



Detailed Engineering Assessment (DEA) Guidance

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Disclaimer: this document remains a draft until national harmonized standards for detailed engineering assessments are approved

For Factory Owners

WHAT IS A DEA?

A Detailed Engineering Assessment (DEA) is a detailed structural engineering investigation and reporting of a building structure. A DEA is necessary when there is insufficient information and documentation on the building structure to determine the safety of the structure.

Intrusive or destructive assessment is expected to be used during this detailed assessment. This means that partial removal or destruction of some structural elements is necessary, for example taking a core out of a concrete column, removing soil for lab testing or removing finishes to see hidden/covered details.

Please note that:

- The factory should get approval from the DIFE Task Force before entering into a contract with any firm to conduct a DEA.
- The final DEA report must be approved by DIFE Task Force.
- No retrofitting work shall commence without approval from DIFE Task Force.

For more details about DEAs, please get in touch with your Labour Inspector.

WHEN IS IT REQUIRED?

A DEA is required when there is insufficient information and documentation on the building structure for the engineering consultants to determine the safety of the structure. During the preliminary assessment stage of a factory inspection, where insufficient data is available, the consultant will make engineering assumptions in order to provide an overall assessment on the structural safety of a building. An approved DEA will confirm the assumptions made during the preliminary assessment.

If your factory is required to undertake a DEA, this requirement will be clearly stated on your Structural Safety report. The report will also outline any other information that needs to be provided with regards to the factory.

WHERE DO YOU FIND ENGINEERS TO CARRY OUT DEAs?

A DEA *must* be carried out by a consultant or firm approved by DIFE. This is the list of approved firms:

	Name	Address	Managing Director
1	BD Technology	House #2 (1 st Floor), 15 New Beily Road, Dhaka-1000	Rifat Salman (CEO)
2	Bureau Veritas	Nur Empori (level 10), House #77, Road #11, Block-M, Banani, Dhaka-1213	Guido Dori (Managing Director)
3	Sthapona Consultants	House #1A (1 st Floor – East), Road #10, Nikunja-2, Dhaka-1229	Mehedi Hasan (CEO)
4	EIMS	126/3, Manipuripara, Tejgaon, Dhaka-1215	A.Hasan (Chairman)
5	Prudential Consultant	House #Monalee, Ga-40/5 & 40/5A, Japanese School Road, Shahjadpur, Gulshan, Dhaka-1212	Muhammed Abdul Malek (Managing Director)
6	Human Properties Ltd.	K-286, Salam Mention (1 st Floor), BIDD Road, Joydebpur, Gazipur	AKM Amir Hossain
7	Eclectic	House #180 (1 st Floor), Road #2, Baridhara DOHS, Dhaka-1206	Md. Asif Sarwar (Owner)
8	FASTBUILD	43/R-10 (Gr. Floor), Indira Road, Pamthopath, Dhaka	Mohammed Jewel (CEO)
9	Arko Consults	House #456, Road #31 (Gr. Floor), DOHS, Mohakhali, Dhaka	Hilton Das (CEO)
10	WASO Engineers & Consultants (BD) Ltd.	Tridhara Tower (3 rd Floor), 67 West Pantopath, Rasel Square, Dhaka-1205	Abdul Wadud (Managing Director)
11	d.zignscape Consultants Ltd.	House #193/A, Road #1, New DOHS, Moakhali, Dhaka	Sayedur Rahman (Director)
12	Benchmark Consultants	House# 1266, Road #10, Mirpur DOHS, Mirpur	Md. Moshir Rahman (CEO)
13	MAK Consultants	46, Kazi Nazrul Islam Avenue, Kawran Bazar, Dhaka-1215	Mynul Hossain (Managing Partner)

CARRYING OUT A DEA: WHAT ARE THE STEPS?

The following steps are necessary in having a DEA done:

1. Understand the content of your factory's Structural Safety report and the specific DEA requirements for the factory.
2. Prepare a request for quotation, based on the specific DEA requirements listed in your factory report. We strongly recommend that you receive advice from your Labour

Inspector and/ or Task Force before issuing any request for quotation to engineering firms from the approved list. The Task Force is a group of engineers reviewing reports and answering technical questions on behalf of DIFE.

3. Obtain approval from Task Force prior into entering contract with the selected engineering firm.
4. The consulting firm carries out the DEA and provides a draft report to factory owner. The consulting firm must consult with the Labour Inspector and Task Force to have the DEA finalised and approved.
5. Upon obtaining approval from the Task Force, issue a final copy of the DEA report to factory owner.

HOW TO PREPARE A REQUEST FOR QUOTATION?

A request for quotation shall be based on the specific DEA requirements set out within the factory's Structural Safety report. If assistance is needed, contact your Labour Inspector and/ or Task Force. Provide the consulting firm with a copy of the Structural Safety report so that they understand the building structure and what is expected of them to do.

