Control of trenchless works carried out by non-government utility undertakers affecting public roads (May 2008)

1. Scope

(a) Underground non-government utility works (tunnels, pipes, crossings, conduits, etc.) constructed using trenchless methods of excavation within unallocated government land and affecting public roads, under public roads, and/or within a horizontal distance from public roads equivalent to the ground cover of the works (hereafter referred to as "trenchless works"); and

(b) Trenchless works where the diameter of the excavation for the tunnel/pipe/crossing/conduit/etc. is more than 1 metre.

2. Control Mechanism

The control requirements, given in paragraphs 3 & 4 here below, shall be imposed as conditions for approval and consent of any proposed trenchless works.

3. General Requirements

(a) The utility undertaker (UU) must employ a suitably experienced consultant and/or a contractor with sufficient resources to undertake the site investigation (SI), design and construction of the proposed trenchless works, including site supervision. The consultant or the contractor shall employ an engineer, as the Designer, who shall be registered with the Engineers Registration Board in the Geotechnical or Civil discipline (and also in the Structural discipline if structural works are required), with a minimum of 5 years of experience in SI, design and construction of trenchless or underground excavation works.

(b) The UU must employ a professionally qualified and experienced consultant with sufficient resources to check the SI, design and construction of the proposed trenchless works. The consultant shall employ an engineer, as the Independent Checking Engineer (ICE), who shall be registered with the Engineers Registration Board in the Geotechnical or Civil discipline (and also in the Structural discipline if structural works are required), with a minimum of 5 years experience in the ground investigation, design and construction of trenchless or underground excavation works. The consultant shall have an acceptable quality assurance certification.

(c) The ICE shall certify that the SI, design, construction method statements/procedures, performance/risk control limits and measures, monitoring and site supervision plan (SSP) for the proposed trenchless works are satisfactory and meet all required standards.

(d) The ICE shall be responsible for inspecting/auditing the site works during construction and for ensuring that appropriate and timely actions are taken to prevent and mitigate risks to public life and property.

4. Submissions and Technical Standards

(a) The design of the SI and trenchless works and associated temporary works shall be undertaken by the Designer. The design shall comply with all relevant geotechnical standards listed in GEO TGN 1 and recognised structural standards. The design and construction method shall ensure that the trenchless works will not cause road settlement greater than 12mm over every 10m. If the Designer considers this road settlement limit is not applicable to the particular conditions of the trenchless works and/or the concerned road, the Designer shall carry out a risk assessment to review and justify any revised settlement limit so required.

(b) The Designer shall make a design submission to the ICE for checking. The submission shall include a plan showing:

(i) all proposed works (including any excavation, ground support, ground treatment and groundwater control) incorporating the findings, recommendations and requirements in the report prescribed in sub-paragraphs (IV) below;

(ii) existing nature of the site (including an accurate survey plan with ground level contours, road levels, geological conditions, groundwater conditions and surface water conditions) and details of streets, structures, foundations, public utilities and other services;

(iii) a schedule of geotechnical design assumptions;

(iv) sequence of the proposed works and the methods to be employed, highlighting the critical stages;

(v) particulars of monitoring to be carried out for sensitive receivers, ground and sub-surface movements and vibrations, and variations in piezometric levels;

(vi) schedule of submitting reports to the ICE and contents of each kind of reports; and

(vii) a Site Supervision Plan which shall include details of the Category A and B site supervision personnel, who shall meet the following requirements:

- **Category A –** Inspections by the Designer or his representative, at twice weekly intervals or more frequently if necessary during the critical stages of the works, to inspect and review the site works, make design amendment submissions for the ICE to check (should there be any significant changes in the design and/or working procedures), and prepare and submit site inspection/design review reports to the ICE, at the frequency specified. The Category A supervisor, if not the Designer, shall possess the same minimum qualifications and experience as the Designer. The

Category A supervisor should be available at all hours to deal with any emergency incidents that arise from the works.

- **Category B –** Full time supervision, by suitably experienced persons, to ensure that inspections and checks on compliance with drawings, specifications or working procedures are carried out effectively. The personnel acceptable for Category B supervision should possess a minimum of a higher certificate/diploma in civil/structural/geotechnical engineering and 2 years relevant site experience with trenchless works.

The plan shall be accompanied by supporting documentation, including:

(I) a report containing the results of a study including topography, geology, groundwater, surface water, site history, public utilities, other services and geotechnical records;

(II) a report containing the results of site investigation and laboratory testing;

(III) a report containing the results of site monitoring of the sensitive receivers and groundwater conditions;

(IV) a report containing the critical examination and interpretation of the reports in sub-paragraphs (I), (II) and (III) above, a schedule of the geotechnical assumptions, discussion of anticipated geotechnical problems and construction method related risks, risk assessment and management strategy, an outline of variations of the works and construction procedures which should be adopted if, during the carrying out the works, a geotechnical design assumption is revealed to be erroneous so that there is an unacceptable level of risk to public life and property, and containing geotechnical requirements for the design and construction of the works including inspection, monitoring and testing requirements; and

(V) analysis sufficient to demonstrate that the works can be undertaken safely, design calculations for the proposed works, calculations of the effects of the works on groundwater conditions, the site and any structure, street, land or service, and calculations for and consideration of all other relevant geotechnical matters.

(c) When applying for approval from Highways Department (HyD) to undertake the trenchless works, the UU shall submit the CV of the Designer and the ICE, and details of its consultants and contractor to HyD for record. The submission shall include a confirmation of employment each issued by the ICE and the Designer. Prior to commencement of construction, the UU shall also submit to HyD a Design Checking Certificate covering the works, a copy of the certified design submission and SSP, all certified and agreed by the ICE.

5. Construction Control

(a) During construction, the ICE shall ensure that either the UU or the Designer submits to him the Category A supervisor's reports on the works at the times specified. The reports shall document the site inspection observations, design review and design amendments made, and a review of the ground investigation, inspection, monitoring and test data obtained during construction. Relevant data and site records should be included in the reports. The ICE shall carry out site inspections to confirm the adequacy of the design review and risk control action taken, at least once a week or more frequently if necessary during the critical stages of the works. He shall submit copies of the Category A supervisor's reports to HyD together with his own inspection report. The ICE should be available at all hours to notify HyD and deal with any emergency incidents that arise from the works.

(b) During construction, the ICE shall ensure the trenchless works will not cause road settlement affecting the safe usage of the roads. If the safe usage of the roads is affected, the ICE should recommend and the UUs should stop the trenchless works immediately and the ICE shall ensure the Designer to review the design and risk control action.

(c) Upon completion of the trenchless works, the ICE shall carry out a site inspection and, if necessary, recommend remedial works that need to be carried out to restore the site to a satisfactory condition, before certifying completion of his checking of the works. The ICE shall confirm, in writing, to the UU and HyD, that his checking of the site works has been completed and the site has been restored to a satisfactory condition, and submit copies of any outstanding Category A supervisor's reports for record at the same time.

6. Enforcement

(a) HyD shall enforce the control requirements and in coordination with LandsD if required to take appropriate enforcement action in the event that the submission requirements, standards, agreed plans or procedures are not followed and/or the works result in damage to property or injury to members of the public.

(b) HyD together with the Geotechnical Engineering Office of CEDD may carry out site audits of the trenchless works. The UU shall make suitable arrangements and provide all assistance to facilitate these audits when requested to do so.