CHAPTER I

INTRODUCTION

The Prachinburi-Khao Yai Highway (3077) was designed by Department of Highways and the construction was completed in 1981. This highway serves the traffic to Khao Yai National Park which is located on the top of the mountain range of the same name. Between Kms. 11 and 15.3 the highway passes through a colluvial slope. At Kms. 12.658 to 12.763, where the embankment of 5 to 9 meters high and box culvert were constructed across a stream valley, the embankment failures had occurred repeatedly on this embankment three times in 1981, 1983, and 1985/1986.

1.1 Scope and Purposes.

The scope of this study is to collect the information about the last two landslides between Kms.12.658 and 12.765 in 1983 and 1985/1986. A detailed investigation was done in an area of 12 square kilometers covering the landslide location with a reconnaissance investigation in Prachinburi-Khao Yai was done to understand the mode of embankment failures. Therefore, the purposes of this study are:

a) To apply appropriate geological survey methods to study the colluvial deposits,

b) To conduct the geotechnical investigations on the problematic colluvial slopes, and

c) To assess causes of failures of the embankment on colluvial slopes.

d) To back analyse the failed slopes.

1.2 Location and Accessibility.

Prachinburi Province locates 164 Kms. east of Bangkok on the Bangkok-Nakhon Nayok-Aranyaprathet highway (33). The Prachinburi-Khao Yai highway (3077) which is aligned approximately north-south cuts across Highway 33 just north of Prachinburi (Figure.1.1).

The study area for the embankment failures lies in the 1:50,000 scale topographic map series L7019 sheet 5237 II Changwat Prachinburi while the area of regional reconnaissance investigation is covered by sheets 5237 II (Changwat Prachinburi) and 5237 I (Ban Salika).

1.3 Approach to Study.

The reconnaissance and detailed investigations were done in 4 periods, i.e. October to December of 1983, September to October of 1985 and 1986, and March to May of 1987. The approach of study can be categorized into 4 parts as follows:

1.3.1 Geologic investigation.

The work includes geologic, geomorphologic and geophysical surveys. The approaches are described as follows:

