

Case History: Electrical Leak Location Survey

Project:	Inspiration Lake, Hong Kong Disney Land
Type of work:	Electrical Leak Location Survey
Location:	Penny's Bay, Hong Kong
Client:	Civil Engineering and Development Department
Consultant:	Maunsell Consultant Asia Ltd.
Main Contractor:	China State Construction Engg. Corp.
Survey Period:	March 2004



The Introduction

A lining system was installed across the base and sideslopes of the Water Recreation Centre Artificial Lake at the Disneyland project on Lantau Island. The Artificial Lake development is entirely within a reclaimed area of the site formed by dredged sand. The plan area of the entire Artificial Lake is approximately 125,000 m². The area over which the electrical leak location survey was performed was approximately 100,000 m².

The lining system installed across the base and sideslopes consists of the following, from bottom to top: A 300 mm thick layer of "10 mm single-sized" crushed stone; a 600 g/m² nonwoven geotextile; a 1.5 mm thick high density polyethylene (HDPE) geomembrane liner (smooth-surfaced across the base and textured-surfaced across the sideslopes of the Artificial Lake); a 600 g/m² nonwoven geotextile; a 400 mm thick layer of "10 mm single-sized" crushed stone; and a 300 mm thick layer of Grade 200 rockfill.

As geo-synthetic components of the lining system may have been damaged during the installation and/or construction processes, a second geomembrane liner integrity testing method was considered beyond that of the already established and implemented project quality control system. An electrical leak location survey would be of benefit in determining the presence and location of damage in the form of holes (if any) in the geomembrane component of the lining system. To this end, an electrical leak location survey was performed between March 9 and March 20, 2004.

The Scope of Work

The scope of the electrical leak location survey performed included:

- Performance of equipment calibration and survey sensitivity analysis;
- Division of Artificial Lake area into sectors & delineation with flags, flag lines, and string lines;
- Systematic survey and determination of the presence and location of holes in the geomembrane component of the lining system;
- Removal of the rockfill and crushed stone layers to expose the underlying geosynthetic materials in the vicinity of the holes located;
- Repair of the holes found in the geomembrane liner and the immediately underlying and overlying geotextile layers;
- Resurveying in the area of the repaired holes to confirm continuity of the geomembrane liner and to locate additional damage (if any) in the vicinity.

The Principle

The survey method detects electrical paths through a geomembrane liner. A voltage is connected to one electrode placed in an electrically conductive material covering the geomembrane, and to a second electrode placed in electrical contact with material beneath the geomembrane. Electrical current flowing through holes in the geomembrane liner produces areas of high current density. These areas are located by making a series of systematic electrical potential measurement scans on or in the material covering the geomembrane.



The Overview

An electrical leak location survey was performed on the geomembrane component of the lining system installed in Water Recreation Centre Artificial Lake at the Disneyland site, Penny's Bay, Lantau Island, Hong Kong.

