SECTION 'A'

SCOPE OF WORK

Maharatna Company

Bharat Heavy Electricals Limited
Project Engineering Management
PPEI Building, Sector-16A
Noida-201301

1.0. Scope of Works

1.01. Determination and presentation of design earthquake parameters like magnitudes, hypocentral distances, peak ground acceleration etc. and construction of the ground motion history, design response spectra etc. by conducting site specific seismic study including a detailed write-up on the assumptions, basis of determination of ground motion parameters and characteristics, adopted risk levels and the attenuation laws and other equations used for the purpose of the study.

The response spectra curves (i.e. time period Vs spectral accelerations) shall be constructed for material damping values of 0.8%, 1.0%, 1.6%, 2%, 3%, 5%, 7% and 10%. The response spectra shall also be presented in a discretised tabular form to eliminate errors resulting from curve reading and to enable direct and consistent use of numbers by all users. The spectral values shall be correct to the third place of decimal and shall correspond to time periods ranging from 0.0 to 4.0 seconds at suitable intervals of time to represent the curves adequately. Time history of the design ground motion shall also be provided.

1.02. Detailed write-up on the regional geology, site geology and seismotectonic set-up of the site covering an area of not less than 200 Km radius around the project site. This should include the locations and magnitudes of all known earthquakes in the area

1.03. Geological structure model shall consist of following data;

(a) Large-scale plate tectonic exposure for the study area.
(b) Small-scale micro plates are to be described or excluded.
(c) Existing faults, dislocations, drops and lineaments in the deeper and shallower subsurface.
(d) Lithological as well as stratigraphic structures for the deep subsurface layers up to Holocene boundary.

Based on the information, a litho-stratigraphic 3D model of the subsurface shall be developed up to the Holocene boundary.

SECTION 'B'

PROJECT INFORMATION

`

PROJECT INFORMATION

1.	Owner	BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED,
2.	Project	2 x 660 MW MAITREE KHULNA-STPP
3.	No of Units	2
4.	Consultant	FICHTNER
5.	Location	The site is located approximately 14 km northeast of the Mongla Port and 14 km northwest of the Sundarbans, is infringed by the Passur and Moidara Rivers to the west and south east respectively. The project requires an area of approximately 500 acres.
6.	District	The site is located in Rampal Upazila of the Bagherat District in the Rajnagar Union
7.	Nearest Railway station	Khulna
8.	Nearest Airport	Jessore
9.	Nearest Seaport	Mongla
10.	Accessibility	Currently, the Site is accessible by boat and road.

`

SECTION 'C'

SPECIFIC TECHNICAL REQUIREMENT FOR SITE SPECIFIC SEISMIC STUDY

Maharatna Company

Bharat Heavy Electricals Limited
Project Engineering Management
PPEI Building, Sector-16A
Noida-201301

1.0. Scope of Works

1.01. Determination and presentation of design earthquake parameters like magnitudes, hypocentral distances, peak ground acceleration etc. and construction of the ground motion history, design response spectra etc. by conducting site specific seismic study including a detailed write-up on the assumptions, basis of determination of ground motion parameters and characteristics, adopted risk levels and the attenuation laws and other equations used for the purpose of the study.

The response spectra curves (i.e. time period Vs spectral accelerations) shall be constructed for material damping values of 0.8%, 1.0%, 1.6%, 2%, 3%, 5%, 7% and 10%. The response spectra shall also be presented in a discretised tabular form to eliminate errors resulting from curve reading and to enable direct and consistent use of numbers by all users. The spectral values shall be correct to the third place of decimal and shall correspond to time periods ranging from 0.0 to 4.0 seconds at suitable intervals of time to represent the curves adequately. Time history of the design ground motion shall also be provided.

1.02. Detailed write-up on the regional geology, site geology and seismotectonic set-up of the site covering an area of not less than 200 Km radius around the project site. This should include the locations and magnitudes of all known earthquakes in the area

1.03. Geological structure model shall consist of following data;

(a) Large-scale plate tectonic exposure for the study area.
(b) Small-scale micro plates are to be described or excluded.
(c) Existing faults, dislocations, drops and lineaments in the deeper and shallower subsurface.
(d) Lithological as well as stratigraphic structures for the deep subsurface layers up to Holocene boundary.

Based on the information, a litho-stratigraphic 3D model of the subsurface shall be developed up to the Holocene boundary.

2.0. General Requirement

2.01. All documented earthquakes in the study area shall be listed with their magnitude-height. A differentiation between the respective focal depth and the location of the epicenter (shallow or deep tremor) shall be considered. From the available seismic data, the energy values of the shear waves (maximum and average values) at the construction site shall be derived. Furthermore, the wave intervals between 4.0 s up to 10 min must be taken into account. Subsequently the thus obtained values must be transferred to the soil parameters.

2.02. BHEL is carrying out detailed geotechnical investigation at site. The soil parameters (bore hole data, shear wave velocity etc) based upon the detailed geotechnical investigation shall be furnished to the bidder.

Due to soft soil at site, ground improvement shall be carried out at site by BHEL at a later stage. The soil data after ground improvement shall also be furnished to the bidder. The design ground acceleration response spectra shall include the effect of ground improvement.

The design ground acceleration response spectra values and other design parameters shall be provided at following elevations considering the amplifications due to geotechnical conditions of the ground:-

2.02.1. Top of ground
2.02.2. 5.0 m below ground

2.03. The site specific seismic hazard assessment parameters shall be in line with the provisions of Bangladesh National Building Code (latest revision).

3. Documents to be submitted by vendor.

3.01. Five hard copies of report shall be submitted along with a soft copy on Compact Disc.

3.02. The report should also cover other pertinent details not specifically mentioned above but which are necessary for the completeness of the report. The report should include detailed guidelines for using the various seismic parameters, history of ground motion and the response spectra for the design of all power plant structures and equipment. Recommendations for the design of buildings in line with the provisions of Bangladesh National Building Code shall be furnished.

4. Time Frame.

4.01. An interim report, which shall include a brief write-up and recommendations, the peak ground acceleration for the project site, the site specific design response acceleration spectra (along with the discretised values in tabular form) for all the stated damping values and guidelines for using the various seismic parameters including response spectra for the design of all power plant structures and equipment, shall be furnished within 8 weeks from “T” and the final detailed report within 12 weeks from “T”, where “T” is the date of award or date of submission of input (as mentioned under S. No. 5 below) by owner (whichever is later).

5. Inputs by owner.

5.01. Owner shall furnish the following data for the site.

5.01.1. Salient features of the project including latitude and longitude of the project site.

5.01.2. Bore-logs details.

5.01.3. Shear wave velocity at the site up to 30m depth.