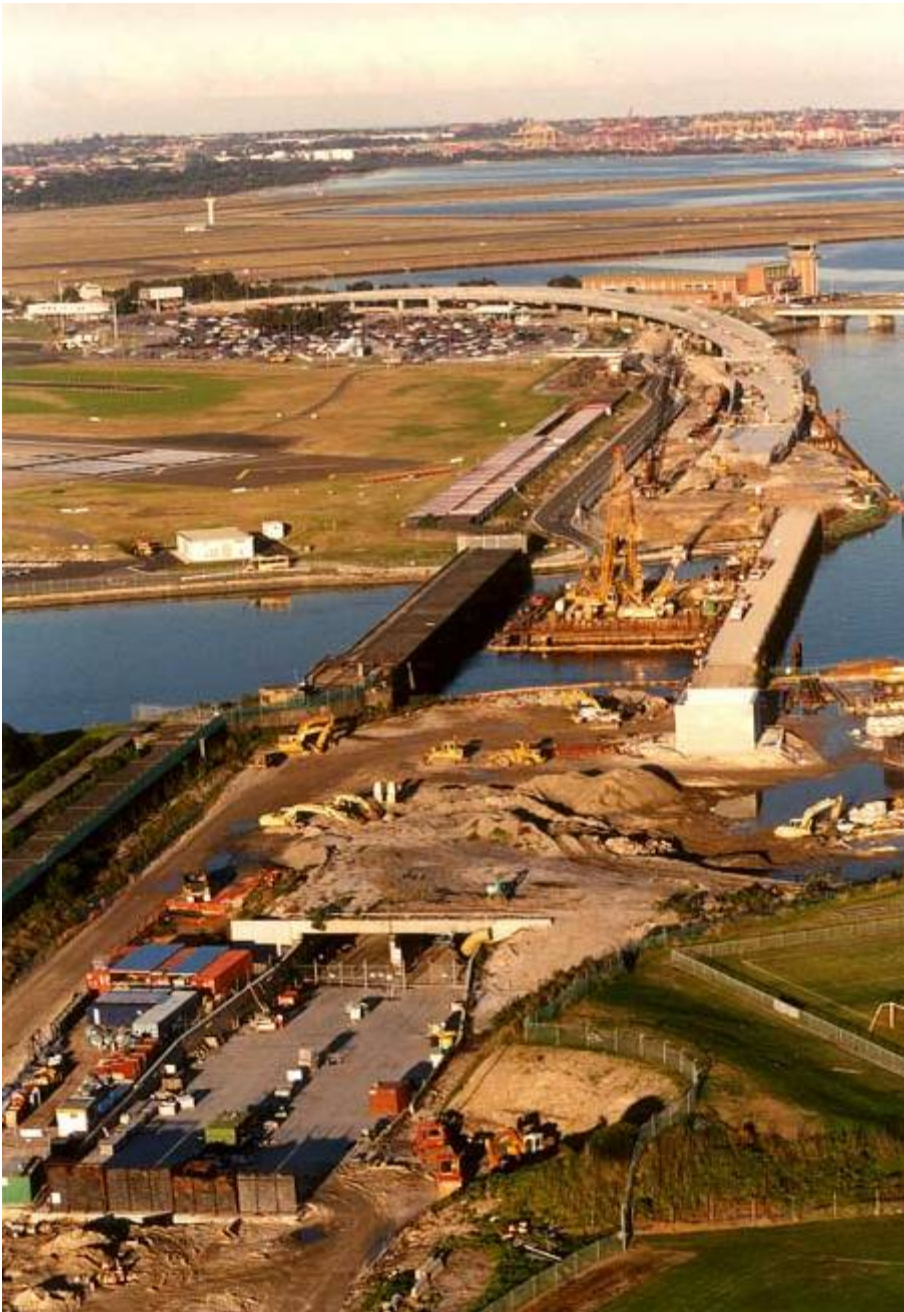


# M5 East Motorway - Sydney



## Diaphragm walls for river crossing



▲ Cooks river crossing tunnel between airport and Botany Bay

The M5 East Motorway forms the link between the existing M5 Tollway at Sydney's Beverley Hills and the Eastern Distributor at General Holmes Drive. This publicly funded \$750 Million Project completes the southern section of Sydney's Orbital Road Network.

The 110m Cooks River tunnel section is located at Sydney's Airport directly adjacent to the East-West runway. The tunnel walls, roof and supporting bored piles were built from three cofferdam cells and a temporary construction bridge.

The contract for the diaphragm walls and the bored piles was awarded to VSL Intrafor in July 1999, with construction to be carried out in 3 phases.

Two parallel diaphragm walls, approximately 20m apart and each 354m long were built to form the tunnel sides. The walls were constructed in individual panels of just over 6.5m in length, 1.0 or 1.2m thick and an average of over 18m deep.

Ground pretreatment was carried out to stabilise soft marine clays underneath the riverbed. Two Liebherr excavation cranes then utilised clamshell and chisel to excavate through sand backfill, clay layers and up to 3.5m into the Hawkesbury sandstone. Excavation took place under bentonite slurry, mixed and recycled in one central location on site. Excavation spoil was potentially acid-sulfate reactive and had to be disposed off site by immersion under water.

A PVC membrane formed the water stop in the vertical construction joints between adjacent panels. The reinforcement cages were fixed on site and lowered into the trench by crane. The concrete consisted of a 50 MPa tremie mix specifically designed for the aggressive conditions at the Cooks River.

The bored piles were constructed by Bauer BG-30 piling rig. One hundred and eight bored piles of 1.0m pile diameter and 650mm column diameter were placed along the centre line of the tunnel to an average depth of 22.0m.

All crane booms had to be lowered whenever the East-West runway was brought into operation. Virtually no work was carried out during these airport shut-downs. All cranes were retrofitted with emergency lowering equipment to drop the crane booms in the event of crane power failure.

In total, VSL Intrafor excavated 13,000m<sup>2</sup> of diaphragm wall, poured 11,000m<sup>3</sup> of concrete and installed 2,300t of reinforcing steel.

The M5 East Motorway was opened on 9 December 2001 approximately 6 months ahead of schedule.



▲ Exposed diaphragm wall section prior to roof slab construction



▲ Steel reinforcement cages for diaphragm wall construction



▲ Clamshell on excavation crane



▲ Diaphragm wall excavation under bentonite



▲ Entrance to tunnel at approach ramp

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**MAIN CONTRACTOR :**  
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