1.3.1.1 Field geologic investigation: This includes is the regular geologic field survey to obtain geologic knowledge of

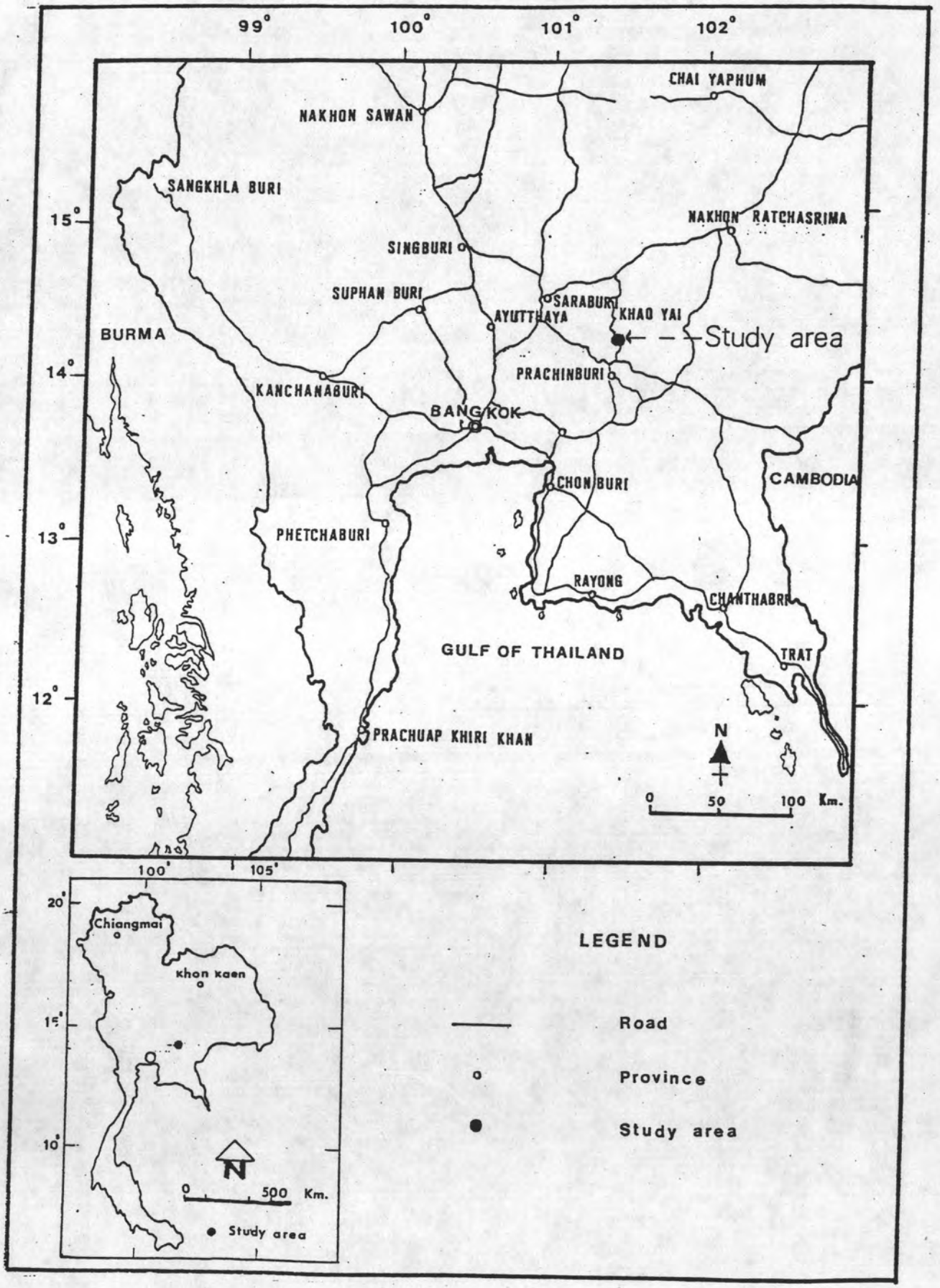

Figure 1.1 Location of the study area.

the landslide area and of the areal distribution rocks, soils and geologic structures being responsible for the stability of embankment and colluvial slopes.

1.3.1.2 Geomorphology investigation: This is essentially an air-photographic interpretation plus field observation in order to classify the landforms, and to gain information on the slope geometry, and geomorphologic processes, delineating landslide-susceptible landforms and pinpointing the vulnerable locations. A geomorphologic map was prepared in this study.

1.3.1.3 Geophysical investigation.: A resistivity survey was carried out in the area of embankment failures in order to obtain an information about the thickness of sediments, and to locate and identify shape and type of failure surfaces.

1.3.2 Geotechnical and hydrologic investigation.

The field geotechnical investigation, laboratory tests for the engineering properties of involving materials and hydrologic investigations were performed. The objectives of the investigations are as follows:

1.3.2.1 Field geotechnical investigation.: The work includes the topographic, geotechnical and engineering geologic mappings, in situ shear strength test, and surface and subsurface investigations in order to identify the weaker/stronger rock formations and the ground water situation and to gather other quantitative data of rocks and soils.

1.3.2.2 Hydrologic investigation.: The hydrologic investigation is to observe the occurrence of surface water, groundwater, spring and seepages and to do a field permeability test. The statistics of rainfall from 1977 to 1988 of Changwat Prachinburi was also collected from the Meteorological Department. The studies are to obtain information on groundwater condition in the landslide area.

1.3.2.3 Laboratory tests.: The rock and soil samples in the landslide area were collected for laboratory tests. These include the petrographic identification of rocks and the classification tests and strength tests of soils.

1.3.3 Compilation of geologic and geotechnical data.

The data that were gathered from various surface, subsurface and geophysical investigation techniques, together with the results of laboratory tests were evaluated and compiled in order to gain knowledge about the location of engineering geologic unit boundaries, geotechnical properties of materials, and groundwater situation in the study area. These informations were illustrated in the engineering geological map and profiles in the concerning Figures.

1.3.4 Slope stability analysis.

The stability of failed embankment on colluvial slopes was back analyzed to assess causes of failures and factors controlling the stability of this natural slopes.

