



## GEO-FOUNDATIONS Contractors Inc.

### Nipigon River Bridge



Date: 2004 - 2005

Technology: Micropiles

Canadian Pacific Railway's Nipigon River Bridge, located 125 km east of Thunder Bay on one of Canada's principal east-west rail corridors, is a 24-metre high structure built in the late 19th century and founded on timber piles. With the continued reliability of the original foundations in question, CPR tendered a contract in 2004 that included construction of 100 micropiles to permanently support the bridge's three piers.

Drilling of the micropiles was completed using a diesel-hydraulic crawler rig positioned at ground surface or, as was the case at Piers 1 and 2, atop temporary trestle structures bridging the high flowing Nipigon River below. Each of the hundred micropiles consists of a 273mm diameter upper cased section and a full depth, single, central, 63.5mm / 550MPa threaded bar embedded at least 25 metres into the silt and sand/gravel soils underlying the site. The micropiles were advanced using single-head, concentric percussive duplex drilling, and were pressure grouted through the casing during casing retraction before being post-grouted a day after installation.

Several challenges were overcome throughout the course of micropile construction, including cold weather, varying and challenging soil conditions and drilling-induced movements of the superstructure. In order to fulfill the terms of the contract and validate Geo-Foundations' proposed installation techniques, several pre-production static load tests were conducted.

All of the micropile work was conducted with the railway above in full, uninterrupted operation. Cold weather eventually dictated that the work be suspended in December 2004 and resumed in May 2005. Use of micropiles at this site is an exemplary application of innovative geo-construction to the evolving needs of transportation infrastructure maintenance and rehabilitation.



*Permanent 273mm diameter steel casings with threaded joints*



*Drilling of micropiles at Pier 2 in November 2004*



*Photo of Nipigon River Bridge taken in 1937 – Piers 1, 2 and 3 from left to right*