

Fehmarnbelt Fixed Link

Geotechnical Advanced Laboratory Testing

Information to Candidates

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1. Introduction

The Geotechnical Advanced Laboratory Testing constitutes an element in the ongoing Geotechnical Investigations for Design and Construction.

This Geotechnical Advanced Laboratory Testing is by Femern Bælt A/S put into a restricted EU tendering procedure.

A Contract Notice, 2009/S 50-072595, was published in the Official Journal of the EU 13 March 2009.

The objective of the pre-qualification procedure is to give candidates the possibility to document their experiences, competences and resources related to laboratory testing within:

- Classification testing
- Deformation testing
- Strength testing
- Geotechnical Data Reporting, GDR

and thereby give Femern Bælt A/S the best possible basis for selecting competent tenderers for the subsequent tendering procedure.

The present document supplements the Contract Notice. The document gives brief background information about the Fehmarnbelt Fixed Link project and provides some general information about the Geotechnical Investigations. It also describes the procedure for selecting tenderers to participate in the following tendering procedure.

Section 2 includes information about the contracting authority, i.e. Femern Bælt A/S.

Section 3 includes general information about the planned Fehmarnbelt Fixed Link.

Section 4 gives an overview of the Geotechnical Investigations for the Fehmarnbelt Fixed Link project.

Section 5 describes briefly the services included in the contract covering the Geotechnical Advanced Laboratory Testing.

Section 6 is listing the required information to be included in a complete Request to Participate.

Section 7 describes the criteria for selection of tenderers.

Section 8 includes certain administrative information to the candidates.

Section 9 describes briefly the subsequent tendering procedure.

Section 10 presents the tentative time schedule until award of contract covering Geotechnical Boring Campaign.

2. Contracting authority

The contracting authority is:

Femern Bælt A/S

CVR no. 28986564

Address:

Vester Søgade 10

DK-1601 Copenhagen V

Tel +45 33 41 63 00

Fax +45 33 41 63 01

www.fehmarnlink.com

Femern Bælt A/S is a company in the Sund & Bælt group. The Sund & Bælt Holding A/S owns and operates the Great Belt Fixed Link and owns half of Øresundsbro Konsortiet, the Danish-Swedish company responsible for the operation of the Øresund Fixed Link.

Femern Bælt A/S is ultimately owned by the Kingdom of Denmark and is established according to a separate Danish law. Femern Bælt A/S is responsible for the preparation and planning phase for the coast to coast part of the fixed link across the Fehmarnbelt.

3. Background information

3.1 The fixed link across the Fehmarnbelt

A fixed link across Fehmarnbelt will address “the missing link” in the transport corridor Hamburg-Copenhagen also known as “Fugleflugtslinien” or “Vogelfluglinie”. Since this transport corridor was opened in 1963 the idea of establishing a fixed link between Puttgarden and Rødbyhavn, (distance 20 kilometres), has surfaced on a number of occasions.

In 1992 the Ministers of Transport of Germany and Denmark agreed to initiate a feasibility study for a fixed link between the two countries. The study was carried out in 1995-1999.

The transport system between Scandinavia and continental Europe is today to a large extent based on ferry transport.

The fixed link across Fehmarnbelt is supposed to replace the existing ferry service between Puttgarden and Rødbyhavn. The currently used five ferries on the route carry approx. 2 million vehicles a year and also a number of rolling stock on the Copenhagen-Lübeck-Hamburg railway line for passengers. Since 1997 all freight trains between Zealand in Denmark and Germany have used the Jutland route via the Great Belt fixed link.

In recent years road traffic has shown fairly strong growth after a stagnant period in the 1990s. In the years 2000-2007 the annual growth of vehicles on the Rødbyhavn-Puttgarden ferry service was approx. 6.5 %.

As part of the feasibility studies, preliminary Geological/Geotechnical Investigations were carried out in 1995/96. During these feasibility studies, a number of technical solutions for the fixed link were investigated, including bored tunnels, immersed tunnels, suspension and cable-stayed bridge solutions, for different traffic capacities.

The Ministers of Transport of Germany and Denmark have agreed that a cable-stayed bridge should be considered the preferred technical solution and an immersed tunnel the preferred alternative solution for future investigations. Both the selected solutions are outlined with a four-lane motorway and a twin-track railway.

Nevertheless, a suspension bridge solution is included in the Navigational Studies currently being performed and the choice between the cable stayed bridge and the suspension bridge solutions will await the result of the Navigational Studies and the recommendation/decision from the Maritime Authorities.

