LATERAL MOVEMENTS AROUND DEEP BASEMENTS IN SYDNEY

The Meriton Apartments' redevelopment of the old Village Cinema site in George Street, Sydney involves a 34m deep, vertically sided basement, being excavated in Hawkesbury Sandstone immediately adjacent to existing structures (see Photo 1). The basement extends 10m below the level of nearby rail tunnels which pass beneath George Street.

With the relatively high horizontal stresses in the Hawkesbury Sandstone the excavation of such basements results in lateral movements of the excavated faces. Monitoring of many such excavations in the CBD has indicated inward movements at the surface of between 0.5mm and 1.0mm per metre depth of basement. With the proliferation of deep basements in certain parts of the city the interaction effects between such basements and existing tunnel infrastructure becomes quite complex.

For a new project SE of the Village site, which straddles rail tunnels, it has been necessary to model the sequential excavation of all major basements in the area to obtain meaningful predictions of the impact of the new project.

Figures 1, 2 and 3 show some of the output from this large scale 3D model which was calibrated well against known movements around existing basements, such as World Square.

Photo 1: Partly excavated basement adjacent to George Street, Sydney

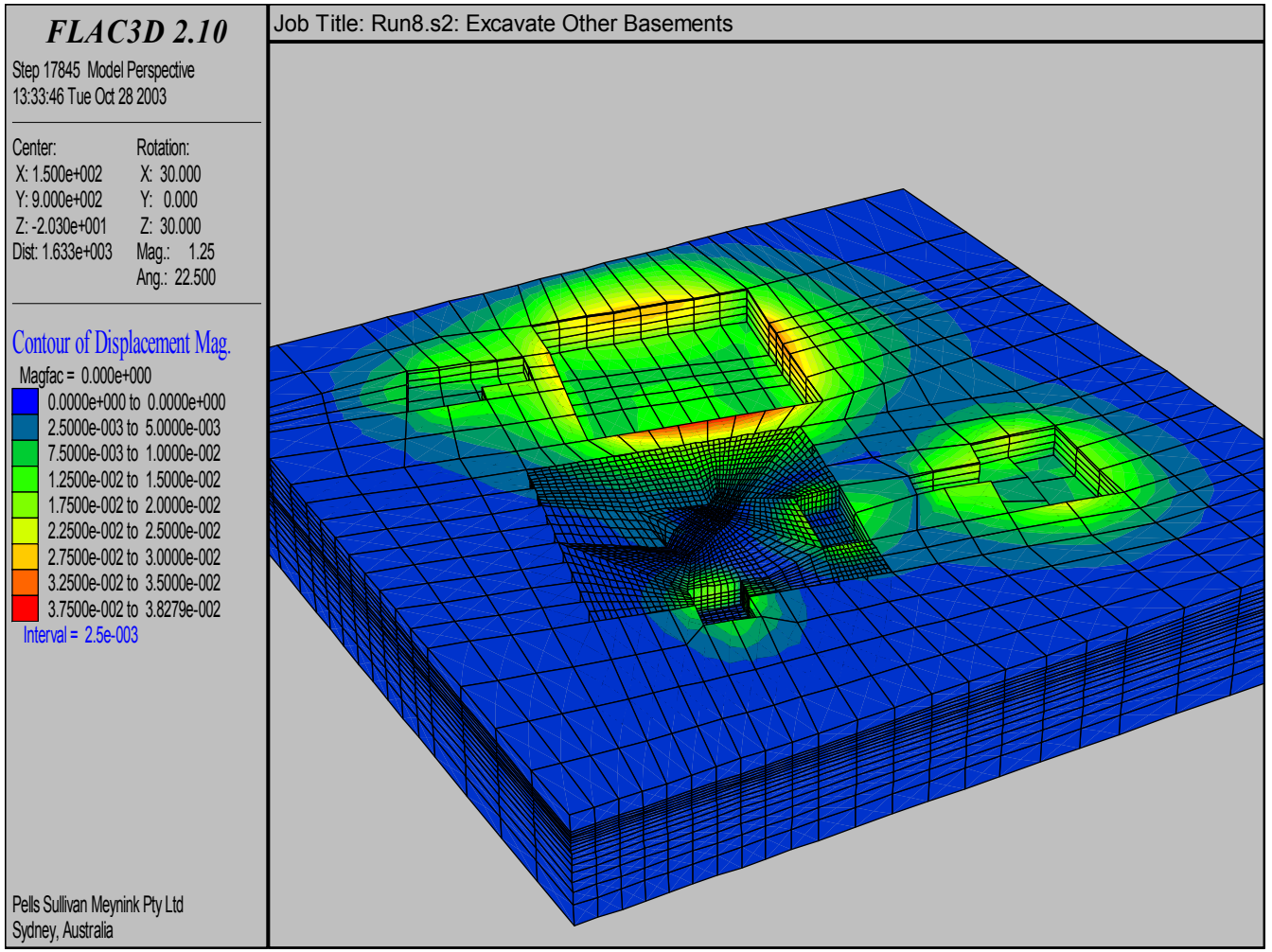

Figure 1: 3D numerical model of existing basements around a new site in southern Sydney CBD

