Cullen Bay Seawall - Rectification

Client: Department of Infrastructure

Value: $3,600,000

Scope:
This project commenced in 2011 after new and significant growth of a cracks at the rear of the seawall, were noticed. This growth was indicative of a potentially significant failure of the seawall structure. Emergency inspections were undertaken and recommendations were made to reduce or stop the progression of movements in the seawall.

Further inspections confirmed that the movements were serious and indicated a failure of a number of structural wall elements; remedial works would depend on further investigation and understanding of what had actually deteriorated or failed. Monitoring of relative crack widths and movements was commenced immediately to observe the rate and shape of wall movements. Survey stations were established, and public access and movements were restricted for safety reasons, and superfluous loads carefully removed from the ground backing the wall.
The major issues Advance had to address on this project were:

- Stabilising the existing sheet pile wall to prevent a catastrophic failure of the structure
- Maintaining public access to the existing ferry terminal and pontoon

Solutions adopted by Advance were:

- Construct a temporary tie back system which was achieved by installation of a 60 tonne kentledge tie back with stress wire anchors supporting the retaining wall
- Remove existing and construct new fuel tanks away from the rear of the retaining wall
- Carry out on going investigation and assessment of the lock wall under the instructions of engineers

For the drilling and installation of the 70 metre anchor ties, Advance assisted to develop the concept of drilling anchors through the face of the wall off a temporary gantry, thus eliminating the high cost of barge and crane work.

In addition, ACE devised a suspended leader through which we drove the 400 mm diameter temporary gantry piles again eliminating the need for costly barge and crane work.
An environmental plan was produced and managed by ACE’s environmental consultant, with the main emphasis on preventing contamination of the existing water way through oil spills, and other related contaminants.

A settling pond was created off site for the specific discharge of drilling muds associated with the rock anchors.

This was a unique project in that intensive inspection and testing was required throughout each phase of the project. This included the transportation of samples of failed anchors to London for analysis and reporting. Prof Littlejohn, a metallurgy expert based in London, provided the professional expertise in this part of the project.

At each stage throughout the project, significant delays occurred whilst waiting for final designs which could only be forthcoming after site investigations of every component of the structure.

This resulted in an extended construction time frame which is possibly not consistent with the scope of work on a normal predesigned project. This is consistent with the reactive nature of this project.
Advance was responsible for the installation of 5 x 70 m long multi strand anchors through the face of the sheet pile wall.

Disciplines included;

- Drill 80 mm Ø holes to a depth of 70 m @ 30º angles
- Installation of hole liners as drilling progressed
- Installation of multi strand stress wires
- Pumping of high strength grout into anchor holes
- Stress of tendons and lock off on completion

No injuries were sustained during the life of the project, neither to the staff involved or the public utilising the infrastructure.