea of an auditorium as being the center of activities for this Boarding School. Located close to the visitors' parking area, the class-rooms and the administrative offices, the auditorium is

therefore easily accessible to visitors, students and administrators -- and fulfills the function of an auditorium as a meeting place for both offcampus and campus residents.

a. Acoustic Study

Architectual acoustics are basically concerned with two objectives:

- the provision of good hearing conditions within a space, by controlling the direction, impact, and duration of sound waves, and
- the provision of a satisfactory acoustical environment by raising barriers against unwanted sounds, originating outside the space.

Size, shape, and volume of the auditorium are also important in acoustical design.

(1)* Factors Influencing Hearing Conditions

The environment of the auditorium should provide good hearing conditions.

1. It must be completely quiet without any intruding noises from adjacent areas.
2. The desired sounds must be sufficiently loud.
3. The sounds must be well distributed through the room to give a desirable degree of acoustic uniformity, and to avoid disturbing echoes and focusing.

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* Time-Saver Standards, Fourth Edition

4. The reverberation time must be long enough to give proper blending of sounds and yet be short enough so that there is no excessive overlapping and confusion.

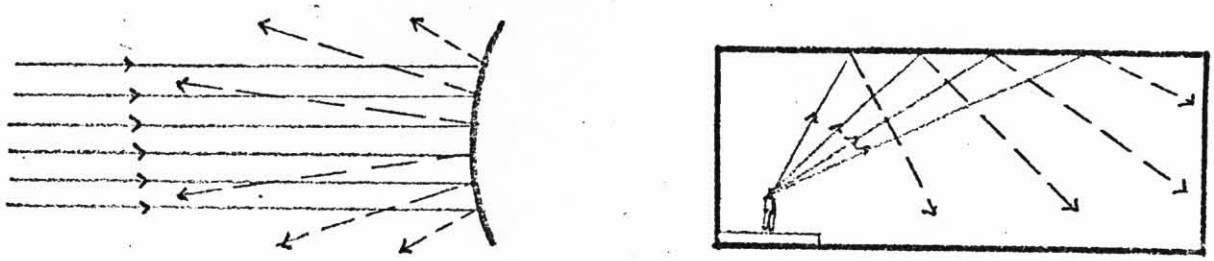
(2) Sound Absorption and Reflection

The quality of hearing as applied to sounds originating within a room itself, is governed by the size and shape of the room, the location and the volume of the sound, and the reflection characteristics of the materials in the room.

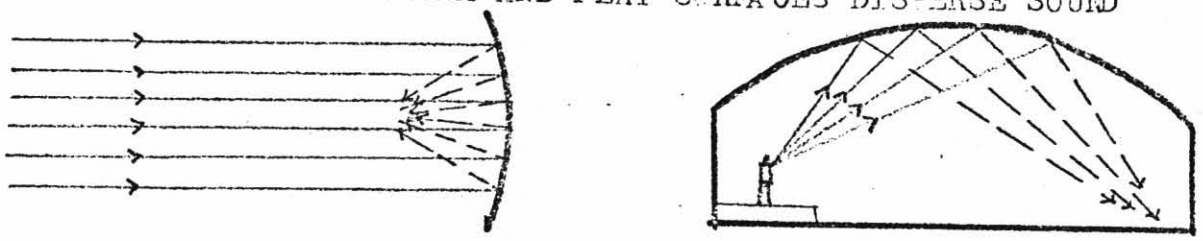
In designing this auditorium for good hearing, the objective is to so dispose the reflective and absorptive materials within the room that all occupants will receive as nearly as possible an agreeable volume of sound.

The side walls are non-parallel in order to avoid fluttering schoes. Non-parallel side walls, converging in the direction of the sound source are always preferable to parallel walls. They improve sound dispersion and tend to reduce the reverberation period. Wood screen on poured concrete will be used along the side walls to reflect the sound.

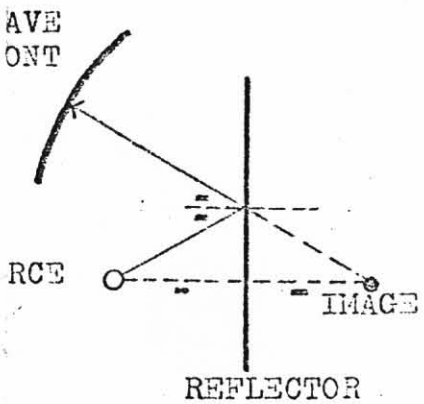
The back walls or the surfaces behind the audience and facing the sound source are absorptive, to minimize the rebound of sound energy which causes repetition of the first hearing. Wood veneer, on 2" x 3" wood studs, is used as the surface a long the back walls.

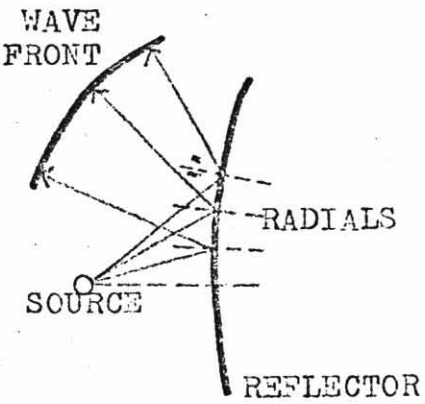


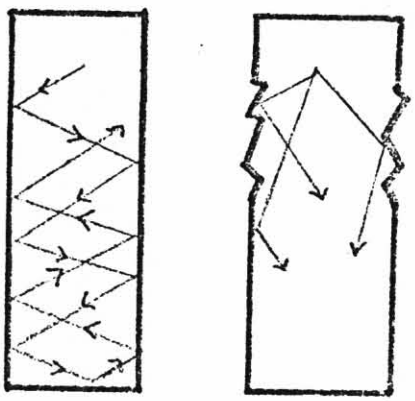
CONVEX AND FLAT SURFACES DISPERSE SOUND



CONCAVE SURFACES CAUSE FOCUSSING(BAD)



Long parallel unbroken walls produce flutter effect. Splayed surfaces correct this.

Plaster on metal lath will be used as the reflective material on the ceiling in order to reflect nearly all of the sound reinforcements.

(3) Echo and Blur

Whenever the distance difference between the reflected sound and the sound source is greater than 65 feet or .06 seconds apart, the reflected sound will interfere with the sound source, creating an echo. If the distance difference were to be between 50 and 65 feet, the resulting overlapping of sound will be a blur. Both the blur and the echo tend to cut down the clarity in articulation, as well as clarity in music, and are therefore considered undesirable. These conditions are most likely to exist in large spaces such as those in an auditorium.

