

# Bishops See Stage 2

## Diaphragm Walls & Grouting



**Developer: Hawaiian and Brookfield**  
**Main Contractor: Brookfield Multiplex**

**Specialist Contractor: GFWA**

## THE PROJECT

Located at 235 St Georges Terrace, similar to Stage 1, this project is to be built on the heritage-listed Bishops See site in Perth's CBD.

Bishops See will comprise of 46,000 m<sup>2</sup> of prime commercial office space. Stage 1 includes a nine level office tower totaling 18,000m<sup>2</sup> set amongst the historic Bishops See gardens.

The tower's underground car park can only be built by constructing a ground retaining structure before the commencement of bulk excavation.

The geotechnical report indicated that the superficial layer was composed of fill, 1 m to several metres thick. Dune sands were identified from the depth of 4.5 to 11 m, clay and sandy clay followed from the depth of 9 to 11 m, and sand was once again recorded from 16 to 28 m. This layer was underlain by a second clay layer from the depth of 20 to 33 m, then more sand from 33 to 39 m and finally siltstone.

## THE ROLE OF GFWA

GFWA was awarded the design and construct contract for the retaining structure at the periphery of the bulk excavation, and proposed diaphragm walls (D-Walls). 917 m<sup>2</sup> of D-Walls were constructed, as an extension to a previously constructed D-Wall during Stage 1. Whilst a relatively small wall area, significant challenges faced the design and construction teams.

D-Wall panels were constructed 0.6 m away from an ageing city high pressure gas line and the heritage listed Bishops See House; with stringent restrictions on panel deflection performance. GFWA was able to ensure that design models limited settlement during panel and bulk excavation of the gas line and heritage structure to less than 2 mm and 10 mm respectively. Pipeline curvature limitations of 1/1,000 were also satisfied. Design verification was provided by real time monitoring during panel excavation by a robotic total station.

The requirement for a water tight butt-joint of the new and existing D-Walls provided a further challenge. GFWA developed specialist tools to excavate and clean the old wall during excavation of the new. T.A.M.s were then fixed to reinforcing cages installed adjacent to the old wall, and cement-bentonite grout injected to provide the required seal. Additionally, extensive grout underpinning was carried out beneath the adjacent Bishop See House.

**Perth**  
Sydney  
Brisbane  
Melbourne

**113 Radium St, Welshpool WA 6106**  
13-15 Lyonpark Road, Macquarie Park NSW 2113  
3 Harvton Street, Stafford QLD 4053  
41 Boundary Road, North Melbourne VIC 3051

**Tel: 61 8 9350 5394 Fax: 61 8 9358 3095**  
Tel: 61 2 9491 7100 Fax: 61 2 9491 7111  
Tel: 61 7 3354 9100 Fax: 61 7 3354 9111  
Tel: 61 3 9326 5885 Fax: 61 3 9326 8996