

# Application of Solidified Materials in Construction Roads of High Standard Farmland Projects

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**Abstract:** Road construction in high standard farmland construction projects has always been the focus of project construction. Mud stone road construction is often used in the tableland area. Due to the impact of rainfall scouring, mud stone roads are often damaged. As a new high-performance curing agent that can optimize and improve the soil, the new soil curing material can ensure that the strength of the subgrade can be effectively enhanced, facilitate the smooth implementation of the construction link, and maximize the quality and efficiency of road construction, which has a good promotion value.

**Keywords:** Curing materials, Soil stabilizer, High standard farmland, Road engineering.

## 1. Introduction

Based on the new situation of social development, the development of road engineering construction in China should keep pace with the times and keep up with the pace of the times. The application of soil curing agent in road construction can not only effectively reduce the overall cost of the project, facilitate the road construction operation, but also achieve the goal of ecological environment protection and development. Therefore, each road construction unit should correctly recognize the importance of reasonable application of soil stabilizer in road construction, scientifically introduce and apply high-quality soil stabilizer, help optimize and improve the soil environment at the road construction site, and stabilize different types of soil. In essence, soil stabilizer refers to a new type of energy-saving and environmental protection engineering material composed of a variety of inorganic and organic materials to solidify various types of soil. During the construction of road works, site construction personnel need to add appropriate amount of stabilizer reasonably according to the physical and chemical properties of the site construction soil, and then through a series of mixing and compaction operations, they can achieve the performance indicators required by relevant construction, Fully guarantee the good stability and strength of soil. At present, soil stabilizer has been widely used in various types of engineering construction, and has achieved good construction results.

## 2. Overview of the Project Area

The project area is located in Qishan County, Shaanxi Province, with geographic coordinates between 107°33'-107°55' E and 34°07'-34°37'N. Qishan County has a warm temperate semi humid climate. The annual average sunshine in Qishan County is 2066.6 h, with a sunshine percentage of 47%. August has the most sunshine hours, 213.6 h, with a sunshine percentage of 51%. The minimum sunshine duration is 142.0 h in September, and the sunshine percentage is 38%. The annual average temperature in the county is 11.9°C, the hottest month is July, and the average temperature is 24.9°C. The project area is located at the foot of the mountain and the upper part of the proluvial and alluvial fans. The soil type is mainly loess, which is a mixture of new loess and old loess;

The loess soil layer is deep, with a thickness of more than 60 cm, high nutrient content, and has the characteristics of "up empty and down solid", "water and fertilizer conservation", "drought and waterlogging resistance", etc. The thickness of the plough layer is 30 cm, with medium soil, granular and lump structure. The unit weights of the plough layer and bottom layer are 1.25 g/cm<sup>2</sup>~1.42 g/cm<sup>2</sup> and 1.40 g/cm<sup>2</sup>~1.78 g/cm<sup>2</sup> respectively; The porosity is 50.38% and 42.27% respectively; Generally, the mature layer contains 1.0%~1.2% organic matter, more total mineral nutrients, 0.07%~0.08% total nitrogen, and 2%~3% total potassium. However, the effective ingredients are low, especially phosphorus deficiency, and serious boron, zinc, manganese, and iron deficiency. The amount of base exchange in the plough layer is 10 me~14 me/100g soil, and the pH value is 8.15~8.5, so the fertilizer holding and supplying capacity is good.

## 3. Construction Characteristics and Basic Principles of Soil Stabilizer

When road patrol personnel are deleting the use of soil stabilizer for patrol operations, we can find that they have the following characteristics: The main materials of traditional soil stabilizer are lime and cement defects. The new soil stabilizer has the characteristics of simple operation, economic benefits and high application efficiency. The road patrol operators shall only select the malicious substances according to the daily physical and chemical properties of the soil on site suitable soil curing agent can be obtained by mixing, compacting and other patrol operations achieve the requirements of technical standards for road patrol; Application of Soil Solidifying Agent in Road Patrol It can minimize the cost of patrol inspection and reduce unnecessary loss of resources of the construction unit; The application of soil stabilizer in road patrol not only does harm to the ecological environment of Zhou, but also It can save various resources and realize the stable and sustainable development of China's ecological economic construction.