The auditorium for the proposed school is designed to avoid echoes and blurs by careful measurement of the sound-source and audience relationship created by each reflecting surface and by keeping this distance difference described above to below 50 feet in each case. This check is shown in drawing No. 5 p. 131.

(4) Sound Foci

Sound foci is a condition created by concave surfaces, in which sound energy reflected from each of such surfaces tends to focus in definite points. In the design of this

auditorium, no concave surface was used, therfore avoiding sound foci: the basically concave walls in the back of the auditorium are broken into smaller portions of flat surfaces, each having characteristics similar in dimension to those of long wavelengths.

(5) Flutter

Flutter is created by two parallel surfaces reflecting sound energy from one wall to another continously until the energy eventually dies down. This process is disturbing in spaces where clarity of the source of sound is required.

In rooms where windows, doors and objects on the walls are reasonably distributed on the walls, diffusion alleviates problems created by flutter. In the auditorium where sound clarity is the major consideration, however, parallel walls should be avoided whenever possible. In this school auditorium, design for diffusion and avoiding of parallel walls avoid any possible flutter.

(6) Room Resonance

In general, a room resonance is the normal mode of a room giving certain frequencies and stronger vibrations to a generated sound source. The dimensions of each room will determine its resonant frequencies. Proper absorption and sound diffusing surfaces, however, will minimize sound pressure built up and will smooth out sound resonance throughout the entire frequency range.

(7) Reverberation Time

Reverberation time is described as the time it takes for the highest point of a sound energy of 60 db. to die out to one/millionth of its original energy. The growth and decay of each sound energy is a phenomenon determined by the amount of sound absorption existing within the space in which such sound energy is generated. A note should be made here that the different frequencies in each sound energy have different reverberation times. For the purpose of design, we should check separately the reverberation times for 125,500, and 2,000 cycles to determine a desirable optimum reverberation time for each room.

There are basically two determinants for the optimum reverberation time; the volume of the room and the amount of sound absorption in the room. For example, if we keep a given optimum reverberation time as a constant, the room volume and the amount of absorption will be two variables directly related to each other. This relationship is best described in the relationship

$$* \quad T \text{ (in sec.)} = \frac{0.49\ V}{S\ (-\ 2.3 \log_{10} (1 - \bar{\alpha})\ )}$$

---

* Knudson, "Accoustical Designing for Architecture," 1950.

where the reverberation time is in seconds, while V represents the volume of the room, and S represents the unit of absorption in the room.

The auditorium in this proposal is designed for multi-purpose uses such as speeches, movies, plays, music and operas. According to past studies made by authorities in acoustical design, the desirable reverberation time in such an auditorium should be 1.3 seconds for medium and low frequencies (1.885). More detailed calculations are listed in the following pages.

In designing an auditorium, we should first of all remember that it is a sound box in which people may experience sounds generated from within.

The first consideration in designing this auditorium was to keep the room down to one space, thus keeping the sound energy within the auditorium, and avoiding the phenomenon known as coupled space. Secondly, sound reinforcement is achieved through the use of ceiling and wall panels carefully angled (See Dwg. 6 page 132) to fully distribute sound to every seat. Thirdly, panels forming interior walls are non-parallel to facilitate sound diffusion and to leave out resonant frequencies. Fourthly, the seating areas are sloped to obtain optimum audibility. Each row will be clearly exposed to the sound source without interference from successive rows in front. The proscenium is used to maintain an atmosphere

of intimacy between the audience and the stage. No noticeable parallel walls exist, hence flutter is alleviated. Furthermore, no concave surface exists, cancelling any possibility for sound foci. The areas designed for absorption (See the calculations on the following pages) keep the optimum reverberation time at 1.3 seconds, a desirable time for an auditorium of this type.

In terms of function, this design calls for only one major entrance into one main lobby in order to best control the entering public. However, a secondary exit is used as a fire escape. The form and aesthetic considerations for this auditorium are a combination of acoustical considerations, function and sympathy with its environment. The free-form, in this case, is almost a result of acoustical design. Its form, however, creates an interesting atmosphere in the interior; an atmosphere sympathetic to the undulating landscape in the background, the unpredictable but basically smooth sea, and the expressively white and smooth sand. The harmony with nature, the detailed consideration for acoustics, and the special designing for the functions are the major factors that recommend the design for the auditorium in particular and for the entire campus in general.

# AUDITORIUM ACOUSTICAL DESIGN

| | | Sq. Meters | Sq. ft. |
|---|---|---|---|
| 1. | Floor 23 m. x 18 m. | 414 | 4460 |
| 2. | Balcony | 200 | 2160 |
| 3. | Walls | 786.5 | 8470 |
| 4. | Ceiling | 414 | 4460 |
| 5. | Ceiling under the balcony | 200 | 2160 |
| 6. | Opening | 30 | 324 |
| 7. | Surfacing | 2044.5 | 22034 |
| | Volume 414 $m^2$ x 11 m. | 4554 $m^3$ | 160900 $ft^3$ |
| | Volume to be taken out (under the balcony) | 560 $m^3$ | 19750 $ft^3$ |
| | Total volume | 3994 $m^3$ | 141150 $ft^3$ |
| | Volume/person | | 250 $ft^3$ |

Total seats $\frac{141150}{250}$ = 560 seats @ 10 $ft^2$/person.

## REQUIRED ABSORPTION

$$t_{60} = \frac{0.049V}{S[-2.30 \log_{10}(1-\bar{\alpha})]}$$

$$1.30xR = \frac{0.049 \times 141150}{22034\ (X)}$$

$$X = \frac{0.049 \times 141150}{22034\ (1.3x1.45)}$$

$$X = .17$$

$$\bar{\alpha} = .16$$

$$S\bar{\alpha} = .16 \times 22034 = 3525.44$$

$$1.30 = \frac{0.049 \times 141150}{22034 \times (X)}$$

$$X = \frac{0.049 \times 141150}{22034 \times 1.30}$$

$$X = .266$$

$$\bar{\alpha} = .235$$

$$S\bar{\alpha} = .235 \times 22034 = 5177.59$$

| | 125 | 500 | 2000 |
|---|---|---|---|
| Optimum reverberation time | 1.885 | 1.30 | 1.30 |
| $[-2.30 \log_{10}(1-\bar{\alpha})]$ | .17 | .266 | .266 |
| $\bar{\alpha}$ | .16 | .235 | .235 |
| Total absorption required $S\bar{\alpha}$ | 3525.44 | 5177.59 | 5177.59 |

