

Highway Construction of Soft Soil Foundation Processing Analysis

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Abstract: Highway is an important channel to connect regional economic development, and is an indispensable part of modern transportation system. In view of the extensive nature of highway cover space and the existence of diversified construction environment, climate and geological influence in highway construction, soft soil foundation is one of the more typical geological forms. With wide distribution in our country, seen as a big difficulty, highway construction technology and directly affect the quality of highway construction, cost, if not properly handled, will cause the soft soil foundation highway engineering structure is not stable, prone to accidents in use. In this paper, we study the treatment of soft soil foundation in highway construction, and put forward some reasonable Suggestions.

Keywords: Highway construction; Soft soil foundation; Construction technology; Processing; Analysis

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1. Introduction

Highway traffic is an important support for China's economic development and is also a key support project of the national economic fixed investment. Figures show that as of 2016, China's highway mileage reached 130000 kilometers, secondary and above total mileage of 590000 kilometers, highway density continues to grow at the same time, the economic construction, population flows, cultural exchange, etc., providing convenient conditions. But at the same time, the highway as a form of ground transportation, its construction must also received various elements such as geography, geology, climate, hydrology, the influence of our country has wide distribution of soft soil base form, easy to cause the instability of building structure, therefore, in the highway construction in soft soil foundation treatment is very important.^[1]

2. Adverse Effects and Human Factors of Soft Soil Foundation in Highway Construction

2.1 The Adverse Effects of Soft Soil Foundation

The so-called "soft soil" is a typical architectural concept, which is generally referred to as the soft plastic, plastic and plastic soil with large amount of water, high compressibility, low shear strength and weak bearing capacity. Obviously, "soft soil" is not a specific soil and soil quality, but a class with the same response characteristics of the soil building, usually divided into in the construction of silt, peat, soft clayey soil, etc. The definition of soft soil foundation in the highway industry is basically similar to the construction industry, namely, "low intensity, high compression, poor permeability," etc., which can be classified into the category of weak soil. Adverse impact of the soft soil foundation in highway construction is very big,^[2] this is mainly due to the properties of highway

"ground transportation", the topography, geology, hydrology, etc have the very strong dependence, and, for any kind of construction project, the foundation is the most basic component.

The highway foundation directly determines the stability of highway structure, which will affect the cost and difficulty of highway construction, and the safety of the latter. By analyzing the bad influence of soft soil foundation, the attention to related aspects is strengthened.^[3-4]

First, the road surface settlement. Surface subsidence is the biggest influence in highway subgrade construction quality, also the most common phenomenon, objectively, many causes of the settlement,^[5] such as foundation under existing cave, cracks, or the problems caused by construction technology and operation process. Combining with the analysis of soft soil foundation, due to the construction of failed to grasp the roadbed compaction degree, resulting in reduced stability, or in the transition and cohesion section of the highway construction processes improper, such as adopt traditional strap structure, easily lead to strap fracture under overload traffic. Relatively, highway transition section, cohesion of settling problems more likely, this is because the settlement itself is closely related to the surrounding environment changes, such as will change after rain enters the soil structure, lead to soil erosion, intensity is abate, the road cause settlement after rolling.^[6]

Second, the road surface erosion and loose. "Hardening" is the basic requirement of road surface treatment. From technical analysis, the pavement structure layer is mainly composed of gravel, concrete, asphalt and other materials. After prolonged passage and rain erosion, the material tightness can be seriously damaged, especially during the rainy season.^[7] Paved roadbed material will be scoured loose and permeated to the soil layer. Soft soil foundation will accelerate the stability of the road surface.

Third, it causes irregular hardening of road surface. Due to the mixed pattern in the composition of the soft soil foundation, and composition proportion, lack of unity, under the influence of soft soil foundation is not stable, and pavement construction materials, prone to irregular hardening phenomenon. This is because, the main material of asphalt and concrete pavement construction, and its matching with the road surface hardening problem has a lot to do, if not in a reasonable scope, will cause inflation, settlement and other signs, then form the road show irregular sclerosis.

2.2 Human Factors

Soft soil foundation has objective influence on highway construction quality, cost, progress, etc., but at the same

time, human factor cannot be ignored. As the only active element in highway construction, the construction personnel have the control ability of equipment, materials and technology.

