CHAPTER 1

INTRODUCTION

Thailand is part of Southeast Asia whose climate is of a monsoon type. Warm climate with moderate to heavy rainfall induces high degree of weathering in this region. The northern part of Thailand, especially Doi Khun Tan area is mountainous or upland area consisting of high terraces, low plateau, hills and mountain ranges. The major parent rocks are granite, gneiss, granodiorite, schist, and shale. The degree of weathering of the area is relatively high and many rocks have been transformed into decomposed materials, especially in the upper part. These decomposed materials are important sources of residual soils that are named after their parent rocks such as decomposed granite, decomposed gneiss, and so on. The important factors controlling road construction and maintainance in the mountainous area are the nature of rocks and their residual products, topography, and geological and structural complexes affecting the stability of cut slope of the excavated area. In the past, little attention was focused on the properties of residual soils derived from weathering of massive rocks. Several years ago soil engineers began to pay attention to weathering rocks because there are many new roads cut through these materials (Ruenkrairergsa, 1976). Slumps and rock falls generally occur in the rainy season. District engineer responsible for maintaining highways in the area of weathered rocks must be aware of this problem and understand the nature of materials. Slumps may be small or large depending on the height and inclination of the cut slope, degree of weathering, rainfall intensity and duration including other environmental factors. The preventive design of a stable cut slope is sometimes very costly, and it is more feasible to locate a new route.

1.1 Location

Doi Khun Tan area is located between the Chiang Mai Basin and the Lampang Basin, Amphoe Mae Tha Changwat Lamphun and Amphoe Hang Chat Changwat Lampang, in northern Thailand. It is about 45 km from Lampang and around 30 km south of Chiang Mai (Figure 1.1).