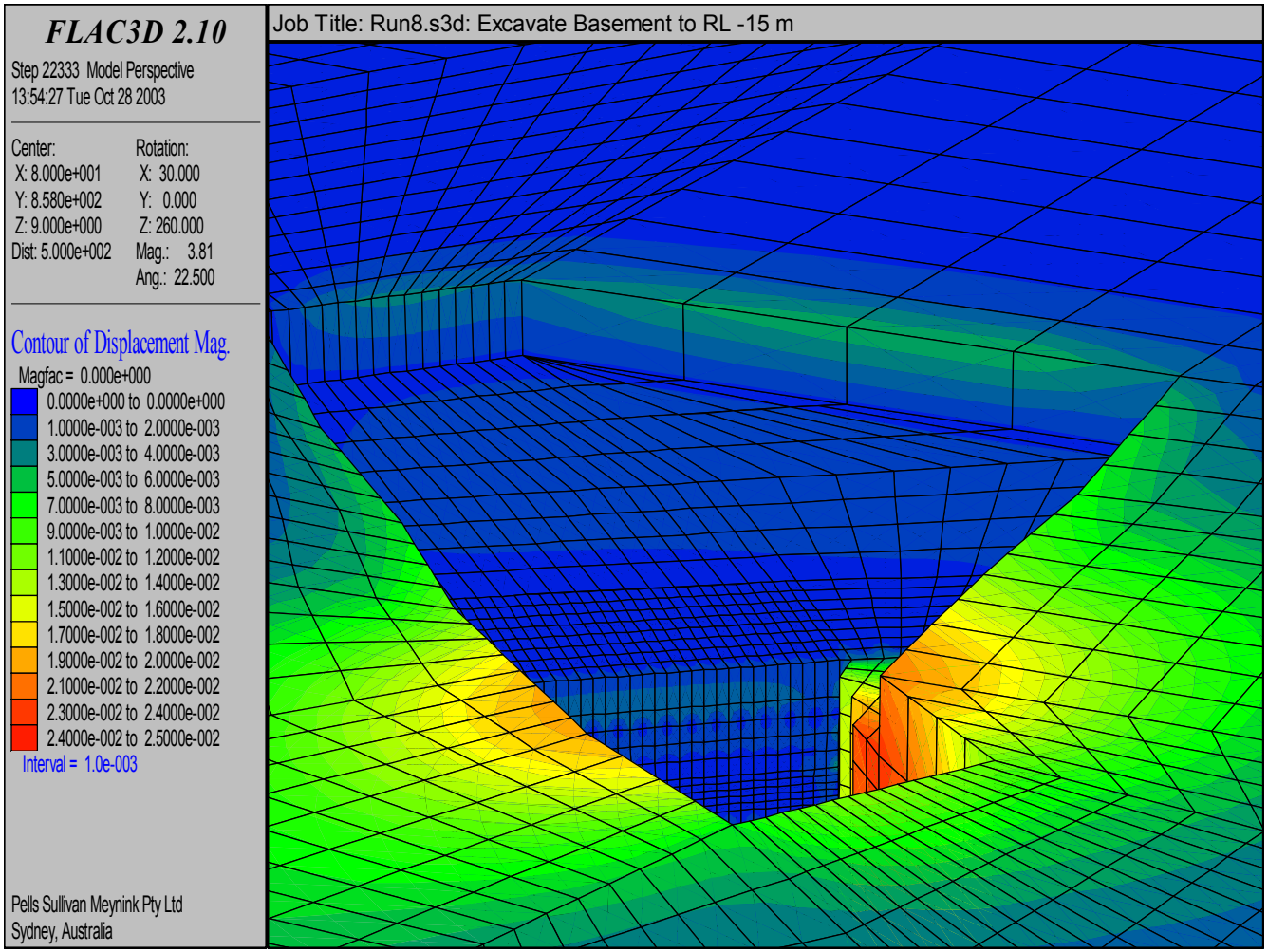

Figure 2: Predictions of displacements around new basement