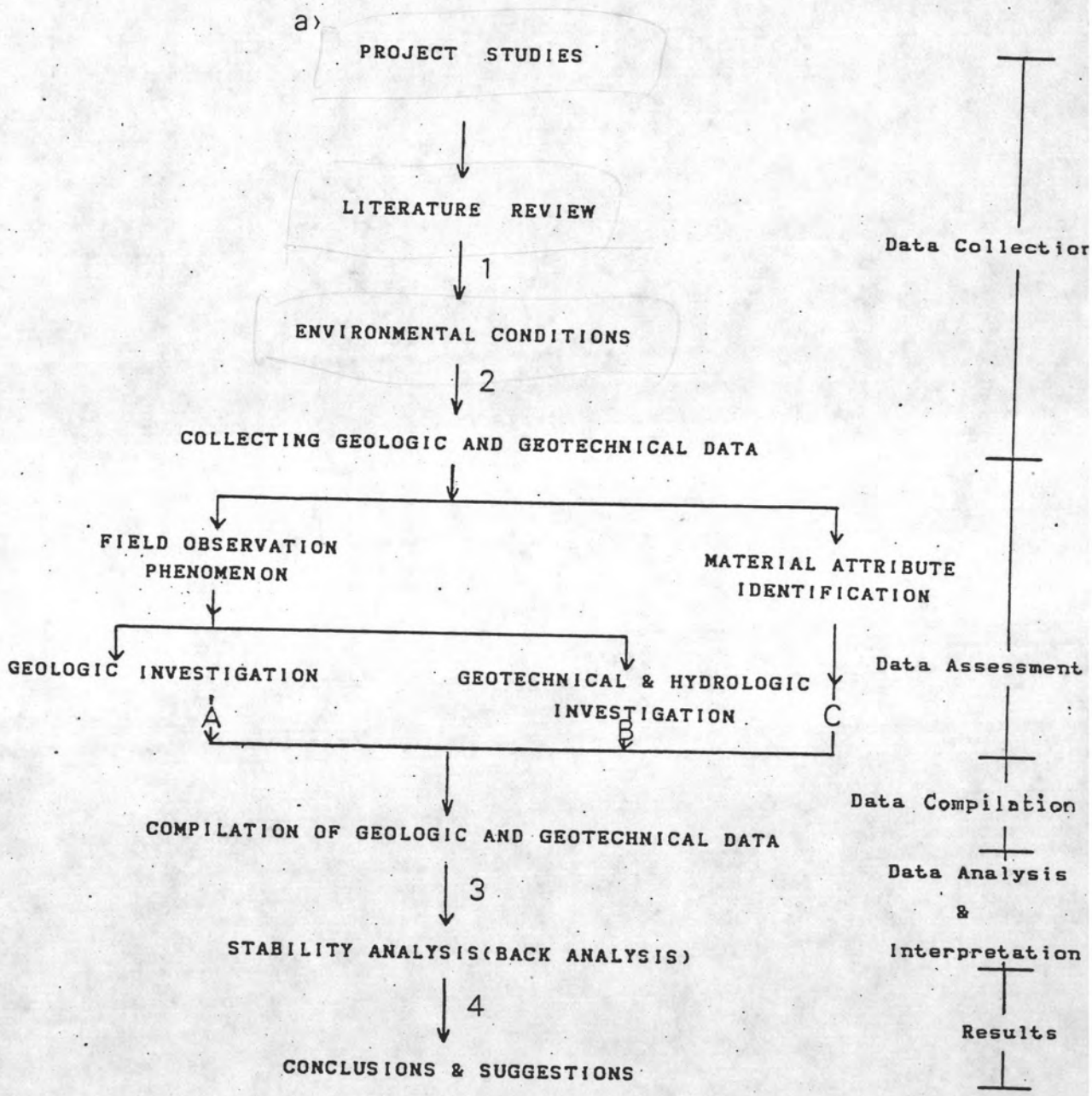

Figure 1.2 Flow charts of methods of study.

a) Main flow chart.

b)

