



■ **Miscellaneous**



## DYWIDAG-Technology provides additional seismic event stability for Terminal Building

### Vancouver International Airport Domestic Terminal Building, Canada

The Vancouver Domestic Terminal Building is a four-story building with a footprint of approximately 40,000m<sup>2</sup>, located centrally on Sea Island. The island is on the Northwestern side of the Fraser River Delta, which is in a seismic zone 4 region.

The original building and piers were founded on timber pile groups with the main columns being built on groups of 7 to 30 piles. The two lower levels of the building consist of a reinforced concrete structure, the two upper levels of a steel moment frame structure. The soil profile at the site is a typical Fraser Delta deposit with a profile of fill or clay /silt crust, silty sand, sand and clay/silt.

Due to the presence of underlying compressible soils the original building site was preloaded for about two years with 4.9 m of sand fill, however, settlement of the structure was deep seated and long term. Between 1966 - the time of the original construction - and 1976, measured building settlements were approximately 75 mm and were continuing.

In order to avoid further settlements and to upgrade the structure according to the new Seismic Code, 330 GEWI<sup>®</sup> Piles were designed and installed in several phases between 1997 and 2002. The piles had to be installed in the building's basement with a limited headroom of only 3 to 4.5 m. Given these circumstances, the DYWIDAG-System comprised of GEWI<sup>®</sup> Bars (Threadbars) coupled together to achieve the desired lengths proved to be the best solution.

The criteria for the evaluation of the seismic parameters is as follows:

- The Fraser River Delta area and Sea Island has the potential for large earthquakes due to the stresses induced in the underlying rocks by the collision of the offshore Pacific Plate with the American Continent Plates. The National Building Code of Canada locates the delta in seismic zone 4.
- The predominant risk for the 475-year return earthquake is of a magnitude of 6.5 -7.5 with an epicenter distance of 25 to 100 km. There is a 10% chance this event will occur within the next 50 years.

Seismic design parameters used:

- Design peak ground surface acceleration: 0.3 g
- Design peak ground surface velocity: 0.3 m/sec
- Design Earthquake Magnitude: 7.

DSI performed its work in several phases between 1997 and 2002 to the full satisfaction of the owner. The terminal could never be closed completely and remained open to passengers during construction, which is still in progress.

#### Reference Details:

**Owner** Vancouver International Airport Authority, BC, Canada

+++ **General**

**Contractor** Ledcor Industries Ltd., Vancouver, BC, Canada

+++ **Structural Design** Read Jones

Christoffersen Ltd., Vancouver, BC, Canada

+++ **Geotechnical**

**Engineers** Macleod Geotechnical Ltd., North Vancouver, BC, Canada

+++ **Piling Contractor**

Kani Foundation Technologies, Richmond, BC, Canada

**DSI Services** Supply of

330 GEWI<sup>®</sup> Piles as micropiles with double corrosion protection, total length 18 m; Technical support; Rental of testing equipment.