First, the construction personnel of highway engineering have caused inaccurate and incomplete problems in survey and design, such as detailed understanding of the location of soft soil foundation treatment.

Second, in the construction of road engineering construction personnel neglect to known to improve the soft soil foundation treatment, lead to market stability, embankment and pavement construction late even endanger nearby buildings.

Third, the construction technology, process, materials and equipment used by the highway engineering construction personnel are not reasonable, causing the subsidence or pavement collapse.

Fourth, improper storage of materials in the construction of highway, such as failing to carry out the layered filling in accordance with the requirements, causing the soil to be too fast and compacted, and the instability is prone to instability.^[8]

3. Analysis and Suggestion of Soft Soil Foundation Treatment in Highway Construction

3.1 Analysis and Suggestion of Riprap Extrusion Sludge

Riprap crowded silting method is the current domestic treatment of soft soil foundation in highway construction, a common method is the basic principle, in the middle of the bottom of the roadbed and toss a certain proportion to each side is gravel, silt by physical mechanism will "crowd out" the subgrade range, in order to improve the subgrade strength.

In this method, it is important to note that the size of the gravel can not be too small (the diameter is greater than or equal to 0.3 m).^[9] In the selection of crushed stone materials, it is necessary to avoid the stone that is easy to be weathered and broken. Using this method has the advantage of construction is convenient, rapid and cost is low, very suitable for drainage difficulty, perennial water depressions, and this kind of soft soil foundation under the thickness is very thin, usually there is no scale block, so you can meet the needs of the rapid rule out.

But, it needs to pay attention to the ripped-rock crowded silting method is not available everywhere, some swamp areas, for example, although in theory for the

ripped-rock crowded silting method, but in the operation will find large mechanical parts inaccessible, stone transportation cost is very high. Therefore, this method is recommended to be used in the environment of abundant stone materials and short haul.

3.2 Analysis and Suggestion of Cement Mixing Pile Method

This method mainly USES cement as the "curing agent", and has adaptability to soft soil foundation in various forms. Its use principle is that using a blender to get cement into soil, and then fully mixing, cement (main) reacts with soft soil composition after curing, so as to realize the need of improving stability.

It is proved by practice that the cement mixing pile method can achieve obvious reinforcement effect, and it has good effect on most soft soil forms such as silt, peat soil and silty soil.

It is important to note that, although the cement mixing pile method can be rapidly put into use, it still has to choose according to the material injection state, which includes two types of wet and dry. Refers to the "wet" refers to the slurry for material, easy to mix, but the hardening time is longer, while "dry" use of cement powder as the main agent, this method shortens the hardening time, but the mixing uniformity effect is not good. When choosing, it can be considered according to soft soil moisture content and composition ratio.

3.3 Analysis and Suggestion of Drainage Consolidation Method

The method also known as "preloading", the characteristics of its low cost has been widely applied, especially in the municipal road construction, a number of ways in the soft ground setting out the drainage channel, A horizontal or vertical drainage pattern, which improves the boundary condition of the old foundation, increases the pathway of the gap water, and USES the additional load or structure of the self, remove excess water from soil to prevent foundation settlement and improve the strength of foundation. Obviously, the drainage consolidation method is mainly a way of ease in the soft soil water conditions, specific applications, the drainage consolidation method can be divided into different forms, such as the precipitation preloading method, the pile of sand drain preloading method, bagged sand well method, etc. The same applies to different soft land forms. The defect of this method is obvious, the filling rate must be strictly controlled in the whole process, and the period of construction is also longer, so it is not recommended to use in areas where soft soil foundation covers a wide area.^[10]

In addition, new technologies, new equipments and

new technologies have been springing up in recent years, which can be enhanced to explore the methods of soft soil foundation treatment.

4. Conclusion

Highway construction level to a certain extent reflects a country's economic development level, at the same time, the most basic part of the development of modern transportation, highway engineering itself has factors of large investment, long period, more features, to ensure its effective role in national economic development, it is necessary to strengthen the importance of soft soil foundation. Objectively, the soft soil foundation treatment technology is an international problem, there is no a unified standard and unified model for processing, to comprehensively use the technical side, overall arrangement, constantly introducing new technology, new equipment, improve the quality of the construction personnel technology, can effectively guarantee the engineering quality.

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