The Plan Approval process in Denmark and in Germany (Planfeststellungsverfahren) shall therefore on parallel basis include both a bridge solution, (a cable stayed bridge or a suspension bridge) as well as an immersed tunnel solution until a final decision has been taken.

Hence, the geotechnical investigations shall cover all conceivable solutions as outlined above in a corridor east of the existing ferry route between Rødbyhavn and Puttgarden as shown on the figure below.



3.2 *German - Danish Treaty*

Following the Guidelines of the Memorandum of Understanding signed by the Ministers of Transport of Denmark and Germany 29 June 2007, a Treaty was signed by the ministers on 3 September 2008. The treaty establishes the overall terms and conditions under which the fixed link across the Fehmarnbelt will be designed, approved, constructed, financed and operated.

3.3 *German and Danish hinterland connection*

The Federal Republic of Germany is solely responsible for the upgrading and financing of the hinterland connections to the fixed link in Germany and

the Kingdom of Denmark is solely responsible for the upgrading and financing of the hinterland connections in Denmark.

3.4 *Homepage for the Fehmarnbelt Fixed Link*

Candidates are encouraged to visit the homepage (address set forth above) for the Fehmarnbelt Fixed Link. It is the policy of Femern Bælt A/S to continually make available developed information about the link. Such information is, however, made available without assuming any liability for the completeness, accuracy or fitness for any particular purpose. It is the responsibility of the user of the information to decide if and to what extent he can use the information including the need to verify the information before using it for any particular purpose. Reports from both completed and ongoing studies can be downloaded from the homepage.

All geotechnical information collected until beginning 2008 will be made available to the tenderers in the form of the GeoDatabase 2008 on a DVD.

4. Geotechnical Investigations

The geotechnical investigations for the Fehmarnbelt Fixed Link project are performed in phases.

Preliminary Investigations (completed)

Geological/Geotechnical Investigations were performed 1995/96 as part of the feasibility studies. These investigations unveiled the following geological units:

- Upper quaternary (peat, gyttja, sand, silt, clay)
- Lower quaternary (mainly glacial tills, with floes of very high plasticity clays, locally with meltwater sand and silt)
- Paleogene clays (very high plasticity clays)
- Cretaceous chalk (slightly indurated, white limestone)

The prequaternary deposits exhibit a domal structure as a result of rising salt. The region is considered a low seismicity zone.

The Geological/Geotechnical Investigations performed in 1995/96 are now classified as Preliminary Investigations in the Eurocode EC7 context. The reports from those investigations are available to the candidates from the Client's homepage under "Publications".

Investigations for Design and Construction (ongoing)

In 2008, Femern Bælt A/S initiated the Geotechnical Investigations for Design and Construction. These investigations comprise:

- Geotechnical consultancy services, including geophysical investigations. A contract covering these services was signed with Rambøll Arup JV on 28 April 2008 and the work is ongoing
- Boring campaign, starting May 2009. Contractor not yet selected.
- Advanced laboratory tests, the subject of this prequalification process
- Large scale tests, to be initiated later

Control Investigations (to be performed during construction)

The control investigations are foreseen to be performed by the construction contractors.

5. Geotechnical Advanced Laboratory Testing

5.1 Scope of services

The Advanced Laboratory Testing constitutes an element in the ongoing Geotechnical Investigations for Design and Construction of the Fehmarnbelt Fixed Link and requires the testing of high quality soil and rock samples which will be recovered by others during the Geotechnical Boring Campaign, 2009-2010. Samples to be used for testing will be either thin walled pushed tube samples or core sub-samples recovered from approximately 40 marine borings and 10 onshore borings drilled to 50-100 m below seabed/ground level.

Samples designated for Advanced Laboratory Testing will be stored in a temperature controlled container in the Employer's premises in Rødbyhavn, Denmark. Samples for testing will include material from the Upper Quaternary (peat, gyttja, sand, silt clay), Lower Quaternary (low plasticity over-consolidated clay till and floes of Palaeogene clay), Palaeogene Clay (very high plasticity over consolidated clay) and Cretaceous Chalk. The boring campaign will be carried out between Q2 2009 and Q4 2010. Advanced laboratory testing is scheduled to commence Q3 2009 and to be completed by Q1 2011. Identification of samples for testing, together with full details of types and numbers of tests to be carried out, will be provided by the Employer.