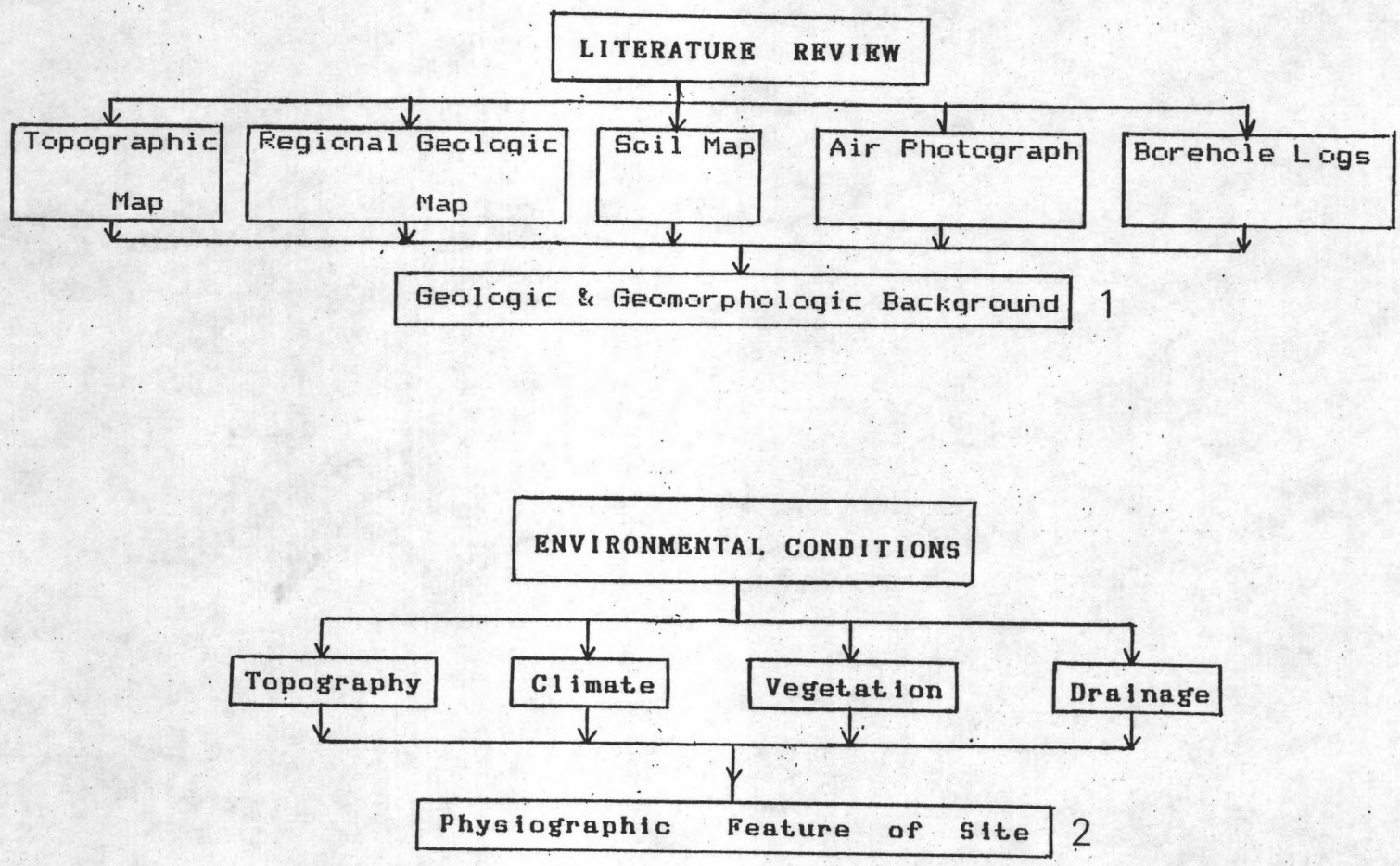

Figure 1.2(b) Sub-flow charts of literature review and environmental conditions

