



Development Bureau

The BES(E) GUIDELINES

THE GUIDELINES FOR DESIGN REVIEW AND
IMPLEMENTATION OF BUILDABILITY EVALUATION SYSTEM
FOR PUBLIC ENGINEERING WORKS PROJECTS

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1.0 Introduction

1.1 Background

To further promote the initiative of “design for buildability” after the promulgation of Buildability Evaluation System under Development Bureau (“DEVB”) Technical Circular (Works) (“TC(W)”) No. 6/2018, DEVB conducted a research study on developing a quantitative buildability evaluation system for public engineering works projects (BES(E)) with a view to improving the design buildability and project performance. The BES(E) Guidelines are promulgated to set out the detailed criteria and procedures for departments to follow in assessing the design buildability of public engineering works projects.

1.2 Contents of the BES(E) Guidelines

1.2.1 The BES(E) Guidelines cover the following major areas:

- (a) Implementation plan;
- (b) Projects required for BES(E) assessment and design review;
- (c) BES(E) assessment;
- (d) Design review;
- (e) BES(E) maintenance and refinement; and
- (f) Sample provisions for consultancy agreements.

1.2.2 As the review on BES(E) will be constantly conducted, the BES(E) Guidelines will be updated from time to time.

1.3 Deviation from the BES(E) Guidelines

Unless otherwise specified in the BES(E) Guidelines, prior approval of the DEVB shall be obtained for any deviation from the BES(E) Guidelines to suit specific needs of individual projects.

2.0 Implementation Plan

2.1 Staged Implementation

The table below summarises the details of staged implementation of BES(E) assessment and design review:

Implementation Stage / Activities	Start date	Finish date
1. Stage 1 Trial		
(a) Collect project data from completed contracts ^(Note i) .	4 May 2020	31 Oct 2021
(b) Refine BES(E) assessment tool.		
2. Stage 2 Implementation:		
(a) Conduct BES(E) assessments and design review <u>without</u> passing score ^(Note ii) .	1 Nov 2021	28 Feb 2023
(b) Collect project data from contracts ^(Note i) .		
(c) Refine BES(E) assessment tool and establish benchmark scoring for design review.		
3. Stage 3 Implementation:		
(a) Conduct BES(E) assessments and design review <u>with</u> passing score ^(Note ii) .	1 Mar 2023	--
(b) Collect project data from contracts ^(Note i) .		
(c) Review BES(E) assessment tool from time to time.		

Note:

- (i) Types of public works programme (PWP) projects required for conducting BES(E) assessment and design review are detailed in Section 3 of the BES(E) Guidelines.
- (ii) Passing score which is established based on the data collected in Stages 1 and 2.

3.0 Projects required for BES(E) Assessment and Design Review

3.1 General

3.1.1 Public engineering works projects which are funded under the PWP, except Design and Build (D&B) projects, projects with substantial parts requiring contractor's design input¹ and projects entrusted to organizations outside Government (e.g. Airport Authority, MTR Corporation Limited, private developers etc.), and meet the requirements in this section are required to follow the procedures in Sections 4 and 5 of the BES(E) Guidelines for conducting BES(E) assessment and design review respectively and the requirements in Section 6 of the BES(E) Guidelines for making submissions to DEVB².

3.1.2 BES(E) assessment and design review for D&B projects and projects with substantial parts requiring contractor's design input will be considered at a later stage upon further consultation.

3.1.3 The procedures for review of preliminary design are covered in Environment, Transport and Works Bureau ("ETWB") TC(W) No. 19/2003. To promote early consideration on design for buildability, project teams are encouraged to take into account the list of items / aspects of the BES(E) assessment tool in conducting preliminary designs.

3.2 Stage 1 Trial

3.2.1 BES(E) assessments shall be conducted for works contracts with final contract values (or anticipated final contract values for substantially completed works

¹ Such as typical Building Services and Electrical & Mechanical (E&M) works projects which require the contractors to propose the detailed arrangements of the plants, equipment and materials for consideration and acceptance by the project offices and end users during the construction stage.

² The implementation of buildability evaluation system for vetting and monitoring design of building projects funded under Head 703 of the Public Works Programme shall refer to DEVB TC(W) No. 6/2018.

contracts) exceeding \$100M, which were completed / substantially completed on or after 2 May 2018.

- 3.2.2 The BES(E) assessment results are not required to be submitted to the Design Review Committee for review at this stage.

