



## **BOARD OF ENGINEERS MALAYSIA**

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### **CIRCULAR NO. 011**

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### **SCOPE OF WORKS, ROLES AND RESPONSIBILITIES FOR ACCREDITED CHECKER**

This Circular defines the scope of works, roles and responsibilities of the Accredited Checker (AC) registered with the Board of Engineers Malaysia (BEM). This Circular can be read in conjunction with Circular No. 010 “Circular for Checking / Reviewing the Work of Another Engineer” but this circular defines more detailed scope of works, role and responsibilities of AC.

#### **1.0 INTRODUCTION**

The need for checking and checkers have long been recognised. The Street, Drainage and Building Act 1974 (Act 133) has already provision under Section 70B for ‘review’ by a second qualified person where the local authority reasonably suspects that defects, deformation or deterioration in the structure of a building under erection may result in failure. The local authority may issue to the owner of the building and order to review the safety and stability of:

- a. The building;
- b. The foundation of the building; and
- c. The surrounding and which the erection of the building is in progress.

Act 133 was amended again in 2018 under Section 70(2)(c) to require any person who intends to erect any building shall cause to be submitted by Principal Submitting Person or Submitting Person (SP) to the local authority or the relevant statutory authority a geotechnical report for the erection involving slope with a gradient more than twenty-five degrees and total vertical height more than ten meters which the report shall be verified by the AC registered with the BEM under the Registration of Engineers Act 1967 (Act 138).

The introduction of AC in the amended Registration of Engineers Act (REA) of 2002 is to reinforce the need for public safety in tandem with therapid advancement in engineering – especially after the collapse of Block 1 of Highland Towers. Currently AC only cover two areas, namely Structural (e.g. high rise buildings but exclude bridges) and Geotechnical (e.g. mainly slopes and retaining walls). The AC scope of works are on checking of the Permanent Works designed by the SP (Professional Engineer with Practising Certificate (PEPC)).

AC have been performing their duties under appointment either by the Local Authorities, Government Departments or Private Companies for various projects especially for mega size, technically challenged and complicated projects. It is important to properly define the scope of works, role and responsibility of AC so that a systematic application and comprehensiveness approach of the above can be adopted by the Clients and engineers.

**Definition:**

AC is a PEPC who is accredited by BEM by virtue of his specialization as per Section 10B of REA. It stipulated under Act 133 Street, Drainage and Building Act 1974, AC shall verify the geotechnical report and to be submitted to the authority.

Other than stipulated under Act 133, PEPC possessing equivalent experience and of appropriate discipline can carried out checking/reviewing works as per client's requirement. Table A (Table of Guideline) of Circular No. 010 indicates the check/review stages and other relevant information.

## **2.0 ROLE AND RESPONSIBILITY OF ACCREDITED CHECKER**

The main role of AC by virtue of their specialised knowledge is to check all aspects of designed Permanent Works by another PEPC (e.g. Design Consultant / SP of the Project) (herewith called the "Design Consultant") that are submitted to them for checking with particular reference to the safety of the Permanent Works. The Design of Permanent Works includes calculations, analyses, design, drawings and specifications of the Permanent Works (herewith referred to as the Design).

The works of AC will be based on the documents provided including the Design of the Permanent Works (includes calculations, analyses, design, drawings and specifications of the Permanent Works) submitted by the Design Consultant. AC shall highlight any missing or inadequacy in Permanent Works Design to the Design Consultant for him to reconsider in delivering the final design.

Checks are to be carried out independently of the Design Consultant work, and the AC should include in his report his observations and/or suggestions for amendments and/or alternative solutions on designs consistent with his terms of reference and the prevailing standards, codes, and local bylaws and regulations.

An AC shall take full responsibility for the integrity, thoroughness of his report and recommendations in a competent manner based on his independent analyses, designs and experiences for the Permanent Works Design (covers analyses, design, calculations, drawings and specifications) that has been independently checked by him including independent analyses and independent design.

The AC scope of works does not include checking on the Design of Temporary Works during construction. As the area and scope of checking are wide and extensive, the matters to be checked should be carefully specified in the terms of reference of the assignment.

Any failure of the permanent works due to the weakness or error in the Design (covers analyses, design, calculations, drawings and specifications) which has been checked, accepted and endorsed by AC, then both the Design Consultant and the AC shall be jointly responsible and liable.

The client would need to evaluate and decide whatever to implement the recommendations/observations of the AC, and the next course of action to be taken shall be done as specified in Circular No. 010.

Hence it is important for AC to carry out his work with due skill, care and diligence so that the concepts, recommendations, designs, drawings or observations recommended by him on the Design of Permanent Works will be subsequently incorporated into the works and will later be re-submitted to AC for approval.