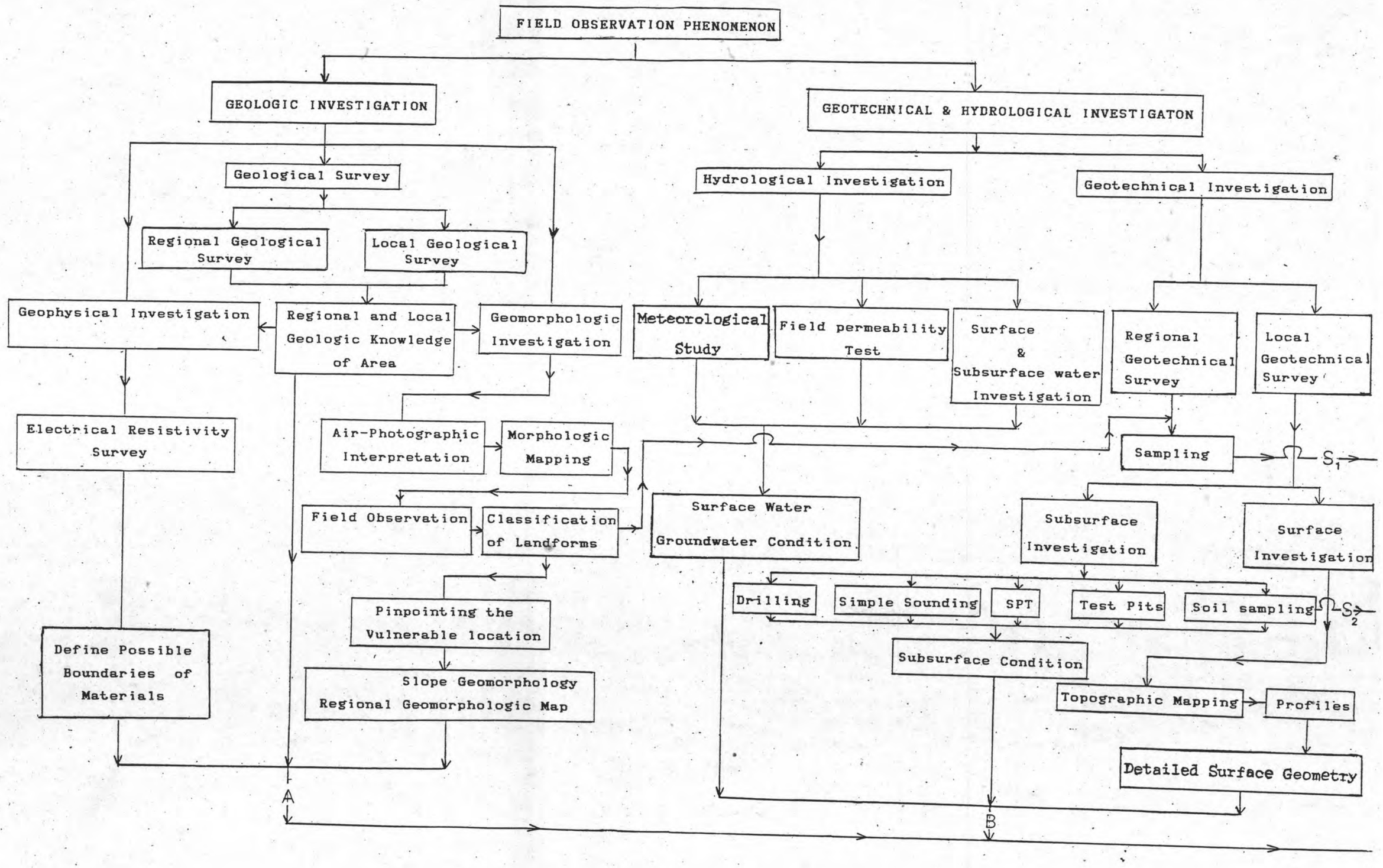

Figure 1.2(c) Sub-flow chart of field observation phenomenon.