3.3 Stages 2 and 3 Implementation

- 3.3.1 For works contracts with tenders to be invited on or after 1 Nov 2021 and with estimated contract values (excluding the parts requiring contractor's design input, such as E&M works) exceeding \$100M, BES(E) assessment and design review shall be conducted prior to invitation of tender. The BES(E) assessment and design review will be subject to the passing score in accordance with Section 5.2.5 of the BES(E) Guidelines if tender for the works contracts concerned are to be invited on or after 1 Mar 2023; and
- 3.3.2 BES(E) assessments shall be conducted for substantially completed works contracts with anticipated final contract values (excluding the parts requiring contractor's design input, such as E&M works) exceeding \$100M, which are substantially completed on or after 1 Nov 2021 and without conducting any previous BES(E) assessment specified in Section 3.3.1 of the BES(E) Guidelines. These BES(E) assessment results are not required to be submitted to the Design Review Committee for review.

4.0 BES(E) Assessment

4.1 Assessment Teams

A summary table below shows the assessment teams to conduct the BES(E) assessments:

Type of Design	Self-assessment	Independent Assessment
Stage 1 Trial:		
Completed works contracts	Project team or Consultant	Another team independent of the Self-assessment Team, or Project team if self-assessment is conducted by consultant.
Stages 2 and 3 Implementation:		
In-house design	Project team	Another team independent of the Self-assessment Team
Design by consultant	Consultant	Project team
Completed works contracts	Project team or Consultant	Another team independent of the Self-assessment Team, or Project team if self-assessment is conducted by consultant.

4.2 Procedures for BES(E) Assessment

4.2.1 The BES(E) assessment tool and user manual are posted on the DEVB's website under the heading "*Buildability Evaluation System for Public Engineering Works Projects (BES(E))*" in the "*Publications*" section and will be updated from time to time as appropriate when reviews are conducted.

- 4.2.2 The assessment teams shall make reference to the user manual and the BES(E) Guidelines to conduct the BES(E) assessment. As far as practicable, the latest version of the BES(E) assessment tool shall be used in conducting the BES(E) assessment.
- 4.2.3 Self-assessment and independent assessment shall be conducted separately by different teams as stated in Section 4.1 of the BES(E) Guidelines. For the avoidance of doubt, self-assessment and independent assessment can be conducted by two teams led by different Senior Engineers under the same project team.
- 4.2.4 Self-assessment Team shall provide necessary information and support to Independent Assessment Team for conducting the BES(E) assessment. For example, Self-assessment Team may share with Independent Assessment Team basic information, such as project background, design considerations, site constraints, works packages etc. for sake of a consistent BES(E) assessment. Nevertheless, to achieve independency, prior discussion between the assessment teams on the detailed BES(E) assessment should be avoided.
- 4.2.5 Upon completion of the BES(E) assessment, Self-assessment Team shall compare its BES(E) assessment result with the one conducted by Independent Assessment Team. If there are some items / aspects with largely deviated BES(E) Scores due to some misunderstandings on the basic information and / or some diverted views on the BES(E) assessment, discussion amongst the assessment teams can be conducted at this stage in order to resolve such misunderstandings and diverted views as far as practicable³.

³ Discussions should be conducted to resolve the following inconsistencies:

- (i) inconsistent input and assessment in Project Information Page and Modules 1, 2 and 4;
- (ii) individual item(s) in Module 3 with a difference of 10% in score shown in “% Gained” column in BES(E) assessment tool; and
- (iii) individual item(s) in Module 5 with a difference of 40 BES(E) Scores or more.

- 4.2.6 Self-assessment Team shall review its BES(E) assessment with due consideration of the views/comments offered by Independent Assessment Team. In case there are still some items / aspects with largely deviated BES(E) Scores unresolved after discussions between the assessment teams, they shall be properly recorded, including the views/comments of the assessment teams.
- 4.2.7 The BES(E) assessment shall be conducted with reference to the detailed design information.
- 4.2.8 In Stages 2 and 3 Implementation, the assessment result of Self-assessment Team, after consideration of the views/comments offered by Independent Assessment Team, shall be submitted by D1 officers or above to the Design Review Committee for review and approval prior to invitation of tender. In Stage 3 Implementation, invitation of tender can only be proceeded with when the BES(E) Scores reviewed by the Design Review Committee achieve the passing score or above in accordance with Section 5.2.5 of the BES(E) Guidelines, unless prior approval of Head of Department is obtained in accordance with Section 5.2.6 of the BES(E) Guidelines.
- 4.2.9 Project teams shall submit, including but not limited to, the following information to the Design Review Committee for reference and review:
- (a) Relevant information on detailed design (e.g. layout plans and design drawings) and the associated major design considerations and site constraints;
 - (b) Print-out of the completed BES(E) assessment and necessary supporting documents;
 - (c) Any items / aspects with unresolved BES(E) Scores as mentioned in Section 4.2.6 of the BES(E) Guidelines; and
 - (d) Any other documents that the project teams consider suitable for facilitating the review.