## ABSORPTION BY SURFACES

| Absorption materials | area/ sq. ft. | 125 cps. coef. | 125 cps. units | 500 cps. coef. | 500 cps. units | 2000 cps. coef. | 2000 cps. units |
|---|---|---|---|---|---|---|---|
| **Floor** | | | | | | | |
| Audience, seated in upholstered seats, per sq. ft. of floor area. (2/3) | 3114 | .60 | 1868.40 | .88 | 2740.32 | .93 | 2896.02 |
| Unoccupied cloth-covered upholstered seats, per sq. ft. of floor area, (1/3) | 1557 | .49 | 762.93 | .80 | 1245.62 | .82 | 1276.74 |
| Carpet, Amritza, on concrete. 7/16" | 1324 | .09 | 119.16 | .24 | 317.76 | .24 | 317.76 |
| **Ceiling** | | | | | | | |
| Plaster on metal lath 3/4" thick. | 6620 | .04 | 264.80 | .06 | 397.20 | .04 | 264.80 |
| **Wall** | | | | | | | |
| Wood screen on poured concrete, unpainted. | 6350 | .01 | 63.50 | .02 | 127.00 | .02 | 127.00 |
| Wood veneer, on 2"x3" | 2120 | .11 | 233.20 | .12 | 254.40 | .10 | 212.00 |
| **Door** | | | | | | | |
| Wooden doors | 324 | .10 | 32.40 | .05 | 16.20 | .04 | 12.90 |
| Air 75% relative hum. | 141150 $ft^3$ | -- | -- | -- | -- | .0025 | 35.20 |
| TOTAL ABSORPTION | | | 3323.19 | | 4998.50 | | 5142.50 |
| ADDED ABS. REQ'D. | | | 202.25 | | 179.09 | | 35.09 |

(8) Library (Dwg. No. 2 p. 128)

The library is located in the center of the school site and close to the classrooms and the auditorium. The building is divided into two sections, by the lobby; the art section is in the northern part and the science section is in the southern part of the building. This design concept, provides privacy and easy control for each section, and yet it will separate the reading arras from the main traffic. A natural ventilation system is included for the reading areas.

(9) Designing Classrooms (Dwg. No. 2 p. 128)

Classrooms are carefully designed for the new system of teaching. In consideration of good hearing, a classroom is shaped to meet the acoustical requirements. A preparation room for the teachers is located between the back walls of two classrooms; it is also used as a projection room. The court between the classroom buildings will provide a shaded rest area, and yet it will help in traffic circulation in the area before and after classes.

(10) Cafeteria (Dwg. No. 2 p. 128)

The cafeteria is located in the northeastern part of the school site, and it is between the classrooms and the dormitories. This building location is based on the daily schedule of the school and its functions.

The kitchen is on the northern part of the building.

The service way is the same passage way which is used for the ceramic, arts, and crafts laboratories.

(11) Gymnasium (Dwg. No. 2 p. 128)

The gymnasium, center for indoor sports, is located on the west side of the complex. A soccer field with tracks is on the west side of the gymnasium, and a 50 meter swimming pool is on the south. This group of sport activities is designed to be used for major competitions and practice for such competitions. The gymnasium is used for several activities including basketball, badminton, and gymnastics. In order to be convenient for visiting spectators, the parking lot is located next to the center.

The practice soccer fields, basketball courts, and tennis courts are provided for the students to use for practice during their sport hours. These outdoor sport activities are located on the east side of the complex which is close to the dormitories.

(12) Dormitories (Dwg. No. 2 p. 128).

The dormitories are on the east side of the campus, and they are close to the cafeteria and the classrooms. The two buildings face to the sea in order to give a good view of the beautiful scenery from every room in the buildings. There is a visitors' parking lot on the west side of the dormitories, convenient for visitors and the students.

There will be 200 students in each six story building. Each building has 100 double rooms, with 20 rooms per floor. The dormitory administrative office, including the information desk and the switchboard, is also on the ground floor.

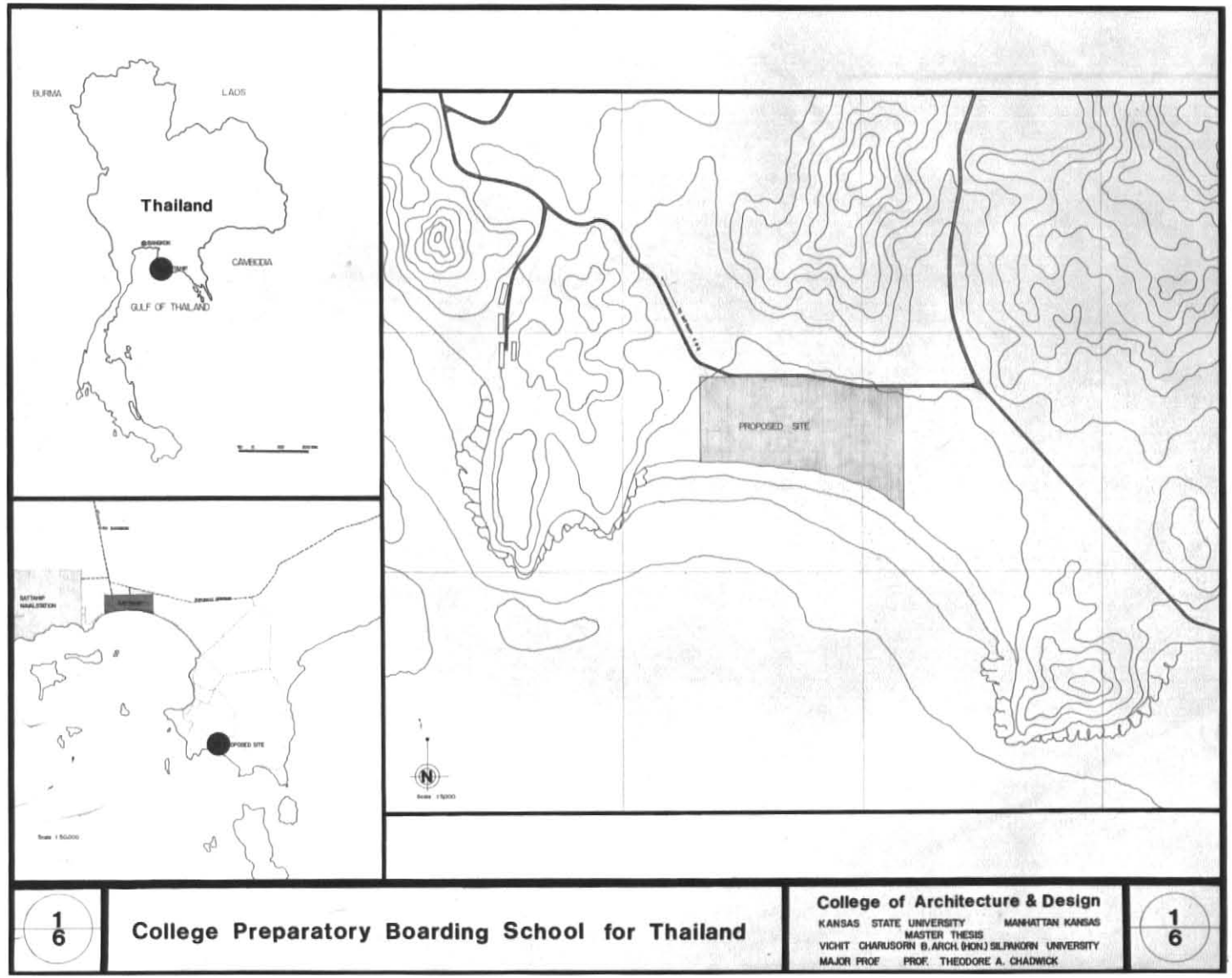
(13) Administrative Office (Dwg. No. 2 p. 128)

