PARTICULAR SPECIFICATION

APPENDIX U

CONDITION SURVEY OF STRUCTURES

CONDITION SURVEY OF STRUCTURES

1 INTRODUCTION

The Condition Surveys shall be carried out on all structures within Influence Zone.

2 SCOPE OF SERVICES

2.1 The services to be provided shall include but not limited to the following:

a. Pre-construction condition survey and assessment

b. Post-construction condition survey and assessment

2.2 The pre-construction condition survey and assessment, and post-construction condition survey and assessment shall be carried out in accordance to the zones indicated. The Contractor shall carry out pre-construction condition surveys before major construction works on site and any change in proposed schedule shall be agreed with the Engineer. The Contractor shall carry out post-construction condition surveys within the period as agreed between the Engineer and the Contractor.

2.3 The Contractor shall appoint a Professional Engineer to carry out the pre-construction condition survey and assessment, and post-construction condition survey and assessment.

2.4 The Contractor shall submit a list of structures to be surveyed within the zones indicated.

2.5 During the post-construction condition survey, the Contractor shall assess the extent of effect to the structures and buildings as a result of tunnelling, excavation or any underground works. These findings shall be incorporated in the post-construction condition survey report.

2.6 Reports

2.6.1 All reports submitted by the Contractor shall be duly signed and endorsed by a Professional Engineer.

3 EXTENT OF CONDITION SURVEYS

3.1 All existing structures located within the zones are considered for inclusion in the Contract. Any structure that ‘straddles’ the boundary line shall be surveyed as a unit, and is considered to be within the Contract limits.

3.2 All the structures to be surveyed shall include, but not limited to buildings (including surrounding retaining walls, boundary walls, all external works and any structures associated with the building), bridges, viaducts, roads, tunnels, underpasses, car parks, canals, box culverts, lined drains, sumps, and linkways, etc. All the structures included in the survey corridor are to be verified on site by the Contractor.

3.3 For structures that are under construction during the Contract period and considered not reasonably possible to be surveyed in time, the Contractor may defer such works until such a time before the expiry of the Contract. The Contractor may defer such works to a later date as agreed by the Engineer..

3.4 For structures that have been demolished or under demolition at the time of tendering, such structures shall be verified by the Contractor on site during tendering stage and may propose to omit the condition survey subject to Engineer's approval.

3.5 For structures that:
a. exist during the time of tendering; or
b. under construction during the time of tendering; or
c. knowledge that the structures are to commence construction at the time of tendering;

such structures shall be verified by the Contractor on site during tendering stage and shall not constitute an addition to the Contract.

3.6 There may be some structures where knowledge to commence construction are unknown at the time of tendering. The Contractor is under the obligation to inform the Engineer should such structures be discovered in the course of the Contract. The Engineer shall have the right to order these additional services which the Contractor shall perform.

3.7 Additional Condition Survey

For additional condition survey of the same structure carried out during the construction phase of the Contract, the Contractor shall take photographs from the same angle, wherever possible, describe and highlight the change in the condition compared to the survey previously carried out for the structure.

4 SPECIFIC REQUIREMENTS

4.1 None

5 GENERAL REQUIREMENTS

5.1 Programme

5.1.1 The Contractor shall prepare a programme for the pre-construction and post-construction condition surveys and assessments. The Contractor shall agree with the Engineer on the structures that are to be given priority

5.1.2 The programme shall be sufficiently flexible to allow for any additional surveys that may become necessary as work progresses. Close liaison with the Engineer shall be maintained to ensure that the pre-construction and post-construction condition survey and assessments are completed on schedule.

5.2 Notice to Owners and Access

5.2.1 All notices to the owners of structures for permission to carry out pre-construction and post-construction condition surveys shall be issued by the Contractor. The Contractor shall notify the Engineer in writing of his intention to carry out a survey of any structure at least six (6) weeks prior to the date when he requires access to that structure and shall obtain prior approval from the Engineer before entering the premises and before carrying out any tests or installations.

5.2.2 The Contractor shall be responsible for making all arrangements for access. A suitable pass will be issued by the Contractor to survey personnel to establish their right to enter structures or lands for the purpose of carrying out the condition surveys. The Contractor shall only enter structures or lands to carry out the condition surveys when they have obtained permission from the property and/or land owners.

5.3 Survey Requirements

5.3.1 Surveys shall be carefully carried out having due regard to the fact that the survey records will be used as factual evidence in assessing claims for property damage. In particular, the dates on which descriptive and visual records of structure conditions are made must be such as to be verifiable.

5.3.2 The condition of each structure shall be determined by visual inspection. Photographs, measurement of representative cracks of structural members, and detailed written records shall be taken for:

a. Any visible cracks or spall in the concrete, with dimensions;

b. Degree of water ingress through cracks;

c. Any visible signs of corrosion of the reinforcement;

d. Evidence of previous repairs to the structures; and

e. Other defects.

This process shall be carried out on a logical basis of all accessible parts of the structure, internally and externally. The degree of detail of the inspection shall depend on the particular type of structure. The Contractor shall classify the structures to be surveyed according to the type of construction, age, height, foundation, and rate it according to its likely susceptibility to damage etc. The basis of ratings shall be proposed by the Contractor for the acceptance by the Engineer.

