



ACEBag™-g

The Multifunctional Uses of ACEBag™-g for Dredged Soil Containment and Cofferdam Construction

Location: Nantou, Taiwan

Application: Dredging and Riverbank Protection

◆ Background

Wushe Reservoir, also known as Wanda Reservoir, is a curved concrete gravity dam at the upstream of Jhuoshuei River in central Taiwan. The construction of the dam started in 1939, but was interrupted by the Pacific War, and finally it was completed in 1957. Wushe Reservoir is 114m high and 205m long. The total volume is around 249,000m³. It performs both functions of water reservoir and hydroelectric power. However, these functions were compromised due to sedimentation like most reservoirs in Taiwan. Because Taiwan is located in one of the main paths of North Western Pacific typhoons, approximately three to four typhoons attack the island each year. Heavy rainfall from the typhoons usually brings down large amount of soil from the mountain and subsequently deposit in the reservoirs.



◆ Problem / Task

In 2009, one devastating storm, Typhoon Morakot, attacked Taiwan and caused catastrophic damage to the island. The amount of its 24-hour rainfall was record-breaking high at 3060mm⁽¹⁾. It's estimated that about 60 million m³ of silt was brought into the reservoirs and rivers in central and southern Taiwan by that single storm. In early 2011, the amount of silt in Wushe Reservoir had exceeded 80 million m³. The sedimentation made half of the reservoir dried up and the riverbed of its inflow river, the Tarot Bay River, aggraded. Consequently, the water storage capacity of the reservoir was reduced by 60%, and could not retain enough water for the need of local residents and farmers. Therefore, it was imperative to dredge the reservoir. Since the dredging work was in the reservoir watershed, any contamination to the water resource should be properly controlled. Hence, it was critical to tackle the dredged materials carefully.



◆ Solution

In order to remove the large amount of sediment in the reservoir efficiently, a vast temporary sediment deposit area for the dredged material was planned to set adjacent to the Tarot Bay River. Then, a cofferdam was to be built for stabilizing the area and preventing riverbank clods from falling into the river. Considering the need of environmental protection, limited budget, and short construction time, gabions (ACEGabion™) loaded with geotextile bags (ACEBag™-g) were thought as the best choice for constructing the cofferdam. With appropriate porosity and excellent permeability, ACEBag™-g can contain and dewater the sludge obtained from the dredging. At the same time, the filled ACEBag™-g can replace gravels to be gabion filler. When comparing the methods of using gravel gabion fillers and in-situ sediment gabion fillers, the latter saved more time and money, since it notably reduced the resources allocated for sediment removing and gravel filling. Besides, the carbon emission caused by material transportation was significantly reduced. Furthermore, gabion with ACEBag™-g is easier to be removed after the project completion.



◆ Result

During construction, the cofferdam consisted of gabions and ACEBag™-g ensured the stability of the temporary sediment deposit area and facilitated the dredging job. ACEBag™-g makes the usage of waste materials possible and brings about great benefits in the dredging project. Now, the reservoir is able to store more water and operate efficiently. The local residents and farmers are no longer short in water supply.

(1)The global average annual land precipitation is approximately 900mm.