



GEO-FOUNDATIONS Contractors Inc.

Toyota Engine Dress Up Pit



Date: 2001

Technology: Anchored Shotcrete

Expansion in 2001 of an existing assembly line at Toyota's Cambridge, Ontario automobile manufacturing plant required the construction of a new 3-metre deep pit within the midst of the engine dress up line. An aggressive shutdown schedule, coupled with restricted access and unknown sub-surface conditions highlighted the numerous challenges of this design-build excavation shoring project.

As a hedge against unknown and possibly worst-case soil conditions, 4-metre deep vertical grouted dowels were installed along the entire pit perimeter on 600 mm centre-to-centre spacing prior to any excavation in order to reinforce the eventual excavation face. Driven soil nails, 2.5 metres long at 600 mm lateral spacing, were installed prior to detail face excavation at each of two 1.5-metre high benches. The excavation face at each bench was stabilized with wire mesh-reinforced, 100 mm thick shotcrete.

The presence of the vertical grouted dowels turned out to be critical to the successful installation of the shoring – the excavated soil consisted solely of poorly graded, dry sand which would otherwise never have stood unsupported long enough for shotcrete installation.

Shotcrete had to be pumped more than 100 metres, through piping that had to be diverted and protected from existing factory traffic. In total, 480 lineal metres of drilled-and-grouted vertical elements were installed along with 600 lineal metres of driven soil nails. The shotcrete shoring face was used as the back form for the concrete pit walls.



Application of shotcrete to the excavation face at bottom bench



Start of pit excavating (by others) after installation of vertical soil dowels



Pit shoring complete, ready for floor slab construction