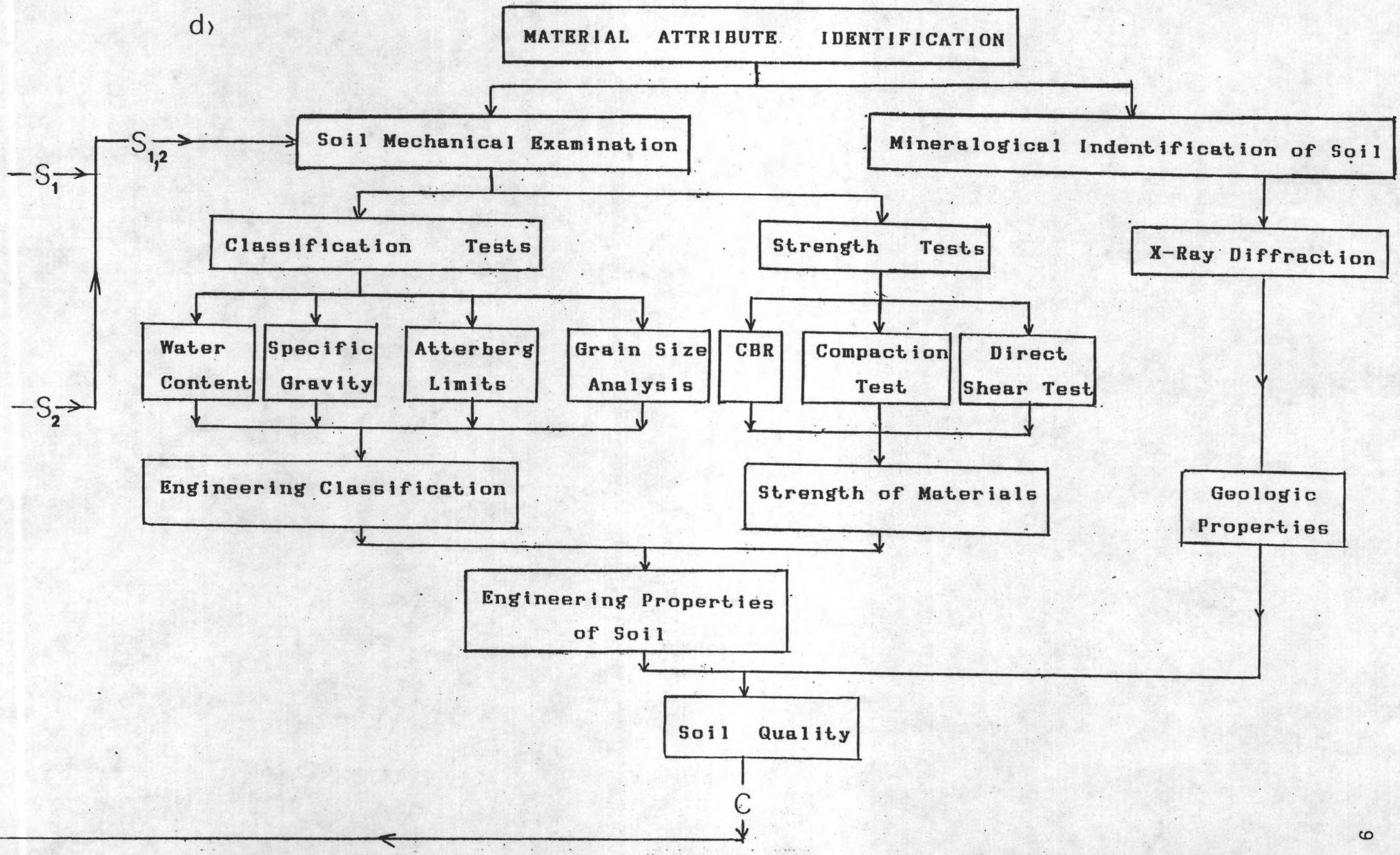

Figure 1.2(d) Sub-flow chart of material attribute identification

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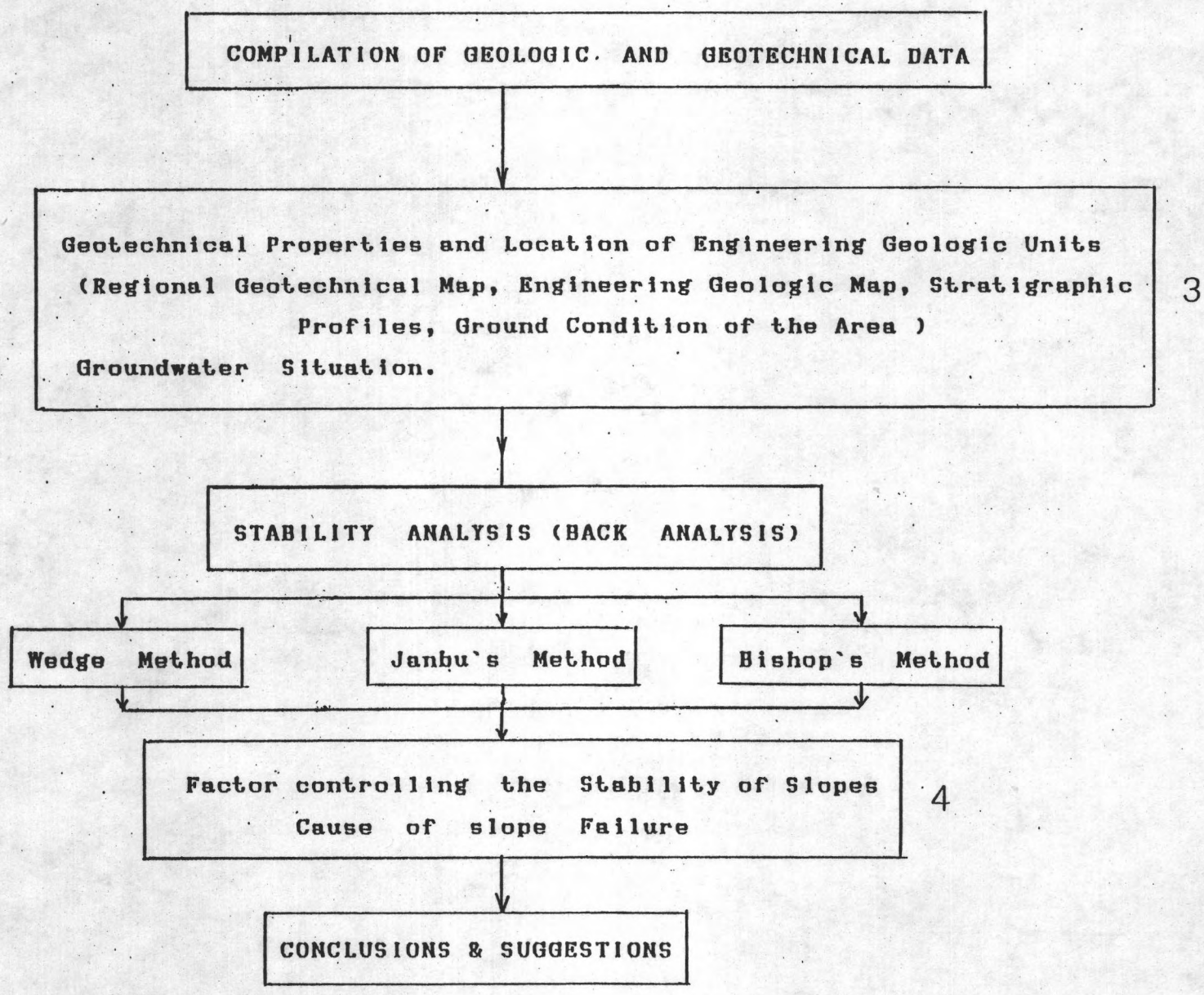

Figure 1.2(e) Sub-flow chart of compilation of geologic and geotechnical data.

The simplified flow chart of all studies being mentioned above is illustrated in Figure 1.2.

1.4 Climate and Vegetation.

According to the climatological data of Thailand Meteorological Department the climate of the area is basically tropical with a peak of rainy season generally occurs in July to September, during which the average monthly rainfall is 350 mm.

The high temperature is in April with a mean temperature of 38.7°c, maximum 40°c while the low temperature is from December to January with a mean temperature of 14.4°c, minimum 11.5°c.

The vegetation growing on the colluvial mass in this study area is essentially the scrub type.

1.5 Previous Work.

As the Department of Highways is solely responsible for Prachinburi-Khao Yai highway, a detailed geotechnical investigation on the second failure were done by the author and Dr. Pichit Jamnongpipatkul of the Materials and Research Division in 1983.