



Comitê Brasileiro de Túneis - CBT

The Brazilian Tunnelling Committee (CBT) wishes to point out the article in the February issue of *Ground Engineering* contains many arguments based on incorrect assumptions. Indeed, the article largely consists of groundless and ill-considered speculation in relation to possible causes of the collapse.

This was a very serious incident with grave consequences for all involved. Unfortunately many reports are misinformed, so CBT has posted a note on its website (<http://www.tuneis.com.br/especial/pdf/collapse.pdf>) containing important points which were omitted by *Ground Engineering's* article. Moreover the worst aspects in the latter were not due to any difficulty in obtaining information or facts; in many cases the points made are inconsistent, but highly damaging for Brazilian engineers and geologists.

While recognizing that a mistake was made and there is a lesson to be learned, CBT strongly refutes vague speculations raised in the article that contribute nothing to public opinion or the tunnelling industry. A few examples will be posed here, rather than an exhaustive response to all unrealistic points in the article, for reasons of space.

Mention is made of the ***“Contractors’ decision to use the New Austrian Tunnelling Method (NATM) on the section of the São Paulo Metrô which collapsed...”***

In fact there was no such decision. A few paragraphs below, the article correctly notes that the 18.5m diameter, 45m long, 40m deep section of tunnel was designed to house the tracks and platforms of Pinheiros Station. From the early stages of the preliminary design and initial geological investigations, São Paulo Metro planned for underground construction compatible with the urban environment. The basic conception was to drive the platform tunnels through Precambrian rock with shotcrete supported staged excavation. The tender documents call for this method and the contractor simply complied.

Just after the accident, some misinformed sources claimed that the work had been tendered for TBM construction but the contractor decided to switch to NATM. *Ground Engineering* repeats these claims but regardless of its sources, it ought to be aware that no 18.5 diameter TBM has ever been available.

“A tunnel of 18.5m diameter is very large. If you have an open face in dodgy ground... there is not a lot you can do other than run away”. There was no face instability process and the article itself subsequently contradicts this statement.

Many stations of similar dimensions have been successfully constructed in São Paulo and elsewhere, in rock and soft ground.

“Open face tunnelling is cheap. NATM is much less expensive than a soft ground TBM, but much less safe” (words of a tunnelling specialist who asked not be named).

The sentence contains many inconsistencies. Even the article itself correctly states that no 18.5m TBM is available anywhere in the world.

“The 6m of rock cover over the large tunnel was ‘thinnish’”.



Comitê Brasileiro de Túneis - CBT

Engineering is able to deal with these situations and more difficult ones too; there are plenty of examples from all over the world. Butantã Station, with similar architecture and dimensions, located 1 km south of Pinheiros Station, was successfully excavated using NATM and in the same general geological conditions. Its rock cover ranges from zero to 14m.

Another similar project worth mentioning in this respect is Alto do Ipiranga Station on São Paulo Metro's Line 2 (270 m² cross section, overburden ranging from 12 to 20 m), which was recently successfully constructed using NATM in soft ground.

“Anderson added that creating interfaces between tunnels and shafts was notoriously difficult... He said it was particularly problematic using NATM”.

Again, scores of stations have been excavated using NATM in recent years, many interacting with even larger shafts, some of them elliptical or skewed in relation to the tunnel axis. Brazilian companies have designed and constructed many such stations in Brazil and Europe. Tunnel engineers are well able to handle these interactions.

In short, the *Ground Engineering* article is based on contradictory speculations that do not apply to Pinheiros Station. An expert committee has been appointed by the State to investigate the causes of the accident. Consultants have been called in by the contractor too. Until their reports come out, by suggesting unrealistic causes for the accident the article is merely making groundless allegations, damaging the parties involved, and rendering a disservice to the tunnelling industry by instigating public opposition to underground construction.

São Paulo, March 12, 2007.

Tarcísio B. Celestino
President of CBT – Brazilian Tunnelling Committee