

Chemical stabilization of soils in Aomori Prefecture, Japan

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Synopsis

Physical and chemical properties were investigated for twelve volcanic cohesive soils and two alluvial clays. These soils were mixed with quick-lime, cement and a special additive. The resultant strengths of these stabilized soils are studied in relation to the basic properties of fresh soils.

1. Introduction

Aomori Prefecture is located in the northern part of the main island (Honshu) of Japan, where the land is widely covered with volcanic soils. These soils present conditions for quick remoulding. The author obtained different sample soils from fourteen sites throughout the Prefecture, and first ran a series of physical property tests. He then conducted chemical composition tests together with X-ray analyses and electron microscopic observations for all the soils. Diatom analyses were also added in order to detect secondary sedimented soils.

These sample soils consist of: twelve volcanic cohesive soils and two alluvial clays. As volcanic ash soils show a tendency to rapidly remould, chemical stabilization was performed in order to promote their strength and trafficability for earth-moving works. For this purpose, compacted fresh soil samples and samples chemically stabilized by quick lime, cement and a special additive were prepared. These samples were tested in a uni-axial compression apparatus.

2. Testing materials

The sites where the tested materials were obtained are shown in Fig.1. The physical properties of these soils are summarized in Tables-1, 2 and 3 in which Nos.12 and 13 are alluvial clays and all others are volcanic cohesive soils referred to as 'loam'. Diatom analysis identified Nos.1 and 17 as secondary sedimented loam soils. Among these loam soils, the amorphous mineral content is relatively high for Nos.2, 4, 7, 9 and 14 and somewhat high for Nos.1, 5, 6, 10, 15, 16 and 17.

Accordingly, the above soils can be classified into the following four categories:

a) Amorphous poor loams (Nos.5, 6, 10, 15 and 16) whose in-situ moisture content is always less than 70% (indicated by symbol ○)

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