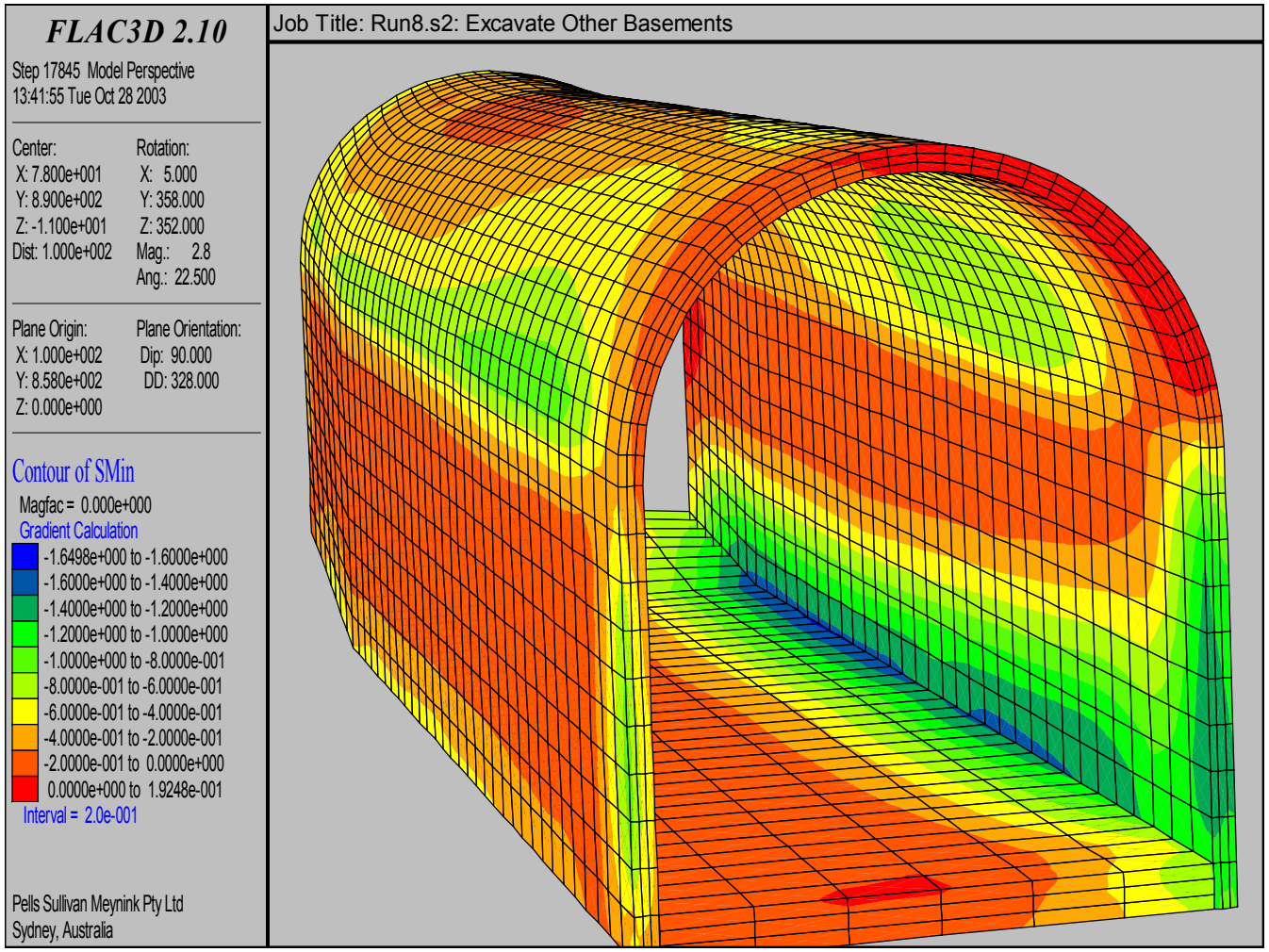

Figure 3: Example of impact of excavation on stresses in existing rail tunnel linings