



Sun Hung Kai/MTRC Case Study



Problem

The IFC building is one of the most prestigious commercial buildings on Hong Kong Island. The structure is constructed upon reclaimed Harbour land and consists of a mixture of reinforced concrete and concrete block work. The design water ingress solution was not as effective as anticipated. After only three years, severe saline water ingress penetrated through the perimeter walls.

The affected areas were the lift shaft and a lift motor room. The ingress caused considerable damage to the equipment in these areas. As is evident in the structure, the worst ingress inundated the lift machinery room and it was submerged to an approximate depth of 2 meters. All of the electro-mechanical plant was submerged causing the damage which resulted in disruption to the users of the building. The situation was unacceptable to the facilities managers and a permanent solution had to be found.

Challenges

The IFC building is situated in the busy business district of Central and sits on top of the Mass Transit Railway Corporations (MTRC) Central Station, which is the gateway to the Chek Lap Kok Airport. The movement of men, materials and equipment is a challenge in such an environment. Restrictions were placed on the installation team (a Local Hong Kong contractor) in terms of access to the site so as not to interfere with the operation of the building. Any work that required a lift closure had to be notified in advance, undertaken at night and kept to a minimum.

Industries:

Commercial Building (lifts)

Regions:

China

Summary:

- Total lump-sum cost of HKD 314,612
- Lift shafts 4 & 5 at basement level B4 treated
- Shafts 2.9m x 2.9m square
- Minimum area treated around 300m²
- RH reduced to less than 92%

Timings:

- The installation for the AOP system took two months to complete commencing July 2000
- No –re-occurrence of water seepage since

IFC Specifics:

- Structure constructed upon reclaimed land
- Deep basements below the water table
- Lift shaft & motor room submerged to 2m

Control Equipment:

- One EPS control unit & one EPS terminal Box
- Line anode wire installed at 900mm centres

Physical structural constraints posed a challenge for the contractor, as route of access and size of openings dictated the methodology of installation. The positioning and design of the AOP system was made all the more challenging by the electro-mechanical assets that could not be moved or removed from the affected areas. The company was challenged not only with the rectification of the existing concrete surfaces but to achieve a relative humidity of 92% within the structure which is the British Standard for paint dry.

Contract

The contract was let by the Sun Hung Kai /MTRC joint venture management company and was tendered on the basis of installation at lift-shafts 4 and 5. An advantage of the AOP system is that if it is installed prior to any other remedial work mechanical cracks can be identified and rectified that may not be perceptible using other methods. This was the case for the IFC and on completion of the installation further works were carried out comprising additional crack injection, drainage and repair of graphic artwork for a small additional sum.

The AOP system is not an off the shelf product at a standard rate. Each structure has its own set of conditions and environment and therefore its own cost. The AOP system is a unique innovative first world technology with a simple installation technique. However the largest component to the cost is labour and access to site. There is no need to undertake expensive excavations as the AOP system is applied within the inside/dry environment of the structure.

Hence the application of the AOP system is comparable in cost to a traditional temporary solution, but considerably less expensive than a traditional perceived permanent solution. The company offered a structural life time guarantee on the AOP system.

Out Come

Since completing the installation in 2000 all surplus moisture in the structure has been eliminated and the incidence of water seepage has not re-occurred. The client has informed the company that this has resulted in a significant cost saving on maintenance and management. The installation of one of the most advanced waterproofing system available to the construction industry has significantly upgraded the quality of the building.

AOP system

The AOP System is an evolutionary technology based on an accepted theory. It gives new life to existing brick, masonry and concrete structures avoiding expensive reconstruction and has a broad field of application in new concrete structures. The "state of the art" methods in use in the building industry today can be characterised as temporary solutions to a problem for which there is no apparent cost effective permanent solution. The AOP System provides a permanent solution. The AOP System is utilised for transporting water encapsulated within the capillaries out of structures, as well as permanently preventing the penetration of water into structures. A control unit produces a low voltage electrical charge, which is passed through electrodes in the form of probes or wires strategically placed within portions of the walls and/or floors which are wet.