

The channel protection project in Taiwan



Introduction

The construction site in Tainan County is a smooth terrain which extends to the west of the Taiwan Straits. Therefore, changing the intrinsic topography and hydrology shortened the time of rain concentration and increase the surface runoff. It also increased the load of draining capacity and made the impair draining. In order to broaden the draining channel to improve the capacity of discharge in this case, the way to build the vertical concrete retaining wall next to the channel side, but unfortunately, it also made flow rate faster than prior section to scour the unprotected channel and lead to the retaining wall and bottom erosion.

The Design

In order to solve the problem of carrying the ooze at the bottom of channel away, the design was to apply ACEFormer at the channel bed. ACEFormer was formed as lattice structure and the single layer fabric was surrounded by double layer fabric lattice which could be filled with cement mortar. The component of single layer was made by permeable fabric and can preserve the groundwater. The double layer part which can be filled with cement mortar can achieve 12 cm thickness. This project used 17 units of ACEFormer which made by sewing 6 pieces of fabric former in 3.8 m width and 8.5~9.5 m length (around 35 m²). The fabric of ACEFormer was made of PP and PET yarns. The bi-axle tensile strength is 50kN/m, AOS is 0.4 mm and permeability was 0.3 sec⁻¹. The cement and sand mix ratio was 1:3 for filling. The total quantity of ACEFormer was 3700m².

Construction

The hose deeply penetrated into the ACEFormer opening port while filling the mortar, and the penetrating length was about 1/2 to 1/3 of the ACEFormer length (around 2.5 to 4.5m). During filling



process, the worker had to vibrate the ACEFormer to quicken the time for installation. When the thickness reached the design requirement, opening port sewed. The required machines for construction were one cement truck (enter the field continuously) and one pumping machine. Construction of ACEFormer needed 6 to 8 workers be a team and the two operators for cement truck and pumping machine. Therefore, it needs 10 workers for ACEFormer installation. If the ACEFormer unit was 35m^2 , it spent 25 to 28 minutes to fulfill the laying and the efficiency of one working team to fill the ACEFormer was 70 to 80m^2 per hour. There were spent 5 working days to finish this project and the total quantity of cement mortar is 11000m^3 .

Performance

Since the ACEFormer used in this field and the shape is solid lattice. It can increase the Manning rough coefficient of the channel bed obviously and then decrease the velocity of flow. Especially at the area where the channel have curve, ACEFormer can decrease the damage probability caused by the swift current. After finishing the construction, ACEFormer application can reduce the ooze at the bottom of channel and letting it freely be carried away foundation of retained wall at riverside can be stabilized. Increased service life of the channel is another benefit of ACEFormer application. Currently, the channel still in good condition even after the typhoons attacked.



Before construction



During construction