On the issues of safety and stability to prevent failure or defects of the Permanent Works; in the event that the Design Consultant disagree with the comments and recommendations by the AC and refuses to change or amend accordingly then it is the responsibility of the AC to highlight timely and clearly to the Client so that proper and timely decisions can be made by the Client. After the AC has highlighted the weakness or errors in the Design of the Permanent Works to the Client and the Design Consultant, but the Design Consultant still refuses to change the design, then AC shall not be held liable for the Design if it fails or becomes defective. On the contrary, the Design Consultant shall be solely responsible and liable for the failures or defects due to his refusal to follow the advice of AC.

### **3.0 SCOPE OF WORKS OF ACCREDITED CHECKER**

The scope of works of AC are divided into two stages namely :

Stage (I) : Compulsory Scope in Pre-Construction Stage

Stage (II) : Extended Scope in Construction Stage

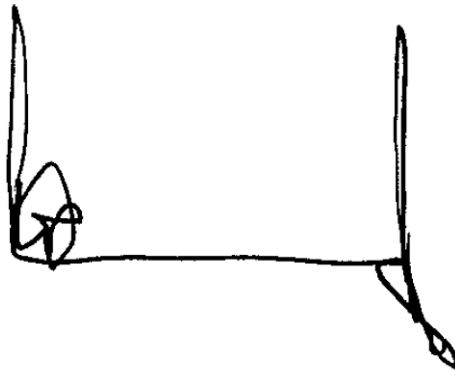
#### **3.1 Stage (I) : Compulsory Scope in Pre-Construction Stage**

The scope of works for AC are commonly and generally include independent checking of the Design of Permanent Works in the Pre-Construction Stage which means starting from planning, conceptual design, preliminary design, detailed design, tender drawings, specifications and tender technical clarifications. The Stage (I) shall be completed upon award of contract and upon starts of construction at site. The recommended scope of service for Stage (I) are in Appendix A and B for structural and geotechnical works respectively.

### 3.2 Stage (II) : Extended Scope in Construction Stage

The Stage (II) scope of works is not commonly included in the works of AC. However for some projects, the Client or Authorities may wish to extend the scope of works of AC to include Construction Stage thus it is an extended scope of works. In Stage (II), the AC responsibility is to check for any changes or updates to the Design of the Permanent Works only starting from award of contract until completion of construction. The AC scope of works exclude check on Design of Temporary Works and Supervision.

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**DATO' Ir. HAJI MOHAMAD ZULKEFLY BIN SULAIMAN**  
President  
BOARD OF ENGINEERS MALAYSIA

## ATTACHMENT A

### SCOPE OF SERVICES OF ACCREDITED CHECKERS FOR STRUCTURAL WORKS

The Accredited Checker for Structural works in Buildings shall check the design intent of the Consultant's structural design intent of the Consultant's structural design on Permanent Works with particular reference to the technical adequacy, constructability, long-term serviceability, and compliance with the relevant legislation, codes of practice, standards and approved design guidelines. It should also include independent interpretations and calculations for critical elements of the project's permanent works.

The Tasks\* for the Accredited Checker shall be on Structural permanent works which include the following:

- (a) Check on the use of the relevant Codes of Practice in the design of the building for both superstructure and substructure. Substructure shall be basement structural elements, pile cap, footing & ground beam (excluding piling).
- (b) Check the standards and specifications of materials to be used in the building works for both substructure and foundations.
- (c) Check the design load criteria for gravity loads, lateral and any other load acting on the structure. Identify the load path.
- (d) Check the relevant factor of safety in the design load.
- (e) Verify the structural design concept adopted in the superstructure and substructure. Identify and check key structural elements.
- (f) Verify that the key structural element sizes of the superstructure and substructure are consistent with the layout drawings.
- (g) Perform independent calculations to determine the adequacy of the key structural elements of the building, including its substructure.
- (h) In addition, to carry-out random calculation checks onto the typical structural element such as slab and beams. Check for both ultimate and serviceability limit states (i.e. deflection and deformation).
- (i) If analysis and elemental design are carried-out with the aid of engineering software, the design assumptions, design parameter, input data and relevant output data should be stated.
- (j) For tall and slender structures, determine the necessity for a dynamic analysis for wind loads and seismic loads where applicable.
- (k) For long span structure, check the acceptance deflection limit (serviceability limit state). This is in addition to check on its ultimate limit design i.e. bending and shear.
- (l) For cantilever structure, check the deflection limit and detailing (serviceability limit state). This is also in addition to check on its ultimate limit states.