The administrative office, including a first aid room is located in the building that is north of the campus center. The visitors' parking lot is on the east side, the classrooms are on the west, and the auditorium is on the south side of the office. This office is the center of the school administration, therefore, it should be easily accessible to visitors and students.

# PRESENTATIONS

## METERS TO FEET CONVERSION TABLE

| | | | | |
|---|---|---|---|---|
| 61 | METERS | * | 200 | FEET |
| 1 | METER | = | 3 | FT. and 3.36 inches |
| .305 | METER | = | 1 | FOOT |
| 13 | SQ. METERS | = | 140 | SQ. FEET |
| 1 | SQ. METER | = | 10.75 | SQ. FEET |
| .0928 | SQ. METER | = | 1 | SQ. FOOT |
| 85 | CUB. METERS | = | 3,000 | CUB. FEET |
| 1 | CUB. METER | = | 35.3 | CUB. FEET |
| .0283 | CUB. METER | = | 1 | CUB. FOOT |




1
6

**College Preparatory Boarding School for Thailand**

**College of Architecture & Design**

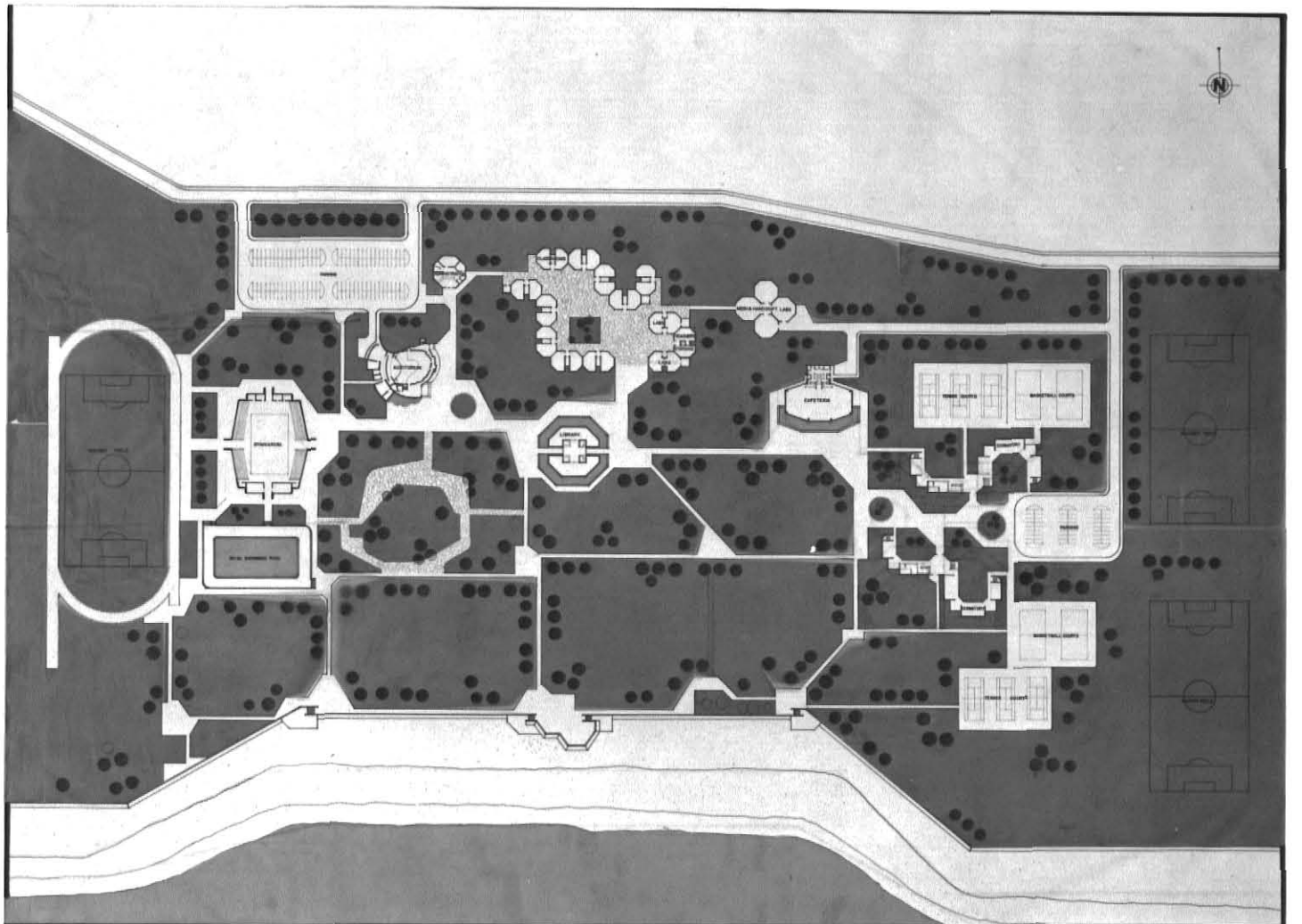
KANSAS STATE UNIVERSITY MANHATTAN KANSAS

MASTER THESIS

