

PERTH CONVENTION CENTRE BRIDGE

STONE COLUMNS



Owner: Main Roads
Main Contractor: Multiplex

Specialist Contractor: GFWA
Engineer: Arup

THE PROJECT

A bridge linking Mitchell Freeway to Mounts Bay Road has been constructed as part of Perth Convention Centre development.

Geotechnical investigation showed that the ground comprised of a layer of medium dense sand overlying soft to firm alluvial clay. While the clay thickness was typically 6.5 to 8.5 m it increased to approximately 15 m towards the approach of the western abutment and exceptionally to more than 27 m where a 15 m wide steep sided intrusion was identified. Groundwater level was high due to the proximity of the project with Swan River.

While abutments and piers of highway bridges are traditionally supported on piles due to the presence of thick alluvial clay, differential settlement between the piled structure and embankment may require ongoing maintenance.

Thus, it was decided to implement ground improvement by stone columns to meet a maximum total settlement of 40 mm for any part of the bridge and differential settlement of 25 mm between the abutments and piers.

THE ROLE OF GFWA

GFWA was awarded the contract for installing the Stone Columns. Approximately 400 columns, each 17 to 19 m long, were installed in the project's foundations. Columns were designed to be 1 m in the alluvial clay and 0.8 m in the upper fill.

Coarse limestone gravel was used for the stone columns. Chemical and pH tests on the groundwater and alluvial clay showed that this material was chemically stable over the bridge's design life.

Based on the ground conditions and design loads the columns' spacing used was variable from 2.2 m beneath the abutments to 2.8 and 4 m under the embankments.

Stone Columns were tested up to 390 kPa using 600 mm diameter circular plates and up to 150 kPa using a 4 m² concrete pad.