

Protection of Chinese Petroleum Company oil pipeline in Taiwan



Introduction

The Chinese Petroleum Company build up 2477m long oil pipeline across Jhuoshuei River in order to transport oil and gas in 1996. The heavy and torrential rain especially in typhoon season causes sudden current raising and erosion problems. Since 2005, within 9 years, the elevation of river bottom drop down 8m. After Mindulle Typhoon, serious damage happened, therefore the Chinese Petroleum Company constructed a bridge to protect the structure as well as to slow down the soil erosion and running off. Initially, concrete cover on layers of gabion were placed around bridge piers, but it was destroyed and rent by rushing stream. Chinese Petroleum Company requested a favor of research institution to carry out hydraulic model experiments and to study the improvement also effect of various protectors. Finally, a new invention, anti-erosion metallic disk with upward hook, and high strength geotextile were applied and got an excellent outcome.

The design

Erosion of wadi is a common disaster during Typhoon season. The destructive force is the downward flow of the stream. It washes off the soil around bridge piers and below the runway to cause the safety problem of bridge directly and indirect respectively.


The new technique of bridge pier protection is composed of anti-erosion disk, rocks and high tensile strength geotextile. The anti-erosion metallic disk with upward ring is a new developed device to protect bridge from damage caused by downward flow.

When the stream head-on meets the bridge piers, the stream goes by all around. The downward part is the main element causing soil running off and bridge pier exposing. The device, anti-erosion disks, are installed on the bridge pier to stop and reflect the downward flow. The reflected flow follows the direction where the upward ring leads to and disturb going flow to dissipate impact.

No. 33, Jing 3 Road, Wuchi, Taichung Hsien, Taiwan, R. O. C.
Tel: 886-4-2659-5926, Fax: 886-4-2659-5935

<http://www.geoace.com>

Four rows of piles enclosed as a separated zone. High tensile strength geotextile is fixed on the piles by metallic ring and then rocks are placed on the geotextile layer upon layer. After finishing geotextile and rocks placement, a layer of armor block is set on the top to oppress rocks and geotextiles. The rock layer can dissipate the downward erosion due to the porosity and high tensile strength geotextile acting as filter can avoid the soil particles from migration. Each part plays its role helping the bridge piers to defend against erosion and finally bringing up an excellent performance.

Anti-erosion disk	Geotextile	Armor block
		

Performance

The new technique can fight against the destructive impact and protect bridge piers from damage. It can extend the service life and cost down significantly. The river bottom cut down and bridge safety problem are improved and it works successfully.