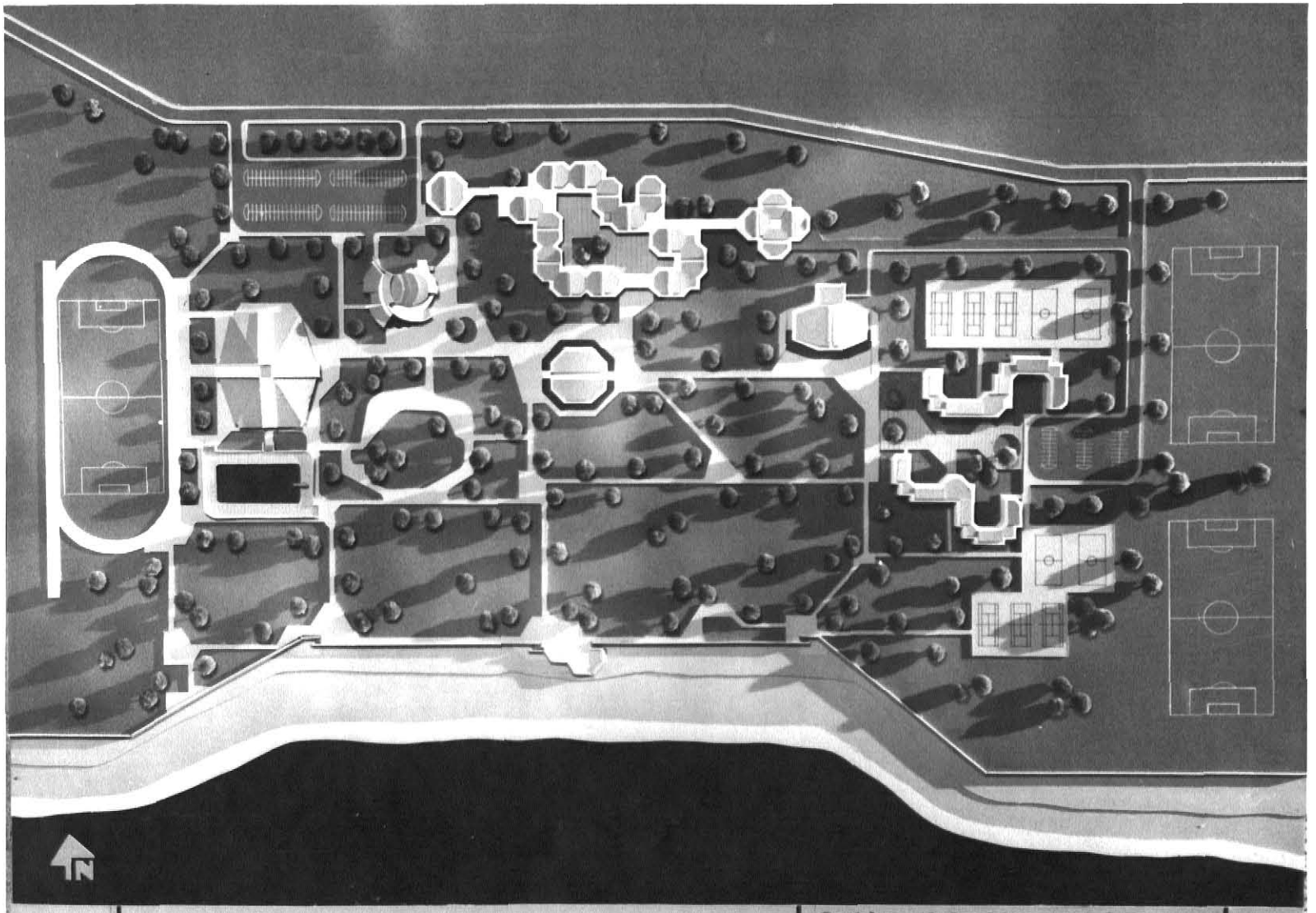
VICHIT CHARUSORN B. ARCH. (HON.) SILPAKORN UNIVERSITY

MAJOR PROF PROF. THEODORE A. CHADWICK

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6



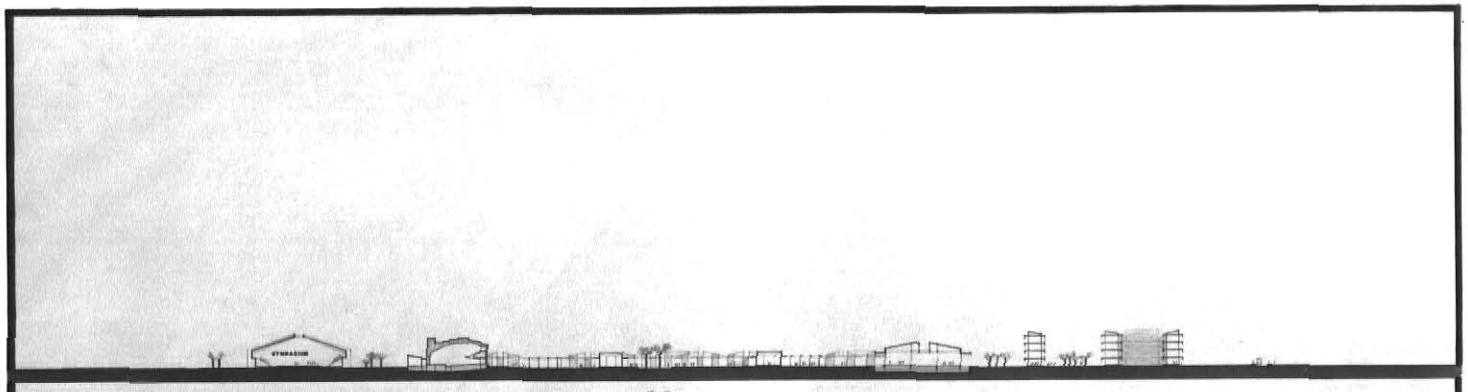
| 2/6 | College Preparatory Boarding School for Thailand | College of Architecture & Design<br>KANSAS STATE UNIVERSITY MANHATTAN KANSAS<br>MASTER THESIS<br>VICHIT CHARUSORN B.ARCH (HON) SILPAKORN UNIVERSITY<br>MAJOR PROF. PROF. THEODORE A. CHADWICK | 2/6 |
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Model
scale 1:750

College Preparatory Boarding School for Thailand

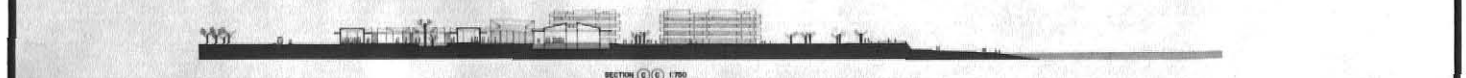
College of Architecture & Design
Kansas State University, Manhattan, Kansas
Master's Thesis by
Vichit Charusorn, B.Arch.(honor) Silpakorn U.
Major Prof. Prof. Theodore A. Chadwick




SECTION (A)(A) 1:750



SECTION (B)(B) 1:750



SECTION (C)(C) 1:750

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# College Preparatory Boarding School for Thailand

