

Main Methods and Treating Measures of Reinforced Soil Retaining Wall in Chongqing

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Abstract: By investigating the reinforced soil retaining walls in Chongqing region, analyzes the main diseases of reinforced soil retaining wall, which divided into two categories: partial and whole, and points out the cause of the disease. Take reinforced soil retaining wall in Chongqing area as an example analysis metope drum belly, crack, the reason of the instability of whole, and by using lattice Liang Mao tube for reinforcement.

Keywords: Reinforced soil disease; Lattice Liang Mao tube; disease

1. Introduction

Reinforced soil retaining wall, as a kind of fill sub-grade reinforcement retaining structure has appeared nearly forty years, and applied in China for nearly 30 years. Reinforced soil retaining wall was formed by using reinforced technology of a kind of retaining structure, the principle of reinforcement is adding artificial ribbon or geo-textiles into the soil, forming the fiber, which is no longer between soil particles scattered state but even connected branches, thereby increasing the stability of the roadbed overall, change the deformation condition and the engineering properties of soil. Because inside the embankment reinforcement of the technology, its advantage is small cross section size, covers an area of less, low requirement to the foundation, the project cost compared with other retaining structure to save more (compared with gravity retaining wall to save 20% to 30%, and with the increasing of wall savings is larger), construction is convenient, less stone. Therefore, the invention of the reinforced soil technology is a great technical innovation[1].

After nearly 40 years of development with reinforced soil retaining wall technology already quite mature, our country has achieved quite rich research results in processing and manufacturing of geo-synthetics, design technology and construction technology. A group of test engineering were build, especially in the southwest region, and compiling the first "highway engineering technical specification for reinforced soil retaining wall (JTJ015-91)". Now, after building maintenance and disease prevention and control has appeared in front of us. According to only 30 summaries of the results in Chongqing found that the main diseases of reinforced soil retaining wall is divided into two categories: local failure and general demolition[2].

By analyzing the above Table 1 and Table 2, the local diseases and the overall disease of reinforced soil retaining wall are not exist alone, or there is no link between them. Local disease failed to timely maintenance and reinforcement that will turn into a whole disease, which can be broadly speaking that the local disease is the initial development of the overall disease state[3].


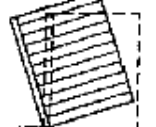

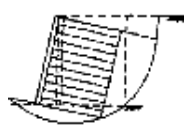
2. The Main Diseases

Table 1. The Result of Local Damage in Chongqing Survey Analysis

Form	Panel Damage	Lacing Wire Damage	Pavement Damage	The Road Base Damage
The number	12	5	6	7
The percentage	40%	16.7%	20%	23.3%
The reason	1)The poor contact of panel and steel. 2) Insufficient strength of panel or thickness lack, so the soil pressure is too easy to burst panel 3) Inadequate packing compaction make the reinforcement with panel	1)Brace friction with the soil is too small,pulled tendons were stretched 2)activity area reinforcement tensile less than stable region, reinforcing steel bar was uprooted	Fill to the undisturbed soil, generally all is fill subgrade, whose late settlement is bigger,lead to the panel skin,that the lighter one crack,the serious one breakage.	1)Basal bearing capacity is insufficient, beyond the scope, ultimately deal to base damage 2)Basal work was not done well in during construction, add bedding layer, etc.

	shear stress too large and panel partial rupture.			
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Table 2. The Result of General Demolition in Chongqing Survey Analysis

Form	Sliding Failure	Overtum Failure	Slope Destruction	Egralintslippage
The number	4	11	9	6
The percentage	13.3%	36.7%	30%	20%
The reason	The friction between the retaining wall and the ground is too small to resist lateral soil pressure, and embedded to too shallow.	The ratio of height and with is too big, not hierarchical design brace is too short. Soil above the tilting torque is greater than the resistance torque caused by the pressure of pour	Donnt adopt measures to strengthen the Infrastructure in the soft soil layer, subsidence caused by over time	Slope instability, subgrade by self weight and external load vehicles, eventually lead to whole sliding with geotextile .
figure				

3. Regulation Scheme

3.1. Project Profile

Taking an example of a flooded reinforced soil retaining wall in Chongqing urban to discuss the reinforcement measures of pan-ku belly, rupture, wall extraversion. The flooding retaining wall is vertical type shoulder retaining wall, put into use in early 2000. The wall panel is made of concrete, whose high is 12m, long is 1.6m, wide is 0.5m, thick is 0.2m. Steel wire or steel wire was possessed of polyethylene coated gangsu composite material as a ribbon, whose wide is 30mm, thick is 2mm, the vertical spacing is 0.3m, the level spacing is 0.75m, the width of tree stress zone is 4m to 8m, the design of pulling force is 1000 N. The packing is the original digging backfill sand soil, it is compaction during the construction, conforming the requirement of the construction. The retaining wall is vertical shoulder retaining wall, right for rapid urban road, traffic is bigger, the retaining wall foundation adjacent to the urban rapid road shoulder, construction will surely affect the normal fast road open to traffic, so while strengthening effect should be reduced to a minimum range.