The scope of services to be provided by the Advanced Laboratory Testing Consultant will include the following:

- Nomination of project manager who will liaise with and advise the Employer on all matters associated with the Advanced Laboratory Testing. This will involve provision of information and data in a timely manner in order that future tests can be properly specified and test schedules provided without delays to the test programme.
- Detailed planning of the implementation and management of the test programme provided by the Employer, including management and supervision of any laboratory testing sub consultants.
- Establishment of a QHSE-plan and calibration of test equipment used to complete the test programme.
- Collection of temperature controlled sample container from the Employer's premises in Rødbyhavn, Denmark and transport to the Testing Consultants laboratory, followed by return of container to Rødbyhavn (allow for 4 container collections).
- Storage of all samples in temperature controlled environment prior to testing.
- Testing of selected samples as specified by the Employer and regular reporting of test results.
- Provision of specialist consultancy services.
- Submission of monthly progress and status reports.
- Factual reporting of the test results in the form of Geotechnical Data Reports (GDRs), and submission of all test results in a format compatible for inclusion in the Clients Geo Database system.
- Unused sample material must be stored for 5 years (frost-free)

The laboratory testing will be subject to the following special testing requirements:

- Oedometer and triaxial tests are to be undertaken using water that is chemically similar to the natural pore water in the sample being tested.
- Unless specified otherwise triaxial tests are to be carried out in accordance with Danish tradition using test specimens with a diameter to height ratio of 1 (D:H of 1:1) with smooth lubricated ends ("frictionless end platens").
- Full compliance testing and calibration of equipment, newly fabricated and existing will be required to allow accurate assessment of soil stresses and strains.
- The over-consolidated and highly plastic Palaeogene Clay may have a coefficient of consolidation of approximately $0.01 \text{ m}^2/\text{year}$. Pilot testing in this soil unit is expected to clarify i.e. strain rate.

The type and approximate number of laboratory tests to be undertaken are:

- X-ray photography of samples prior to testing to assist specimen selection (approx 200 No.);

- Classification testing (water content (250 No.), unit weight (250 No.), Atterberg limits (200 No.), sieve (50 No.), sieve and hydrometer (200 No.), density of solid grains (100 No.), content of CaCO₃ (200 No.), loss of ignition (100 No.), max-min density (30 No.), x-ray diffraction (100 No.), pore water chemistry (100 No.);
- Consolidation testing (incremental loading (IL) to max stress of 10MPa with one unload/reload loop – 70 No. on soil and 20 No. on chalk, Constant rate of strain (CRS) loading to max stress of 10MPa with two unload/reload loops – 120 No.);
- Swelling testing – No. 40 on mainly high plasticity over-consolidated clay;
- Anisotropic/K₀ consolidated undrained triaxial CAU/CK₀U with pore water pressure measurement on test specimens with diameter to height ratio of 1:1 and lubricated end plates (monotonic compression or extension – 250 No.) on soil;
- Anisotropic/K₀ consolidated undrained triaxial CAU/CK₀U with pore water pressure measurement on test specimens with diameter to height ratio of 1:2 and rough pressure heads (monotonic compression or extension – 40 No.) on chalk;
- Anisotropically consolidated drained triaxial CAD on test specimens with diameter to height ratio of 1:1 and lubricated end plates (monotonic compression or extension – 45 No.) on soil;
- Anisotropically consolidated drained triaxial CAD on test specimens with diameter to height ratio of 1:2 and rough pressure heads (monotonic compression or extension – 10 No.) on chalk;
- Undrained direct simple shear DSS (monotonic loading on soil – 100 No., cyclic loading on soil – 40 No., monotonic loading on chalk – 10 No., cyclic on chalk 10 No.);
- Unconfined compressive tests (with measurement of Young's Modulus and Poisson's ratio) on chalk – 35 No.
- Brazil tests on chalk – 35 No.
- Resonant column (50 No.); Diameter to height ratio of 1:2;

Additional tests that may be required include:

- Unconsolidated Undrained UU triaxial compression tests (intact and remoulded)
- Remoulded CAU (1:1) and DSS tests
- Fall cone tests
- CAUcy
- Ring shear interface friction tests.
- Microfossil Geological dating

Large scale triaxial and direct simple shear testing (500 mm diameter)

The English Language will be the working language in the Fehmarnbelt Fixed Link project and normally all reports, drawings and other documents will be prepared only in English language. The Contractor must be able to communicate in both German and Danish as well.