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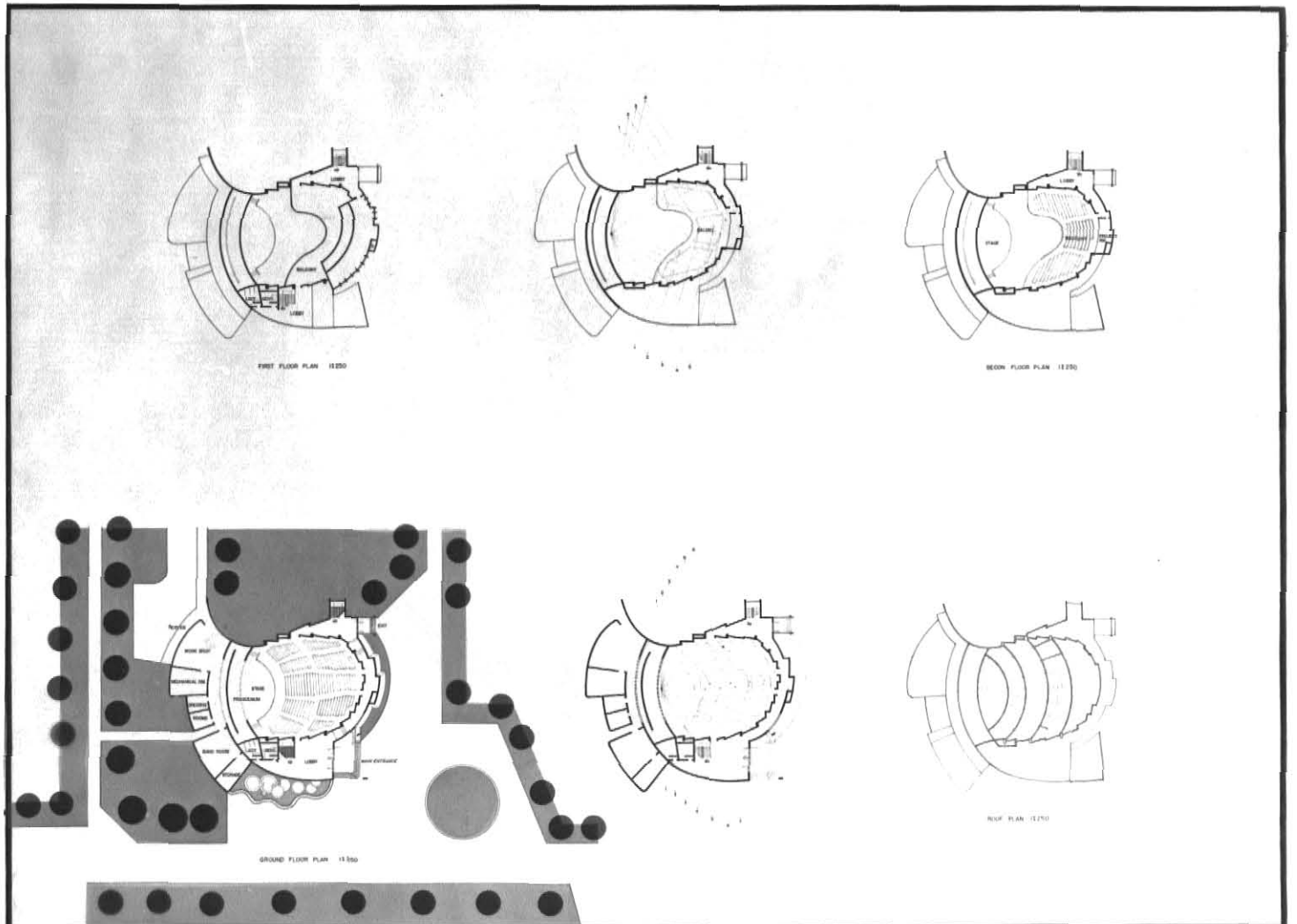
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College of Architecture & Design

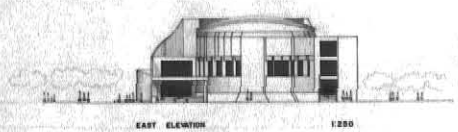
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MASTER THESIS

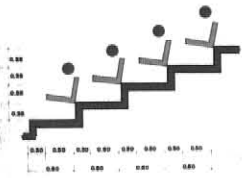
VICHIT CHARUSORN B.ARCH.(HON.) SILPAKORN UNIVERSITY

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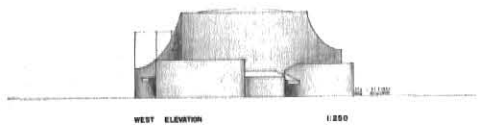
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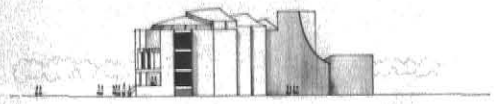
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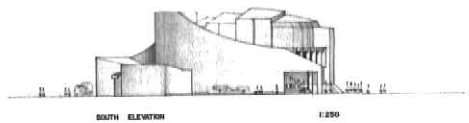
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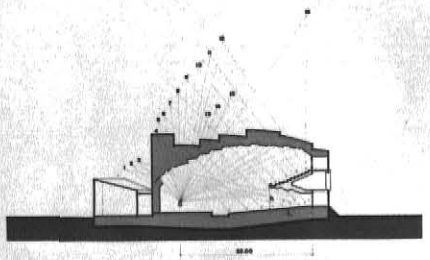
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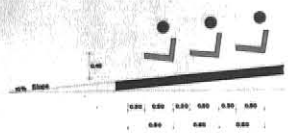
NORTH ELEVATION 1:250