For DEA Consultants

WHAT ARE THE ESSENTIAL INFORMATION THAT ALL DEAs MUST INCLUDE?

At the minimum, all DEAs must contain the following:

1. AS-BUILT DRAWINGS:

As-built drawing should be generated in order to concisely record the general arrangement of the building and size and location of the structural elements.

As-built structural drawing set should include:

- a. Foundation layout.
- b. Ground floor layout.
- c. First floor layout.
- d. Additional floor layouts for each additional suspended floor or mezzanine including beam and column schedule and existing super- imposed dead loading.
- e. Roof layout.
- f. Building elevations.
- g. Building sections.
- h. CAD softcopy of As-built should be submitted along with DEA.
- i. Scan Report of structural members with As Built Structural Drawings.

2. ENGINEERING TESTS:

a. Geotechnical investigation (if required)

Sufficient on site opening up to be carried out to test or investigate the foundation system, bearing levels, bearing capacities and condition of representative sample of elements below ground for size, corrosion and condition.

b. Concrete

Existing concrete strength should be determined using 100mm diameter concrete core to estimate strength capacity of all key structural elements. Areas where samples are to be taken from should be discussed with the Task Force and marked on the drawing. All samples are to be tested at BRTC, BUET or

UGC approved Universities. Follow ACI 562 to evaluate concrete strength from core test results

Reliance on rebound hammer result will not be accepted.

The use of CAPO testing can be considered in conjunction with core testing with the use of the correlation testing of concrete with reference to the aggregate type.

c. Reinforcement

The strength and type of reinforcement used in RC element should be determined by lab test.

Scanning of reinforced concrete element should be performed in order to determine the size/quantity/spacing of the reinforcement provided.

All soft copies of the test result should be submitted along with DEA.

d. Subsoil Investigation report

The subsoil investigation report must be submitted. Existing foundation shall be verified and adequacy shall be checked.

3. LOADING:

The structural assessment of the building should be initially considered based on the existing loading on the structure as observed during the survey. The assessment should consider the self-weight of all structural and non-structural elements (dead load) and all observed super-imposed dead loads including render, finished, floor build-ups, ceilings, equipment, water tanks etc.

Imposed loading on all floor (except roof) should be taken as a minimum of 2KN/m² as agreed by the National Tripartite Committee. However, if the imposed loads observed on site exceed this value (floor usage, storage etc.), the higher values should be used. Point loads due to heavy equipment should be considered where appropriate.

4. LOAD PLANS:

Load Plans for every floor shall be prepared that reflect the actual use of the factory including actual material and work product loads as typically stored at maximum density. Load plans will clearly show measured aisle widths and extent of loading areas. Load plans, duly approved by the Engineering Team shall be posted by the factory owner at each floor level. Storage areas shall be clearly marked to indicate maximum allowable stored height of typical stacked materials.

5. ANALYSIS:

A structural model of the building should be developed using an international recognized computer analysis package. A non-exhaustive list of suitable software is listed below:

- i. ETABS.
- ii. STAAD pro
- iii. Any other software used

The analysis based on as-built drawing should consider the vertical and lateral stability of the structure in accordance with BNBC 2006(Page -10584-1.9.1.1), as amended by the Tripartite Document.

Final analysis must show structural adequacy of all the members using concrete compressive strength/rebar strength of composite section (old/new concrete/rebar)

All soft copies of the analysis should be submitted along with DEA.

6. ADEQUACY OF THE MEMBER:

Consultants have to provide detail analysis of structural adequacy for the members and if they are not adequate with current loading conditions, detail retrofitting drawings should be provided.

HOW SHOULD THE CONCEPT DESIGN FOR REMEDIAL WORK OR RETROFITTING BE PRESENTED?

Where remedial or retrofit work is required, recommendation for further actions shall be presented as per the following guideline:

Provide options for recommendation to factory owners. At a minimum, the firm is expected to present two (2) concept design options for each solution proposed. Provide details such as expected cost, expected disruption to factory operation, longevity/ durability of solution and advantages/ disadvantages analysis for each option.

During the consultation period with the Task Force, take the opportunity to present each option to factory owners and seek confirmation on which option the factory owners will select. The final selection for recommendation shall be made by the factory owner, with approval by the Task Force of DIFE.

WHAT SHOULD BE INCLUDED IN YOUR DEA SUBMISSION?

The following documents are expected to be included in your DEA submission:

1. Hard copy of DEA signed by responsible or assigned Task Force, electronic scan version of the report, core test and reinforce test report, soil test report and all other details as required for DEA.
2. Retrofitting drawings and calculations with proper reference.
3. Soft copy of the DEA report, analysis file, drawings, test reports, and all other files as required for DEA.
4. CV of the engineer who signed the DEA
5. Trade license of the consulting firm (starting year and current year)
6. Company profile of the consulting firm

DRAFT

Colophon

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Department of Inspection for Factories and Establishments (DIFE)

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