5.0 Design Review

5.1 Design Review Committee

The role of the Review Committee set up under ETWB TC(W) No. 19/2003 is expanded to cover the review of the detailed design and BES(E) assessment. The membership and terms of reference of the Design Review Committee are detailed in **Annex A** of the BES(E) Guidelines.

5.2 Procedures for Design Review

5.2.1 The Design Review Committee shall review the detailed design with due consideration of the “3S+ Principle” (i.e. “Standardisation”, “Simplification” and “Single Integrated Elements” plus the elements of project life cycle management and co-ordination), the fulfillment of design objective, cost effectiveness and the relevant issues on the action checklist in ETWB TC(W) No. 19/2003. Some references on the “3S concept” can be found in the “Good Examples of Design and Construction Practices for Enhancement of Productivity in Public Works Projects” available on DEVB’s website in the “*Publications*” section.

5.2.2 The Design Review Committee shall also review the BES(E) assessment for any room for buildability improvement. Particular attention shall be paid to the following:

- (a) Items / aspects in the Modules 1, 2 and 4 of the BES(E) assessment tool having inconsistent assessment as mentioned in Section 4.2.6 of the BES(E) Guidelines and/or not achieving full scores. Reference can be made to the key considerations in Appendix D of the user manual;
- (b) Items / aspects in the Module 3 of the BES(E) assessment tool, particularly for those with unresolved BES(E) Scores as mentioned in Section 4.2.6 of the BES(E) Guidelines, with low BES(E) Scores, and/or with comparatively high BES(E) Scores contributed by imposed conditions;

- (c) Buildability assessment in the Module 5 or the innovative design solutions, if any; and
- (d) Areas of design with significant decrease in BES(E) Scores when compared with the previous design, if any.

- 5.2.3 To facilitate effective communication, the Design Review Committee shall invite the project teams and / or consultants to attend the review meeting(s) and present their detailed design and BES(E) assessment.
- 5.2.4 The project teams and / or consultants shall review the detailed design and the BES(E) assessment by taking into account the comments provided by the Design Review Committee. If necessary, the project teams and / or consultants shall submit the revised detailed design and BES(E) assessment to the Design Review Committee for further review and approval. The project teams and / or consultants are encouraged to arrange the design review as early as practicable so as to early incorporate the comments of the Design Review Committee in the detailed design.
- 5.2.5 In Stage 3 Implementation, unless prior approval is obtained in accordance with Section 5.2.6 of the BES(E) Guidelines, invitation of tender can only be proceeded with when the BES(E) Scores reviewed by the Design Review Committee achieve a passing score of 700 or above. The Design Review Committee may require the project teams and / or consultants to provide supplementary information to facilitate the design review. If considered necessary, the Design Review Committee may require the project teams and / or consultants to review and revise the design with due consideration of the comments provided by the Design Review Committee in order to improve the buildability of the design and/or achieve the passing score of 700 or above.
- 5.2.6 Prior approval of the Head of Department should be obtained if the project teams wish to proceed with the tender invitations even if the BES(E) Scores are lower than the passing score after the design review by the Design Review Committee.

Justifications should be provided in seeking the prior approval. The project teams shall inform DEVB of the approval of Head of Department, providing relevant details of the contract and justifications for record purpose.

5.2.7 The passing score in Section 5.2.5 of the BES(E) Guidelines will be reviewed and updated from time-to-time upon receiving more project data.

5.2.8 After review by the Design Review Committee, if there are any changes in the design prior to invitation of tender which may substantially affect the buildability performance of the works contracts, the project teams shall conduct BES(E) reassessment on the revised design and submit the result to the Design Review Committee for review.

5.3 Workflow

A typical workflow for the BES(E) assessment and design review is attached at **Annex B** to the BES(E) Guidelines for reference.

6.0 BES(E) Maintenance and Refinement

6.1 Overseeing of BES(E)

6.1.1 Relative weightings are assigned to individual Modules / Items / Aspects of the BES(E). In Stage 1 Trial, these weightings are mainly determined basically by professional judgement.

6.1.2 Although the BES(E) assessment tool has been refined with reference to the data collected in the Stage 1 Trial and Stage 2 Implementation, the BES(E) assessment tool, particularly the relative weightings, shall be reviewed from time to time and suitably adjusted when more data are collected from completed public engineering works projects in order to make the BES(E) assessment tool more robust and suitable for benchmarking and serving as the basis for performance monitoring and tender evaluation.

6.1.3 A dedicated team in the DEVB is set up for maintaining and refining the BES(E). The main duties and responsibilities of the dedicated team are to:

- (a) collect/collate buildability data to establish benchmarks;
- (b) maintain the database of buildability for future analysis;
- (c) review the effectiveness of the BES(E);
- (d) refine the design and methodology of the BES(E); and
- (e) review and update the BES(E) Guidelines and relevant reference materials.