The basic working principle of soil stabilizer is to conduct scientific and effective physical and chemical reactions on the soil according to its relevant physical and chemical properties, so as to promote the transformation of most free water in the soil to the shape of crystal water, increase the soil concentration, and effectively agglomerate the dispersed

particles in the soil. Then, the on-site construction personnel conduct mixing and compaction processing by controlling the mechanical equipment, so as to complete the good reinforcement of the reinforced soil. Based on the soil on the construction site under the action of soil stabilizer, all aspects of performance can be improved qualitatively, such as soil stability, strength, etc., which will undoubtedly maximize the actual service life of the road and create more economic benefits for social development.

## 4. Construction Process and Technology of Solidified Road

The length of the test section is 50m, the width of the subgrade is 4m, of which the width of the pavement is 3m, the width of the shoulder is 0.5m, and the cross slope of the crown is 1.5%. The drainage is in the form of scattered drainage. The pavement thickness of this road is 18cm, which is composed of solidified core materials, cement, lime powder, gypsum powder and clay. The solidified core materials: cement: lime powder: gypsum powder=1:100:5:2. During pavement construction, the moisture content of road building materials before and after mixing shall be controlled at about 16%.

### 4.1. Subgrade treatment

Process flow: surveying and setting out → original subgrade cleaning and correction → compaction by road roller → mixing and watering

#### 1. Surveying and setting out

The subgrade control setting out shall be carried out according to the road building drawings provided by Party A, and the pile spacing shall not be less than 25m. The setting out record shall be filled in and submitted to the Supervisor for acceptance and confirmation before the next process.

#### 2. Cleaning and finishing of original subgrade

It is mainly to remove trees, stumps, roots, weeds, garbage and other obstacles in the road construction area, including fine roots, plants, mulch grass and other sundries that affect the construction quality, and timely excavate and transport them to the place designated by the Supervisor.

#### 3. Compaction by compactor

After the completion of the subgrade repair, the Supervisor shall check that the subgrade soil contains water and can be compacted only after it meets the rolling conditions. The subgrade shall be compacted with a road roller. The rolling times shall not be less than three times, and the compaction coefficient shall be more than 0.9. The pavement shall be treated timely according to the situation.

### 4.2. Curing pavement construction

Process flow: surveying and setting out → plain soil paving → turning over and watering → checking and screening the quality of solidified core materials, cement, lime powder and gypsum powder → material mixing → material paving →

mixing and watering → compaction and leveling → stone paving → vibrating compaction.

Rolling forming: under the optimum moisture content of the mixture, the vibratory roller is used for rolling forming, rolling for more than 6-7 times, and the degree of compaction is controlled as 0.95. Static pressure is required for the first time. After the static pressure is completed, a layer of stones with a particle size of 3~7mm shall be evenly spread on the surface, and then pressurized, vibrated and rolled for 2~3 times, followed by static pressure for 3~4 times. After the surface of the pavement is treated, it shall be covered with straw curtains, wheat straw, straw bags and other materials. It is not appropriate to sprinkle water immediately. Generally, it is necessary to sprinkle water or immerse in water for maintenance after 24 hours (depending on the weather). The maintenance shall last for more than 10 days, and the surface shall be watered 6 to 8 times a day to keep it wet. When sprinkling, be careful not to directly impact the pavement with water. No heavy vehicles or objects shall be loaded during curing. The excavation and construction of the catch basin shall be carried out according to the design size at the design location. The construction process similar to that of the cement mortar cellar shall be adopted for the construction, and the drainage outlet shall be reserved. Concrete block curbs and mortar shall be used for the construction of curbs. The joints between blocks shall be pointed with cement grout. The pointing shall be full and beautiful, and shall be cured.

## 5. Concluding Remarks

In the current road construction practice, soil stabilizer has been widely used. It can not only help the construction unit reduce the construction cost, improve the road construction quality and efficiency, but also effectively avoid causing various hazards to the surrounding environment. Therefore, modern construction units should reasonably use soil stabilizer in combination with the actual situation of the road to effectively improve the stability and strength of the road soil.

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