5.4 Photographs

5.4.1 Photographs taken for all condition and foundation surveys shall be as follows:

a. Each photograph shall clearly show all the necessary details intended to be shown and as described in the report;

b. Details of cracks/defects shown in the photographs shall contain a graduated scale;

c. For pre-construction condition survey, digital photographs (high quality, minimum 4 mega-pixel, size 4R and dated) shall be presented, annotated and submitted in bound volumes together with the softcopy;

d. For post-construction condition survey, digital photographs (high quality, minimum 4 mega-pixel, size 4R and dated) shall be presented, annotated and submitted in bound volumes.

In the event that the photographs are of a quality unacceptable to the Engineer, they shall be retaken at the Contractor's own cost.

5.5 Schedule of Condition of Structure

5.5.1 The report shall include, but not limited to, the following:

a. Name of the structure

b. Postal address

c. Use of structure, e.g., residential, commercial, etc.

d. Type of construction, e.g., number of storeys, steel frame building, etc.

e. Foundation type, size and depth (including sketches)

f. Cladding

g. Age

h. Condition of structure:

Detailed description together with photographs including particulars such as the type or quality of finishes in the areas likely to be affected by tunnelling, excavation, vibration or underground works or vibration.

Detailed description of existing defects with detailed measurements, observation of cracks, verticality, history of previous repair, location and type of strengthening measures adopted.

i. Location plan to identify areas described

j. Susceptibility to damage due to tunnelling, excavation, vibration or any underground works

k. Proposed monitoring

5.6 Condition Surveys

5.6.1 The post-construction condition surveys shall be carefully carried out to determine the condition of the structures within the time frame agreed by the Engineer and Contractor. Any visible damage shall be recorded and reported to the Engineer.

5.6.2 The Contractor will not be required to carry out precise level monitoring surveys, but he shall, however, advise and assist the Engineer in the choice of locations and type of reference points to be installed.

5.7 Scope of Condition Surveys of Buildings

5.7.1 The scope of surveying buildings shall be classified as follows:

a. Type A Buildings

These are generally less than five (5) storeys. The extent of the survey shall be as follows:

(i) All areas for all the floors shall be surveyed
(ii) All exterior walls including façade and common areas (including interior walls) for all floors

b. Type B Buildings

These are generally five (5) storeys and above, and are not in a greatly dilapidated condition. The extent of the survey shall be as follows:

(i) All areas on the 1st storey and basements (if any).
(ii) All exterior walls including façade and common areas (including interior walls) for all floors above 1st storey.

For Types B Buildings, the Contractor may make recommendations to the Engineer for additional surveys (if required in his opinion) to be carried out for floors above the 1st storey. The Engineer will decide whether these additional surveys would be carried out.

5.8 Structures In the Zone of Influence

5.8.1 The Contractor shall note that other miscellaneous and ancillary structures like retaining structures, drains/culverts, road pavements, sumps, covered linkways / linkways, bus shelters, fire hydrants, playgrounds, sport facilities, carparks, gantries, driveways, electrical boxes, ATM kiosks and any other minor structures that are not shown on the Drawings are deemed to be included under the scope of the Contract and deemed to have been priced by the Contractor in the Contract Price.

6 REPORTS

6.1 The Contractor shall prepare written comments on every structure or a group of structures/buildings (if they are linked) surveyed. He shall furnish the Engineer an original report with colour photographs and an additional five (5) bound copies (including colour photographs) all duly signed and dated upon completion of the survey of that structure together with one soft copy of Report and photographs. For post-construction condition survey reports, all colour photographs shall be printed in photo quality ink jet paper. For the pre-construction condition survey reports, manual colour photographs have to be attached in the original report but photographs printed in colour through the scanned soft copies of the original report could be used for the additional five (5) bound copies.

6.2 The report shall detail the type of structure concerned, the foundation and structural records, etc. The Contractor shall submit the Draft Report to the Engineer for approval prior to the submission of the Final Reports.

6.3 In addition to the original condition survey report and five (5) copies to be submitted to the Engineer, the Contractor shall also prepare one (1) additional copy of the report for each structure to be issued to the individual owner. For survey of HDB residential/industrial blocks, two (2) additional copies should be prepared for issuance to Housing and Development Board (HDB) and respective Town Councils. The Contractor is not required to issue one (1) copy of the said report to each individual HDB residential household unit.

6.4 The information in the pre-construction condition survey and post-construction condition survey reports shall be stored in CD-ROMs and be given to the Engineer. The information, drawings and colour photographs taken in digital format in the CD-ROMs shall be in the following format (xls, doc, pdf, jpeg, tiff, wmf, dxf, dwg, and dgn). The cost of these CD-ROMs and all associated works shall be deemed to be included in the Contract Price.

6.5 In addition, the Contractor shall also develop and provide the Engineer with a computerised tabulation of the below details for ease of retrieval of the reports. All related reports, referenced drawings and photographs shall be linked to this computerised tabulation.

a. Contract No.
b. Structure Ref. No.
c. Type of Structure
d. Structure Name
e. Owner Name
f. Structure Address if applicable
g. Foundation Assessment Report No.
h. Pre-construction Condition Survey Report No.
i. Post-construction Condition Survey Report No.

6.6 All Compact Discs shall be securely labelled and clearly marked with:

a. The Project title
b. The Contract No.
c. The Stage of Survey
d. The date of issue to the Authority
e. The name of the Contractor
f. The unique issue sequence number (CD No)

6.6.1 If more than one disc is required, then each shall be clearly labelled to indicate the order in which the Engineer should read the reports. The unique sequence number shall run sequentially from the start of the Contract.

6.6.2 All data files shall be checked using a recent proprietary anti-virus program for viruses before issuing.