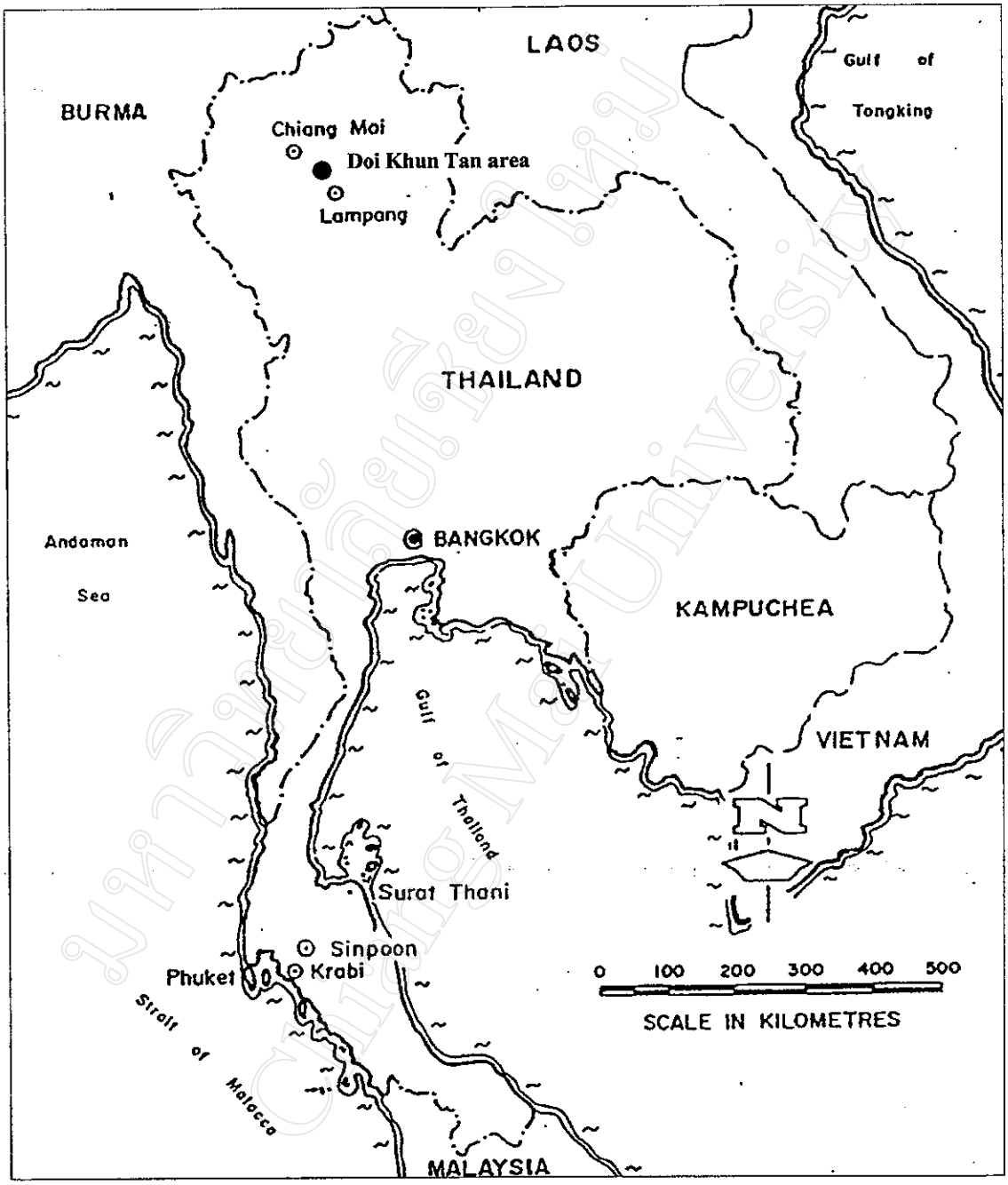

Figure 1.1 Location of study area (● Doi Khun Tan area).

1.2 Access

1. Highway No.11 is the main road connected between northern and central of Thailand. The study area is located about 640 km from Bangkok and around 40 km from Lampang.

2. The road from the Doi Khun Tan National Park to Amphoe Hang Chat.

3. The railway from Bangkok to Chiang Mai passes through this area, and has a stop at Khun Tan station. It is 1.5 km from the park headquarters (Figure 1.2).

1.3 Topography

The study area covers about 110 km^2 and lies between latitudes 18° 23' - 18° 40' N and longitudes 99° 12' - 99° 17' E, located between the Chiang Mai Basin and the Lampang Basin, Amphoe Mae Tha Changwat Lamphun and Amphoe Hang Chat Changwat Lampang, in northern Thailand. It is about 325-1,373 m above mean sea level and is surrounded by Doi Khun Tan Mountain. The highest peak in the vicinity is Doi Khun Tan, which has an elevation of 1,374 m. The Mae Khom, Mae Tam, and Mae Prai rivers are important tributaries of the Wang River and the Mae Pa Kha, Mai Yom Wai Loang, Tung Pai, Song Tha, and Mae Tha rivers are important tributaries of the Ping River. This area is well irrigated by a number of canals that divert water from these tributaries of the Ping River and Wang River.

1.4 Climate

The climate in the study area is typical of the northern Thailand which is influenced by the southwest and northeast monsoons and secondarily by cyclonic storms and intertropical fronts. From May to October, the air masses move from the Indian Ocean and bring moisture creating the rainy season. Most of the rain falls in August and September, but isolated heavy downpours are experienced in May to November. The dry season occurs in mid-October to mid-February with cool and dry weather. The duration of seasons varies Because of the effect of monsoons. Heavy rainfall occurs when a cool air mass from the north meets the southwest

