

## GALLERY CORING HINZE DAM STAGE 3

### OVERVIEW OF PROJECT

With a rapidly growing population and widespread drought, the pressure on water supply is forever in demand. The Hinze Dam Stage 3 Upgrade was identified as being a priority to increase the dam's water storage capacity and delay the release of floodwaters onto downstream floodplains.

Hinze Dam therefore received an upgrade which included the raising of the dam and spillway wall by 15 meters which resulted in its capacity being doubled.

### DRAINAGE GALLERY BREIF

The existing drainage gallery measured 2.5m high by 1.2m long by 35m wide. It was accessible via several flights of stairs from the upper portion of the spillway, see figure 1.

### PROBLEM

The Stage 3 upgrade shared a modified version of the Stage 2 gallery. To ensure that increased hydrostatic pressures generated by the elevated height of the wall were controlled a number of pressure relief holes measuring up to 25meters deep were cored in various areas of the gallery floor and walls, see figure 1 for core hole layout

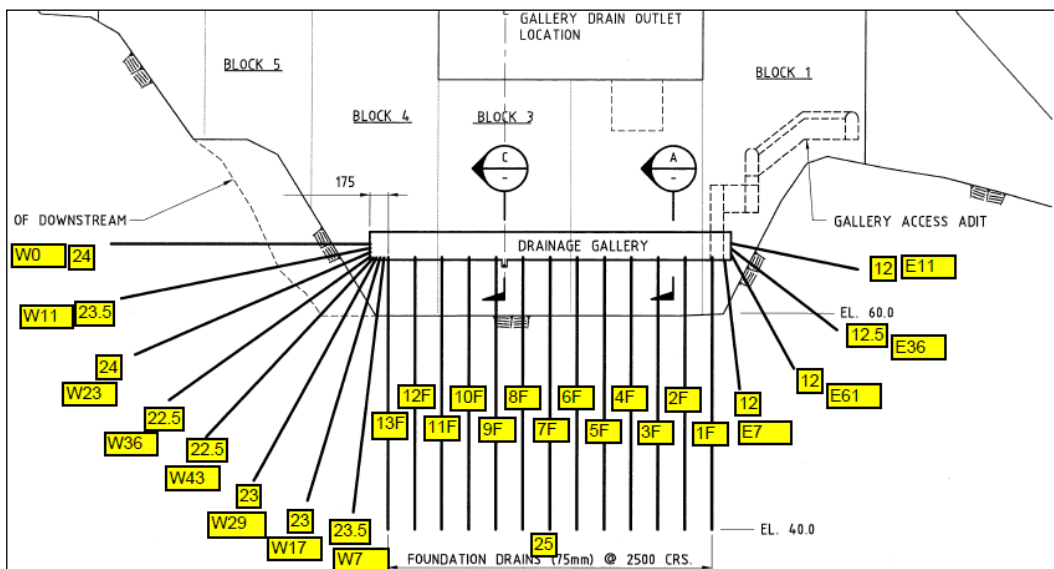


Figure 1 – Drainage Gallery Elevation showing Hole Depths and Numbering System



## SOLUTION

DecoTEC had vast experience in similar projects and were therefore called upon to carry out the required works. There were a number of elements that had to be addressed before and during these works were conducted.

### WORK IN A CONFINED SPACE

To work in a confined space all DecoTEC operators had to be confined space trained. In addition to this a spotter was also required to stand at the gallery entrance at all times in case of an emergency. Pneumatic powered ventilation fans, a 4four point intercom system and fixed gas monitors were installed to provided the operators with the safest possible working environment.

The required drilling apparatus could not generate exhaust fumes within the enclosed area therefore hydraulic drilling equipment was chosen to complete the work. This gear was exhaust free, quiet and provided powerful and efficient cutting conditions.



*Figure 2 – Left: Entrance to the Spillway Drainage Gallery  
Right: Hydraulic Drilling Equipment*

### SLURRY CONTROL AND WATER SUPPLY

To ensure the works did not negatively impact on the environment all slurry needed to be treated for pH and disposed of into the site sediment basin. To collect and treat the slurry DecoTEC installed an innovative slurry control system. This system consisted of a wet-vac continuously sucking slurry from a collection pit within the gallery. The wet-vac's factory tank was modified to expel the slurry into a 205 litre tank to reduce the need to attend to the slurry system. Once full these tanks were then automatically stage pumped up the multiple flights of stairs into a 3kL bin located adjacent to the gallery entrance. The slurry in this bin was then treated for pH and, with the aid of flocculent, left to settle before disposing of in the sediment basin via an onsite vacuum truck.

Water was provided to core drills via a 3kL tank and a fire pump located outside the gallery.



*Figure 3 – Left: Gallery Floor Slurry Control System  
Right: Slurry Collection Tank and Water Supply Tank*

### PRECISION CORING WHILST MAINTAINING SAFETY

To core to the required angles and depths within an extremely small margin of error diamond core drilling was chosen to carry out the works. To stay within the clients' program two drill rigs with specially fabricated diamond core cutting heads were used. These cutter heads provided a precision cut to the desired diameter whilst maintaining the required production rates.

Due to the tight fit inside the gallery 1metre screw type core barrels were used. Every metre of cutting required a new barrel to be screwed onto the chain. To ensure the holes would stay on line with how they were initially setup reamers were used. Several of these were installed throughout the chain of barrels and provided the barrels with a tight fit inside the hole.

At the time of coring there was up to 15 meters of head in the dam. This therefore created the potential for water to backflow out of the cored holes generating a safety hazard. Even though the calculated maximum backflow pressure was only minimal DecoTEC wanted to ensure the uttermost safety for their operators therefore a backflow valve was fabricated and installed on each hole.



*Figure 4 – Drilling Equipment*

INNOVATIVE SOLUTIONS

The horizontal outbound drain hole measured 160mm in diameter and was located below the floor of the gallery. This required a cavity in the gallery floor and a recess in the downstream gallery wall to be cut out to make room for the drilling gear. Along with this tight fit DecoTEC also had to ensure that the appropriate fall was maintained along the entire 18metre length of the hole.



*Figure 5 – 160mm Diameter Drain Hole*