3.2. Disease Causes

The project main diseases are surface pan-ku belly, wall cracking and extraversion. The main reasons are as follows: 1) Packing source is limited ;Grading can not meet the design requirements ; The packing is crushed inadequately; Local compaction is not up to standard; 2) The design and construction steel blanking is wrong, shorter than the actual requirement of 0.5 m to 1.0 m, reinforced aging serious;3) Backfill is insufficient then ground subsidence result in whole extraversion or capsized.4) Traffic increases year by year in recent years, in particular,

heavy traffic, serious overload. It directly resulted in the road far exceeds the design value of load by squeezing increases the side pressure of soil.5) Perennial rainy in Chongqing region, except in September 7, 8, sunny more, year-round climate is damp, is not conducive to rain from pavement sub-grade, which in turn into packing failed to timely eliminate impact retaining wall stability as a whole.

3.3. Strengthening plan

The most common and easy method is retaining wall in the outer edge of the back pressure of the filled soil and the construction of fender piles In view of the reinforced soil retaining wall metope pan-ku belly, rupture failure . By the project summary, the lateral lower part of the retaining wall is the urban rapid road, if fill back pressure will affect the normal operation of the road. And if building fender piles, the cost of the project is too high, because the flooding high retaining wall is 12 m, but fender pile foundation is buried deep. Long construction period can also affect the normal operation of the road below. The two conventional methods is not case of flooding reinforced retaining wall.

By analyzing the feasibility of the engineering and technology, the engineering reinforcement use lattice anchor tube grouting method for reinforcement.

The main steps of construction are as follows:

1) Measuring Unreeling, Construction Preparation

The original uniform distribution inside the reinforced soil retaining wall reinforcement to space, in order to prevent the anchor pipe and steel cross influence each other, winding, the anchor pipe lay level. According to the panel size to carry on the design layout, Horizontal spacing is 1.6 m, the vertical distance is 1.5 m, anchor pipe is made from seamless steel pipe manufacturing.

Length according to the specific activity area length and the engineering practice situation use 5 m to 9 m.

The original packing for digging filling of dense sand soil combined with actual situation to choose airport side wall panel eccentric DTH hammer impact drilling.

2) Detection to Empty Grouting

Within the finished holes cleaning eye residue, inspection hole stability, it begins to grout after it conforms to the condition. This project is a late reinforcement engineering, so we can use pure pressure grouting method. According to the single and double of anchor pipe number to grout, the first time is the single one, the second time is double one. If the single number grouting is discontent or its situation is not in conformity with the requirements, then the second grout should pay more attention to strictly control the quality and strengthen when processing. In order to better control the spread of the aperture, grouting orifice pressure along with the specific situation of control in 0.1-0.3 Mp, water cement ratio 1:1 or 0.5: 1, but thick pressure building are mainly composed.

When grouting pressure, we should read on the aircraft, if the readings appear continuously 1 mp or greater than the number, we should check in time. According to the actual situation, stopping construction or stopping to take other methods.

3) Anchorage Performance Testing The anchor Head Sealing

After the grouting test anchorage performance accords with a condition when it closed the anchor head. Inside the anchor head end through concrete block and help welding method and lattice beam connection. The main reason of the project instability for the damage caused a series of subsequent disasters, so waterproof and drainage measures should not be neglected.

4) Lattice Beam Casting

Lattice beam adopts C30 concrete cast-in-situ, lattice beam cross section is 0.25 m, 0.3 m. Mechanical reinforcement of 4 root diameter 14 mm, HBB335 thread reinforcing steel bar, stirrup diameter 6.5, HPB335 round steel bar, stirrup spacing of 200 mm. The template USES the steel mold.

4. Summary

Reinforced soil retaining wall technology had been already quite mature, innovation great progress has been slow. But the completed reinforced soil retaining wall appears a partial or whole disease over time. This paper discusses extraversion diseases and the lattice anchor pipe reinforcement combined with a water immersion reinforced soil retaining wall in Chongqing as an example. The method without destroying the original state and under the condition of stability, the impact on the road next to the minimum reinforcement engineering, it has been.

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