

## case study



# Foundation Refurbishment – Lake Karapiro

*Project: Foundation Refurbishment – Lake Karapiro*

*Client: Transpower Ltd*

*Location: Waikato*

*Contract Value: \$3,650,000*

During Routine Condition Assessment exercises field staff noticed the concrete foundations on the two towers in Karapiro Lake had serious spalling of the concrete, some of the piles had the reinforcing bars exposed at and below the water line. With the World Rowing Championship due to be held on the lake in October 2010 it became a top priority to remedy this potentially serious foundation integrity defect.

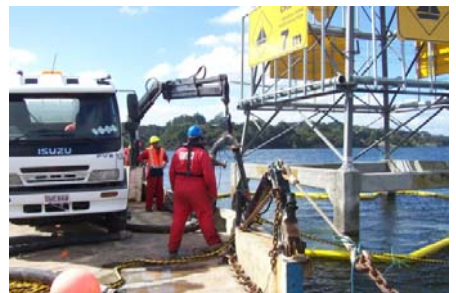
Electrix was awarded the contract to engage an underwater dive team to access and quantify the actual defects and take both still and video photographs of the foundation degradation. This information was then passed to the international engineering consultancy company CPG who designed the repairs as subcontractors to Electrix.

The original foundations were installed in 1947 as part of the Karapiro Hydro Scheme with the foundations constructed on a plateau above the original Waikato river bed. Once the dam was completed the towers with 8.5m concrete up-stands were completely surrounded by water and the only access was by boat. Having been build soon after the 2<sup>nd</sup> world war and with limited building materials available at the time the original concrete seems to have been made using inferior cement that contributed along with the additional loading of some very large warning signs to the foundation destruction.

Electrix engaged 'Bay Underwater Services NZ Limited' to utilise their 20m long barge and dive crew along with the barge tender vessel to deliver the ready mix concrete and reinforcing equipment to the tower sites. A concrete pump subcontractor was also hired to pump the concrete from the ready mix truck to the placement positions. The original piles were encased in cylindrical tubes with a diver controlling the slurry tube delivering concrete into the new reinforced form work. Also engaged was a qualified civil engineer (Diver) from Opus International to monitor engineering compliance below the water line.

A total of 177m<sup>3</sup> of ready mix concrete was delivered by the barge in 33 separate delivery runs from the South shore of the lake with a ferry run of approximately 2km round trip for each delivery. The barge was maneuvered around using the Tug boat and shunted into the boat ramp to allow the ready mix truck to be driven onto the barge, depending on the wind and lake current this was always quite a challenge.

Electrix had a representative on site at all times to ensure the precise repair design was achieved in a safe and competent manner. The project was completed on time and to the clients satisfaction



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