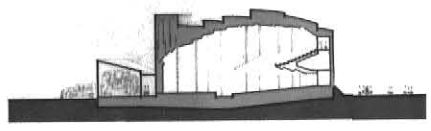
SOUTH ELEVATION 1:250



1:250



1:25



LONGTITUDINAL SECTION 1:250

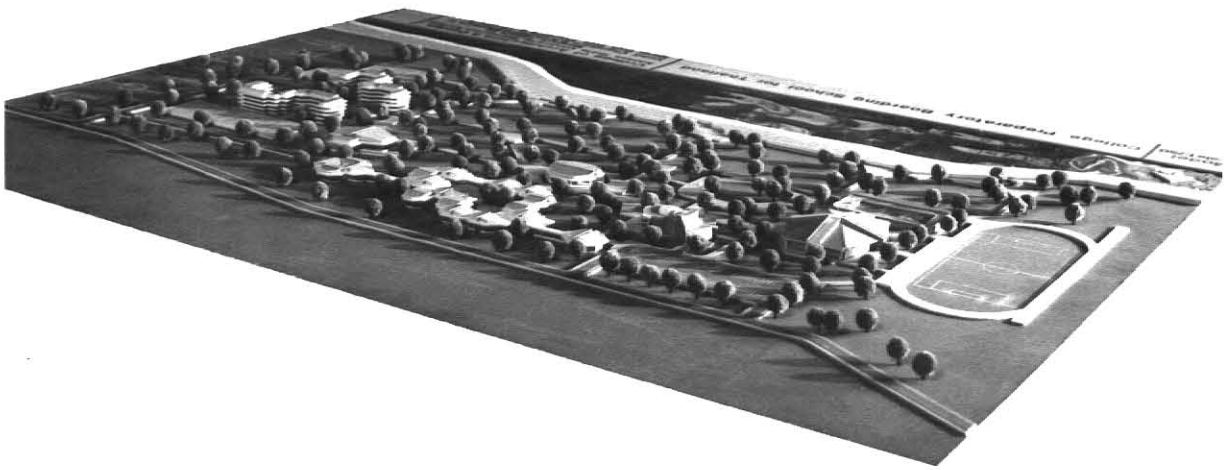
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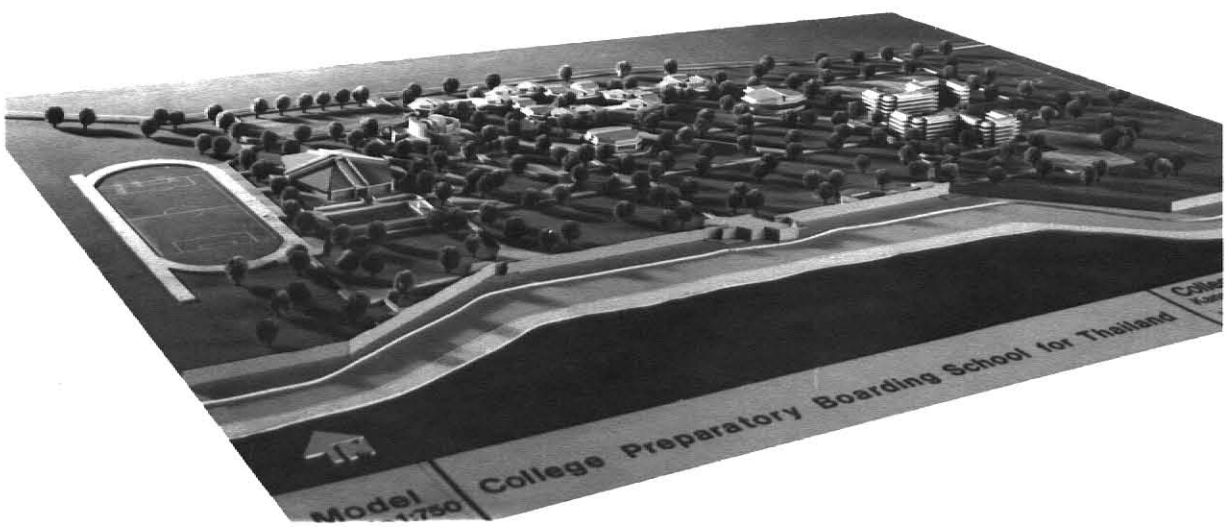
# College Preparatory Boarding School for Thailand