6.2 Collection of Project Data

6.2.1 To facilitate review and refinement, project teams shall submit the following project data to DEVB for reference:

- (a) Duly completed BES(E) assessment results after discussion with the Independent Assessment Team and review by the Design Review Committee (for detailed design), and the necessary supporting documents (in pdf format);
- (b) BES(E) assessment results (in MS Access format);
- (c) Approval of Head of Department, if any, obtained in accordance with Section 5.2.6 of the BES(E) Guidelines, together with the relevant details of the contract and the justifications;
- (d) The initial and latest approved / accepted construction programme;
- (e) Original contract sum and final contract sum (or anticipated final contract sum for substantially completed contract)
- (f) Final costs (or anticipated final costs for substantially completed contract) of individual works components shown in the BES(E) assessment tool;
- (g) A summary of instructed variation orders / implemented compensation events, including item descriptions and the corresponding time and cost implications to the contract;
- (h) A summary of valid claims including item descriptions and the corresponding time and cost implications to the contract;
- (i) Total manpower input (in man-day) of the contract (i.e. as referred to in the score card for assessment of site safety performance); and
- (j) Any other relevant information upon request.

6.2.2 For BES(E) assessments conducted on works contracts which were completed / substantially completed before the promulgation of the BES(E) Guidelines, project teams shall submit the project data listed in Section 6.2.1 of the BES(E) Guidelines to DEVB within 4 months after the promulgation of the BES(E) Guidelines. For BES(E) assessments conducted on works contracts which are substantially

completed after the promulgation of the BES(E) Guidelines, project teams shall submit the same project data to DEVB within 4 months after the substantial completion of the works contracts.

- 6.2.3 For BES(E) assessments conducted on detailed design which have been reviewed by the Design Review Committee, project teams shall submit the project data listed in Section 6.2.1 (a) to (c) of the BES(E) Guidelines to DEVB within 4 months after the invitation of tender and the remaining project data listed in Section 6.2.1 (d) to (j) of the BES(E) Guidelines within 4 months after the substantial completion of the works contracts.

7.0 Consultancy Agreements

7.1 Sample Provisions for Consultancy Agreements

For projects, except D&B projects and projects with substantial parts requiring contractor's design input, undertaken by consultants, sample provisions as shown below shall be included in the consultancy briefs for design and construction assignments invited after the DEVB TC(W) No. 6/2020 takes effect to incorporate the requirements of the BES(E).

[A new Section 6.2.8 has been added to "Typical Format on the Brief for a Design and Construction Assignment" in Appendix 4.6 of EACSB Handbook Revision No. 16 as below]

6.2.8 The Consultant shall follow the requirements stipulated in DEVB TC(W) No. 6/2020 and the BES(E) Guidelines to perform all tasks relating to the BES(E) assessment and design review for the Assignment. The tasks include but not limited to the following: -

- (i) Conduct the assessment (if required by the Director's Representative) in accordance with Section 4 of the BES(E) Guidelines;
- (ii) Provide all relevant information and support to the Director's Representative for conducting independent assessment under Section 4 of the BES(E) Guidelines, and design review under Section 5 of the BES(E) Guidelines;
- (iii) Discuss with independent assessment team (if required by the Director's Representative) under Section 4.2.5 of the BES(E) Guidelines to resolve any misunderstandings and diverted views on BES(E) assessments;
- (iv) Attend meetings invited by the Design Review Committee (if any) under Section 5.2.3 of the BES(E) Guidelines and present the detailed design and BES(E) assessment; and

- (iv) Review the detailed design and carry out design revisions to address comments of the Design Review Committee if required by the Director's Representative.

Design Review Committee**Terms of Reference:**

- (1) To ensure that designs are carried out properly and appropriately to meet design objectives and functional requirements.
- (2) To ensure efficient and cost effective designs within budget.
- (3) To ensure that design reviews together with the associated BES(E) assessments are properly carried out in accordance with the BES(E) Guidelines with a view to improving the buildability of the designs and achieving the passing score or above.
- (4) To review alternative designs, if any, which may improve the cost effectiveness of the designs.
- (5) To check that changes to the design subsequent to approval adhere to the same design policy and functional requirements.

Membership:

<u>Role</u>	<u>Post</u>
Chairperson	An officer not lower than D2 rank
Members	At least one officer not lower than D1 rank invited by the Chairperson from the project team; and at least one officer not lower than D1 rank invited by the Chairperson and who is not from the project team
Secretary	Project team or other team as directed by the Chairperson

Flow Chart of BES(E) Assessment and Design Review

