

## Analysis of soft soil subgrade construction

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**Keywords:** soft roadbed; highway; subgrade; Construction Treatment

**Abstract:** The rapid development of modern economy accelerated the popularity of the car, but also on China's highway construction put forward higher requirements. In order to meet the needs of China's economic development and the rapid spread of the car, in recent years, China's highway construction project continues to grow. Because of China's vast territory, geological conditions faced by highway construction process complex, its highway construction put forward higher requirements. As highway construction difficulty, when processing soft subgrade construction quality has an important impact on the highway.

### Introduction

With the rapid development of China's economy, China's total mileage has gone up 47-fold from the early days of more than 80,000 kilometers, reaching 3.8282 million kilometers at the end of 09. Soft soil roadbed of highway construction as roadbed common form, its scientific treatment after use of road maintenance, construction and other life has an important impact.

### The nature of soft soil

Soft soil is the general term of silt and silty soil, mainly by large natural water content, high compressibility, low carrying capacity of silt sediment and soil, soft soil humus composed of a small number refers to the coastal, lakes, valleys, flood deposition natural high water content, porosity ratio, high compressibility, low shear strength of fine-grained soil, with natural high water content, natural void ratio, high compressibility, low shear strength, low coefficient of consolidation, consolidation a long time, high sensitivity, disturbance of large, poor permeability soil layered complex distribution, physical and mechanical properties between layers quite different characteristics.

#### High moisture content and high porosity

Natural soft soil moisture is generally 50% to 70%, even more than 200 percent maximum. Liquid limit is generally 40% to 60%, with natural water content increases proportional to the increase in liquid limit. Natural void ratio between 1 and 2, the maximum of 3 to 4. Its saturation is generally greater than 95%, and thus its natural moisture natural porosity ratio linear relationship changed. Such a high water content and high porosity characteristic of soft soil is an important factor in their decision to compression and shear strength.

#### Weak permeability.

Soft soil permeability coefficient is generally between  $1 \times 10^{-4} \sim 1 \times 10^{-8} \text{cm/s}$ , and most coastal and delta phase soft land area, since the soil layer sandwiched varying amounts of or very thin a thin layer of powder, sand, silt, etc., so the horizontal permeability is much greater than the

vertical direction. As such the soil permeability coefficient, water content is large and saturated, which will not only delay the process of consolidation of its soil, and in the early stages of loading, often prone to high pore water pressure, have a significant impact on soil strength.

#### **High compressibility**

Soft soil belong to the high compression of the soil, all kinds of soft soil compression coefficient  $a_{0.1} \sim 0.2$  is generally  $0.7 \sim 1.5 \text{MPa}^{-1}$ , the largest of  $4.5 \text{MPa}^{-1}$  (such as the Bohai Sea silt), which along with liquid limit soil and higher natural moisture content increases. Since the soil itself factor, deformation under construction loads such soil has the following characteristics: large and uneven deformation, deformation stable long duration

#### **Low Shear Strength**

Small soft soil shear strength is closely related to the loading speed and drainage consolidation conditions, undrained shear strength of the resultant triaxial fast shear value is small, and its lateral pressure independent of the size. Shear strength under drained conditions with consolidation degree increases.

#### **More significant thixotropic and creep shape**

The so-called soft subgrade thixotropic refers soft soil structure itself is a certain structural strength, but once the soft soil structure is destroyed, the structural strength of soft soil structure will rapidly decline, then with the standing time continues to increase structural strength and gradually restore features, soft subgrade thixotropic generally represented by sensitivity, sensitivity formula is:  $k = q / q_1$ , in the formula,  $q$  represents no side undisturbed soil unconfined compressive strength,  $q_1$  was remolded unconfined compressive strength, the greater the value of the sensitivity represents the structural strength of the soft subgrade falling faster among the general soft subgrade sensitivity value of 3 to 4, individual can reach between 8-9. Soft subgrade shear strength with increasing time and declining feature is soft subgrade creep resistance, creep resistance in highway construction projects by great dangers, a common slope of embankment slide and other hazards are caused due to peristaltic

