



Project Title: Geotechnical Assessment and Design

Client: New Brunswick Department of Transportation (NBDOT)

Project Description:

Over the past 10 years, GEMTEC has been involved in the geotechnical design and/or geotechnical assessments for more than 50 highway and/or structures throughout New Brunswick. These structures have included the Eel River Bridge, La Plante Road and the new Petitcodiac River Bridge. The geotechnical analysis have included utilizing static, dynamic and wave equation (GRL WEAP) methods of calculating pile size, embedment depths and anticipated pile stress. We have also provided driving inspection services for this and many other NBDOT structures using our Pile Driving Analyzer (PDA) equipment. Through the use of our PDA we have been able to use lower factors of safety as per the U.S. Pile Driving Contractors Association (PDCA) Manual and the Canadian Foundation Engineering Manual.

The largest of these NBDOT projects that GEMTEC has served as the geotechnical consultant is the \$30 million 9 span Petitcodiac River structure at Moncton along with the associated approach embankments on the soft tidal deposits. GEMTEC was retained to undertake a geotechnical investigation and provide geotechnical recommendations with respect to; 1) the approach embankments; 2) foundation design; and 3) cofferdams.

The approach embankment was constructed on 9 metres of soft laminated fine and coarse silt. Our piezocone testing equipment proved to be very useful in determining actual in-situ pore water dissipation results that were used

in the design and construction process, so as to avoid embankment failures due to high pore water pressures.

Our PDA equipment was utilized for pile driving inspection at all piled foundations for this site. Given that the piles penetrated into the soft mudstone bedrock some 3 to 4 metres and relaxation was a concern, the PDA proved very useful in identifying this relaxation that may have otherwise been overlooked.

Another recent project that GEMTEC analyzed, designed and supervised for NBDOT was the construction of a single span structure at Route 425 / Miramichi with abutments embedded in a 12-metre-high embankment. The embankments were in turn constructed on a soft glacio-fluvial deposit (20 metres thick). Because excessive settlements were anticipated (0.6 – 0.9 metres) the abutments could not be placed on shallow footings within the embankment. To construct the abutments on piles and allow the embankments to settle would have meant perpetual repairs at the abutment due to the long-term settlement. The solution was to construct the embankment one year prior to the abutments and utilize perforated vertical drains (wick drains) to facilitate rapid consolidation.