Road race

Australian engineers have rerouted a coastal road south of Sydney on to a spectacular cliff hugging viaduct. Ruby Kitching reports from New South Wales.

Travelling between the New South Wales towns of Coalcliff and Clifton has been an arduous affair since the coastal Lawrence Hargrave Drive was closed two years ago.

The New South Wales Roads & Traffic Authority (RTA) acted fast when in June 2003 a chunk of cliff fell on to the road forming a 1m wide crack in the surface. Nobody was killed, but engineers decided the road had to be closed – leaving motorists with a 64km diversion.

However with the road one of the most popular tourist routes along the Illawarra coastline, a permanent solution was needed urgently.

To get things moving the RTA set up an alliance contract to save time and drive down costs. By January 2004 four schemes had been shortlisted and presented to local resident groups for approval.

"The principle of the alliance was that there were no dumb ideas – we were there to foster innovation," says Coffey Geosciences chief operating officer Ian Hosking.

Floating roads and roads built on a breakwater were considered, but the final solution – and the one most popular with local residents – was an S-shaped viaduct. By building the viaduct up to 45m away from the cliff, the chance of rocks falling on to the road was minimal.

Construction of the £19.7M 665m long bridge began in June 2004 and is expected to finish in December. Part balanced cantilever and part incrementally launched, the 10.5m wide road will include two lanes of traffic and a cyclepath. Half of the balanced cantilever section has been built and just two more segments will complete the incrementally launched section.

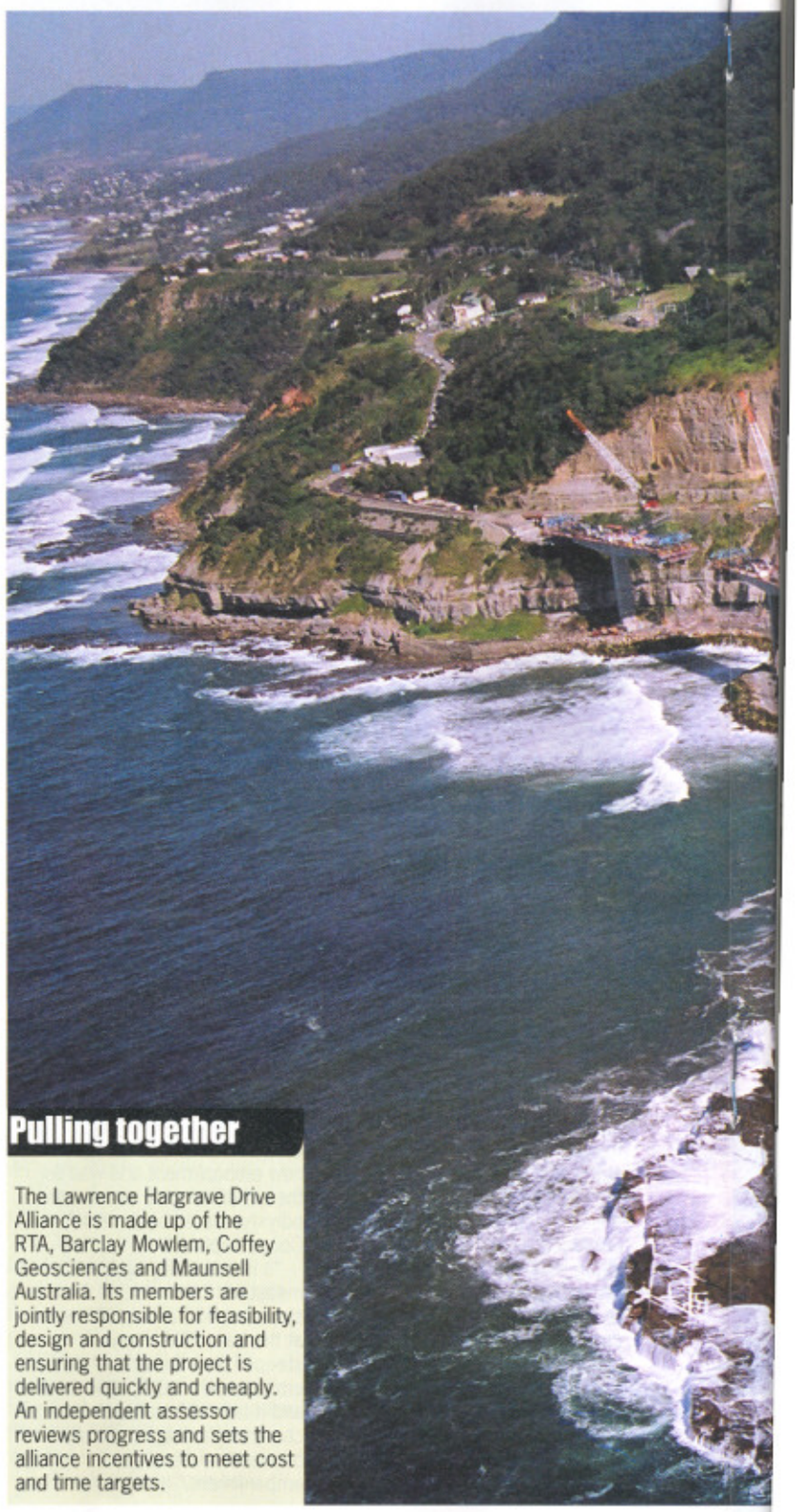
Before the bridge could be started, a temporary road had to be built at the base of the cliff for plant access and for piling the viaduct foundations. Boulders were placed against the seaward face of the road and around pile caps to prevent scouring. The road also allowed access for 10m of coastline to be reclaimed near pier locations and enabled four tower cranes to be erected for the balanced cantilever piers.

The incrementally launched section is 210m long and follows the tightest curve of the structure, 25m away from the cliff face. Piers up to 33m high divide this section of bridge into seven spans between 24m and 31m long.

Sections of the insitu concrete deck are constructed in 15m to 30m long sections and jacked forward along guided tracks.

The form of construction changes at the point of inflection of the two curves of the bridge. The 455m long shallower curved section uses balanced cantilever construction – which can cope with longer spans of up to 105m.

Here the four piers are built off reclaimed land up to 45m away from the cliff face. Deck sections are cast insitu in 3m to 5m sections out from either side of each pier, requiring no temporary supports.



Pulling together

The Lawrence Hargrave Drive Alliance is made up of the RTA, Barclay Mowlem, Coffey Geosciences and Maunsell Australia. Its members are jointly responsible for feasibility, design and construction and ensuring that the project is delivered quickly and cheaply. An independent assessor reviews progress and sets the alliance incentives to meet cost and time targets.

The S-shaped viaduct sits up to 45m out from the cliff, using incrementally launched sections (main picture) and balanced cantilever construction (above).