#### **Soft roadbed anti-trapping low intensity**

Soft subgrade strength refers to the anti-trapping ability of the soil to resist construction machinery and equipment when traveling subsidence, usually with anti-trapping coefficient represented by formula  $c = p / h$ , the formula  $h$  represents the subsidence of soil depth,  $p$  is acting on the soil efficient pressure, due to the soft subgrade bearing capacity difference, compression is high, so when the construction work machinery and equipment, will be due to soft soils reduce the structural strength of the emergence of the phenomenon of subsidence, this construction project is very unfavorable

#### **soft soil construction**

Loading rate during the construction of roadbed stability also has an important influence, when applied load, shear stress increases, the strength of soft clay is also increasing, so do stability control, so as to ensure the stability of the foundation Control includes: determining a reasonable load programs and stability observations to determine a reasonable load plan can effectively ensure the strength and load changes in the soft clay fit the plans, but due to the calculation parameters of the planning phase is not precise enough, which will lead to the project differences in the actual situation, and therefore determine the load program while doing observations, by observing the data to guide the construction work and to ensure its stability, stability, stability control observation is the most important work, the stability of observations include: Lateral displacement observation, observations and pore water pressure of soft clay

settlement observation, etc., the most effective method of pore water pressure can be due to the direct knowledge of the unity of the soft clay foundation status, and therefore it is also the foundation for stability assessment during construction, do a good job pore water pressure is also a key observation of the stability of observations

### **Control Key soft soil roadbed construction process**

Before soft roadbed construction, construction enterprises must strengthen the exploration and experimental roadbed geology, drilling engineering ground level, to take undisturbed soil samples indoor soil test-based, while the static cone penetration and vane shear test such as the original bit test, in order to compare the physical and mechanical characteristics of soft soil parameters, by handling features for the soft subgrade for highway design to meet the need to lay the foundation

(1) Focusing on construction materials is the basis for control of soft soil roadbed construction process control

(2) Focus on soft roadbed construction process technology control is the soft soil roadbed construction process control of key

(3) Strengthening soft soil roadbed construction process of supervision and management is the focus of soft soil roadbed construction process control effects safeguards

(4) Strengthening and perfecting construction management system, and promote soft soil roadbed construction undertaken work to improve the process control construction management system is the key to protect soft soil roadbed construction process control work carried out

### **Technical analysis of soft soil roadbed construction**

#### **Using geotextile treatment of soft soil foundation**

Under normal circumstances, the main method of treatment using geotextiles soft subgrade treatment method, there are two methods of deep and shallow treatment, deep treatment method can effectively improve the density of soft subgrade and increase the strength of the foundation, drainage and plastic bags plastic instead of cardboard drainage means method is the more common method of treatment of the two deep, and porous plastic nonwoven web material and the core material is commonly used in the polymerization of two drainage material, compared with the conventional drainage material, both durable material capable of better, and not prone to clogging, and shallow treatment method is a method of geotextile laying on soft surface, this can ensure that the construction of machinery and equipment can travel, construction equipment filled with over equal withstand load, the soft subgrade does not produce excessive lateral offset and partial sinking, thus improving soft soil bearing capacity relative

#### **Berm construction method**

When in the course of construction of roadbed, roadbed can not reach the allowable value of coefficient of stability required for construction, for the embankment is stable enough and with anti-Berm approach on both sides of the main embankment is Berm law, in embankment on one side or both sides can be set berm. When construction is adopted should subgrade filling Berm method simultaneously when filling had to be separated, embankment reaches a critical height before Berm Filling should be done already. Berm height generally should be half the height of the embankment, and the width of the embankment construction to ensure the settlement of claim must be determined by calculating the stability of Back Berm materials used should also meet when Embankment material requirements.

## **Summary:**

Through the above discussion, we analyze two aspects of a detailed analysis and discussion of the engineering geological characteristics of soft subgrade and soft soil roadbed construction technology control, directly affect the control of highway engineering work soft soil roadbed construction technology the construction quality, service life and the use of safe roads, so road construction projects, the work must be done to control soft subgrade construction technology, so as to ensure the quality of road construction projects, in order to promote China's road sector healthy development.

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