

- G. The Contractor shall provide adequate lighting and ventilation to the shafts/pits. Except where otherwise necessary, electricity shall be 110 volts from a centre tapped to earth (CTE) supply and up to 220 volts with use of ELCB protection.
- H. The Contractor shall provide an air-conditioned control room at the thrust pit/shaft with sufficient space for a desk and chair for one inspector.

### **2.1.8 Investigation Requirements**

- A. The Contractor shall obtain existing utility information, and excavate trial pits to locate and confirm services at pit/shaft locations and along the proposed tunneling route as necessary. He shall obtain approval of utility authorities and relevant Departments prior to the commencement of work.
- B. The Contractor shall carry out all geotechnical site investigation including ground water level monitoring, as considered necessary and as minimum at the proposed pits/shafts locations and along the proposed tunneling route as necessary.
- C. The Contractor shall carry out a geophysical survey on a 10 metres wide strip along the proposed tunneling route covering a depth range between ground level and up to 5 meters below the invert of the proposed tunnel. The objective of this survey is to detect any cavities or broken or collapsed subsurface strata, so that any such cavities or strata can be treated to allow tunnel construction. The general requirements and specification for the geophysical survey are as follows:
  - 1. The survey shall be applicable to depths greater than 8m from existing ground level to invert of pipe.
  - 2. The survey shall provide information on both lateral and vertical extent of subsurface conditions together with the identification and classification of the geophysical materials in the subsurface sequence within the targeted depth of investigation. The information provided is to include details on likely size, depth and character of the features interpreted.
  - 3. The geophysical survey and all associated works shall only be carried out by specialist companies approved by ADM.
  - 4. Before commencement of the survey, the Contractor shall submit the anticipated calibration work required to fully assess and interpret the geophysical survey, and confirm his acceptance that the objectives of the survey are achievable.
  - 5. The geophysical survey technique to be used is that of resistivity