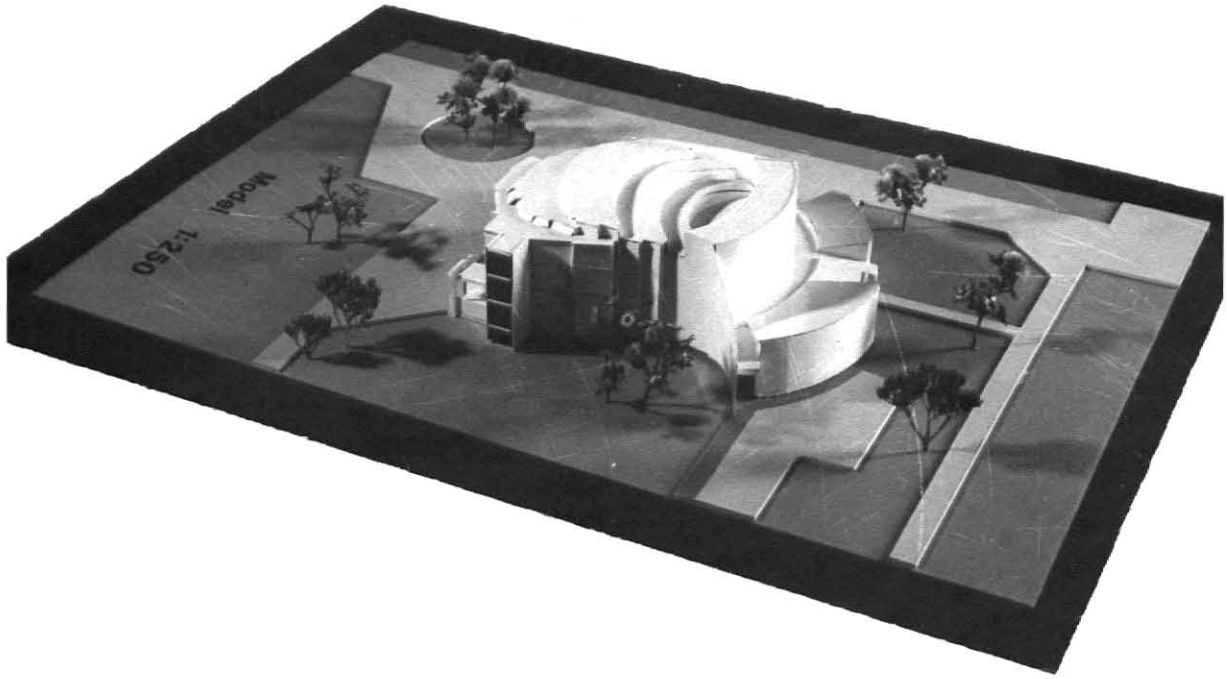
**College of Architecture & Design**

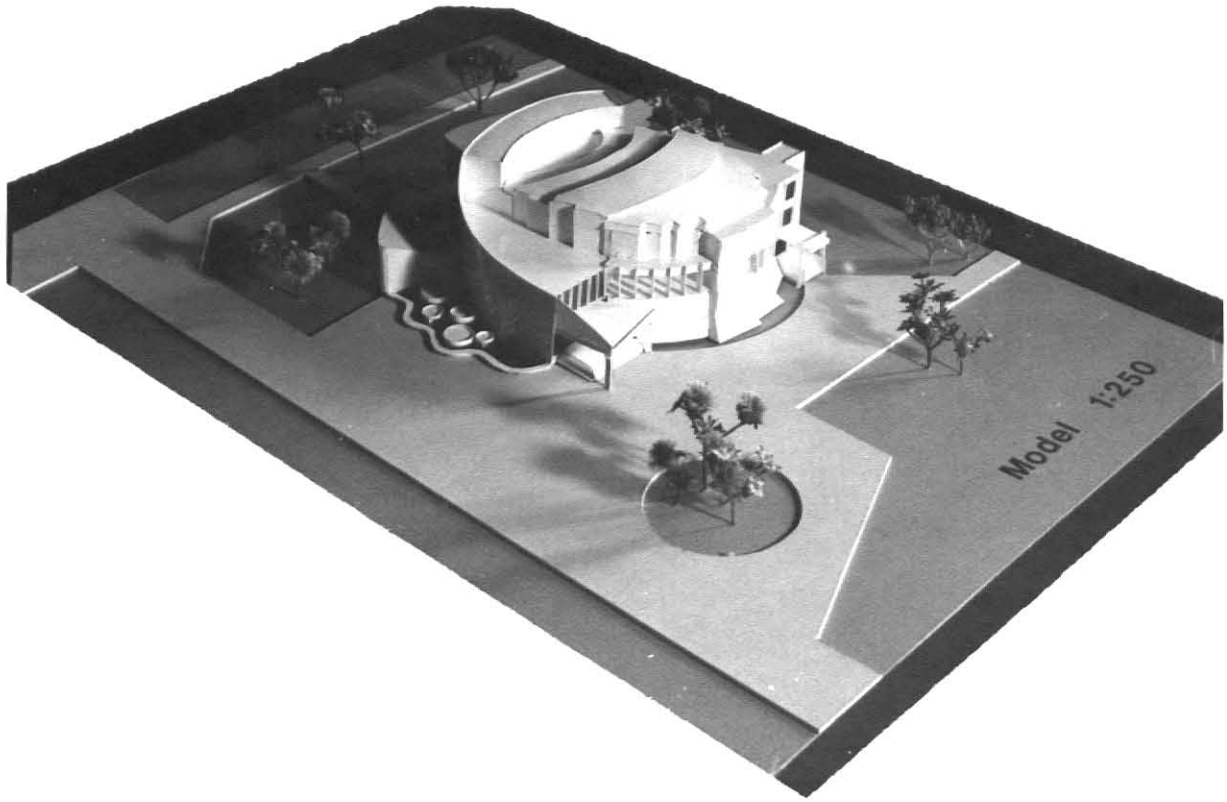
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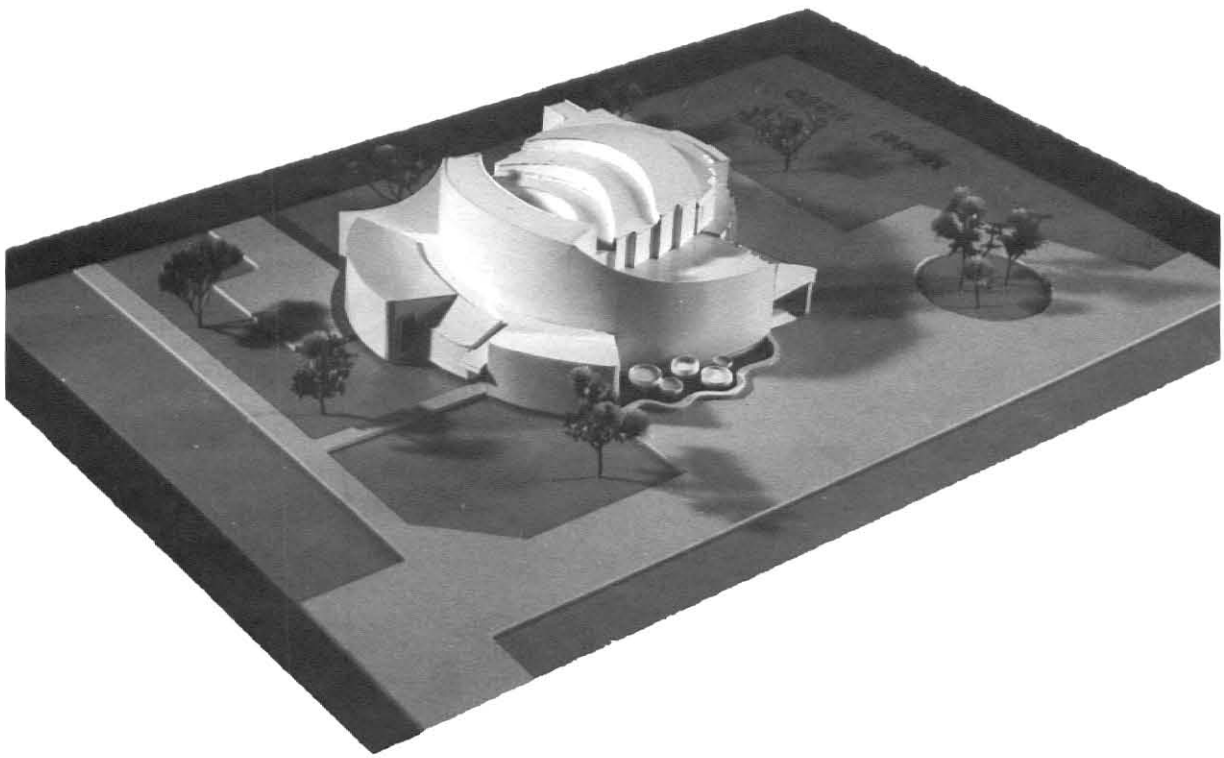
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College Preparatory Boarding School for Thailand


Model 1:250


Model 1:250



# ACKNOWLEDGEMENTS

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# THE DESIGN FOR A COLLEGE PREPARATORY BOARDING SCHOOL FOR THAILAND

by

VICHIT CHARUSORN

B. Arch., (Honor) Silpakorn University, 1969

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARCHITECTURE

Department of Architecture and Design

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1971

Since the present day school system was first installed in the early 1920's, Thailand educational establishment has progressed impressively. Though impressive, the actual progress is still falling behind the proposed goal; the goal to achieve 100 percent literacy for each successive generation.

Plans made by the Ministry of Education are quite realistic; giving priority to education at the lower level. Further addition to higher education are proposed, pending the success at the primary and secondary school levels. The present obstacle in the progress of education is mainly due to the difficulties in implementing prescribed plans. While no definite echalon of the administration may be blamed for the lack of the implementation, general blame may be placed on the bureaucracy in the administration.

Though the Ministry of Education has its own difficulties in carrying out plans for educational excellence in the country, private schools owned and operated in independent trustees have had meaningful success supplementing the present system.

The proposed school, with the given reasons and justifications, is meant to play only a very small part in the total picture of the country's educational future. However, any small proposal, such as this program, will definitely be a step in the right direction.