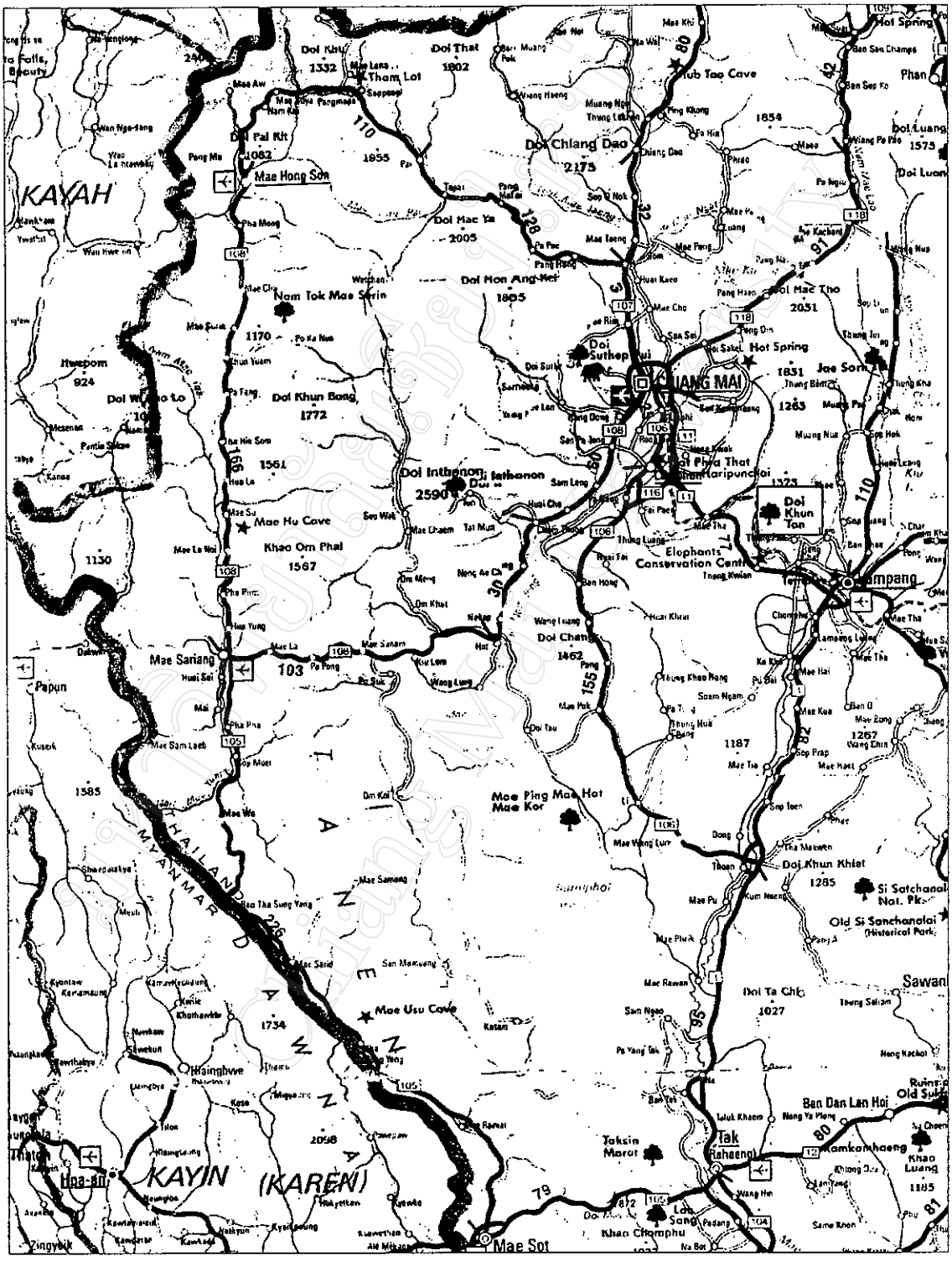

Figure 1.2 Access to Doi Khun Tan area.

monsoons. The cyclonic storms from the Pacific Ocean cause the intense precipitation in the region.

In general, three types of rainfall occur in the area, namely; orographic, convective, and cyclonic. During the rainy season, orographic cyclonic rains prevail while local convective rains of high intensity occur during the hot season. The annual total rainfall recorded in 1990 – 1999 ranges from 956.67-1,425.96 mm. The minimum amount of monthly rainfall occurs during December to February as a result of dry cool air masses moving to the region from the Central Asia. Maximum rainfall usually occurs in August to October due to the southwest monsoons from the Indian Ocean.

The temperature of the area is variable. The maximum recorded temperature occurs in April at 40°C while the lowest is in December at 20.6°C. The prevailing wind direction changes according to the season. From October to January, the northeast monsoon prevails and the wind direction is usually southerly. However, the prevailing wind varies in all directions during the transition period of the northeast monsoon to the southwest monsoon.

1.5 Population

Doi Khun Tan area has 37 villages which have the total population of about 30,039 persons; 15,018 man and 15,021 woman, or about 7,177 families. The majority of populations are workers whose ages range between 18 – 49 years old.

1.6 Career

People in the study area earn their living by growing rices, plant crops (peanut, popcorn, sugarcane, etc.), tree crops (longan, mango, tamarind) and livestocks (cow, buffalo, pig, dug, and chicken). The younger people with the age range of 15-35 years old work in the factories in nearby Lamphun and Lampang.

1.7 Purpose of the Study

The main objectives of the study are;

1. To investigate types and mineral compositions of granite.

2. To assess the impact of granite weathering on transportation routes in Doi Khun Tan area.

1.8 Scope of the Study

1. Approximately 30 samples of granitic rocks from transportation route (railway and highway) were collected.

2. Collected sample were prepared prior to determination by

   - X-ray diffraction (XRD) to study the composition of minerals.
   - Atomic Absorption Spectrometry (AAS) to study chemical compositions.

3. Conducted compression test to determine the uniaxial compressive strength.