- (m) For Transfer structure (either beam or slab), detailed check shall be carried-out for both its ultimate and serviceability limit states.
- (n) Check the overall stability of the building against lateral loads and its acceptance criteria adopted by the designer to ensure that the horizontal drift and acceleration is within the limits for the comfort of the occupants, and shall be in accordance with relevant codes of practices.
- (o) Check that the structural design detailing of the key structural elements including its substructure are in compliance with the design intent and are in accordance with good and standard engineering practice.
- (p) Check all key structural elements of the building to be constructed/erected and ensure that their design intent is in place and is not adversely affected by the construction sequence or methodology specified by the design consultant.
- (q) Check the adequacy of other aspects of the design which are peculiar to the building to be constructed/erected and which are essential to the structural integrity of the building.
- (r) Check the structural design for the substructure works to ensure that it is practical and viable so as to minimize potential damage to adjoining properties during the construction of the proposed building.
- (s) In carrying-out the check, Accredited Checker is allowed to make necessary comment on the overall or elemental design if they are over provided for possible optimisation to be considered by the design consultant.

## ATTACHMENT B

### SCOPE OF SERVICES OF ACCREDITED CHECKERS FOR GEOTECHNICAL WORKS

The Accredited Checker for Geotechnical shall check the suitability and adequacy of the Consultant's design on all permanent works of geotechnical engineering design with particular reference to technical adequacy, constructability, short term and long term safety and serviceability including that of the adjacent properties, and compliance with the relevant legislation, codes of practice, standards and guidelines. It should also include independent interpretations and calculations for critical elements of the project's permanent works.

The Tasks\* for the Accredited Checker shall be on Geotechnical permanent works which include the following:

- (a) Check the site mapping, topography and geomorphology of the site and adjacent areas.
- (b) Check the geological implication on the design.
- (c) Check the adequacy of the surface and subsurface investigations including laboratory tests carried out for the proposed development.
- (d) Check the interpretation of surface and subsurface investigation including subsoil profiles.
- (e) Check all the assumptions, interpreted and selected design soil/rock parameters and groundwater conditions.
- (f) Check the geotechnical analyses and designs of permanent slopes:
  - (i) Slope terrain classification
    - Zoning of slopes at the site and adjacent sites (if there is an influence on the site) into different classes in accordance to authorities' requirements.
  - (ii) Slope stability analyses of existing, natural and engineered cut and fill slopes. Various failure modes shall be checked including relevant surcharge loads etc.
  - (iii) Exposed rock slopes should include detailed rock mapping and kinematic analyses.
  - (iv) Detailed analyses and design of strengthening works for soil and rock slopes (e.g. soil nails, rock bolts, dowels, etc.) with recommendations for regular monitoring and maintenance.
  - (v) Effects on surface and ground water and the provision of adequate drainage measures.
  - (vi) Effects on adjacent properties if the proposed works have influence on the safety and serviceability of the adjacent properties (e.g. dewatering, excavation, rock blasting, etc.) Check on proposed mitigating measures.
- (g) Check the geotechnical analyses and designs of foundations:
  - (i) Suitability of the types of foundation systems proposed.
  - (ii) Detailed analyses and designs of the foundations including bearing capacity and deformation predictions (both short term and long term).
  - (iii) Foundation testing programmes.

- (h) Check the geotechnical analyses and designs of Retaining Walls:
  - (i) Suitability of the types of retaining wall systems proposed.
  - (ii) Detailed analyses and designs of the retaining walls including internal and external stability of the wall.
  - (iii) Deformation prediction (both short term and long term) and its influence on the surrounding structures, services and slopes.
- (i) Check the Specifications for all Geotechnical Permanent Works.
- (j) Check the construction control measures to be implemented at site. (e.g. instrumentation, monitoring scheme, turfing etc.) for all Geotechnical Permanent Works.
- (k) Check the adequacy of the supervision programme proposed by the Consultant for works such as subsurface investigation (S.I.), earthworks and all geotechnical works.
- (l) Check the long-term maintenance programme of the slopes and retaining walls (such as the maintenance of slopes, permanent ground anchors, drainage and weepholes).
- (m) Check the adequacy of instrumentation and monitoring program criteria for monitoring results and actions required.
- (n) Check the construction method proposed by the Design Consultant for Geotechnical permanent works in relation to the design assumptions and approaches.
- (o) Perform independent calculations with the view to determine the adequacy of the key elements of the project including slopes, retaining walls and foundations. If calculations on analysis and elemental design are done with the aid of engineering software, the design assumptions, and limitations of such software should be ascertained and stated. The design parameters, which are the computer inputs should be checked.
- (p) In carrying-out the check, Accredited Checker is allowed to make necessary comment on the overall or elemental design if they are over provided for possible optimisation to be considered by the design consultant.

**\*NOTE: Amend the Tasks as appropriate, to suit the particular works for which the Services are required and add other Tasks as necessary.**