5.2 Tentative Overall time Schedule

July 2009:	Contract award
August 2009 to December 2010:	Performance of laboratory works Reporting of findings in Geotechnical Data Reports, GDRs
January 2011:	Completion of contract

6. Legal, economic, financial and technical information

A Request to Participate in the tendering procedure for the Geotechnical Boring Campaign shall comply with the following requirements:

6.1 Legal information

The candidate shall provide the following information:

- a) Name and address of candidate
- b) Candidate's contact person
- c) Brief description of candidate's organisation

The candidate (and each member of a joint venture or a partnership, if applicable) shall provide certificate(s) from competent authorities/trade registers for the purpose of showing the following:

- a) that he is not subject to proceedings for bankruptcy, winding-up or arrangements with creditors
- b) that he has not been convicted of an offence concerning his professional conduct
- c) that he has fulfilled obligations related to taxes and social security contributions

6.2 Economic and financial information

The candidate (and each member of a joint venture or a partnership, if applicable) shall provide the following information:

- a) annual reports or at least balance sheets for the previous two financial years
- b) statement of overall turnover and turnover in respect of the works to which the contract relates for the previous three financial years

6.3 Technical information

In view of the complex nature of the scope of works, as described in section 5.1, presentation of appropriate evidence of the candidate's state-of-the-art technical capability (incl. skills, efficiency, experience, reliability and facilities) is an absolute requirement for being selected as tenderer

For this purpose the candidate (and each member of a joint venture or a partnership, if applicable) shall provide the following information:

- a) a list of the principal assignments in respect of the services to which the Geotechnical Advanced Laboratory Testing contract relates i.e. geotechnical laboratory testing for major infrastructure projects. For each assignment the following information shall be included: the value, dates and client, public or private, the kind of services provided;
- b) general information about the candidate's educational and professional qualifications and those of the firm's managerial staff, (CVs documenting experience and skills of dedicated personnel shall not be included in the Request to Participate);
- c) general description of the quality control system, QHSE-plans, used by the candidate and his measures for ensuring adherence hereto;
- d) a statement of the candidate's average annual manpower and the number of managerial staff for the last three years;
- e) a statement of the laboratories, tools, technical equipment, and systems available to the candidate and their suitability for carrying out the services.

7. Procedure for selection of tenderers

The Requests to Participate will be reviewed and ranked by a technical expert group chaired by Femern Bælt A/S according to the following selection criteria.

Candidates not satisfying the basic requirements, (See section 6.1 and 6.2), on good standing and proper conduct will be excluded.

Requests to Participate complying with the basic requirements will be evaluated with the use of the following selection criteria and weighting factors:

Selection criteria	Weighting factor	Rating	Score
References Experience of similar type of services and assignments. See section 6.3, item a.	4		
Organisation Relevant experience and skills of organisation in general and quality control systems in general. See section 6.3, items b, c and d.	3		
Facilities Availability/standard of laboratories, tools, equipment and systems. See section 6.3, items e.	3		
		Total score	

For each selection criterion applications from candidates will be given a rating as follows:

	Rating
Not acceptable	0
Good	2
Excellent	3

Candidates with a rating “not acceptable” on any criterion will not be selected.

5 of the candidates with the highest score will be selected to participate in the following tendering procedure (subject to sufficient number of qualified candidates).

8. Administrative information

8.1 Queries

Questions shall be addressed to Mr. Jens Kammer, jka@femernbaelt.dk.

8.2 Closing date

Time limit for receipt of Request to Participate is Wednesday, 22 April 2009 at 14.00 hrs.

8.3 Language

The information included in a Request to Participate shall be in English.

8.4 Copies

Request to Participate shall include 3 hard copies (one marked "Original" and the others marked "Copy 1" and "Copy 2") and 1 electronic version of all information.

8.5 Labels

Request to Participate shall be marked:

Fehmarnbelt Fixed Link
Geotechnical Advanced Laboratory Testing
Request to Participate

8.6 Address

Request to Participate shall be sent to the address stated above. See section 2 "Contracting Authority".

9. Subsequent tendering procedure

Femern Bælt A/S will to the selected tenderers issue the enquiry documents including:

- Letter of Invitation
- Instruction to Tenderers
- Scope of Works
- Form of Contract

The selected tenderers shall in their tenders include attachments, covering:

- Method statements, covering the activities
- Experience and skills of dedicated personnel (CVs) and the way of organizing the services, including QHSE procedures,
- Price elements,
- Proof of authorization

as will be further described in the enquiry documents.

10. Time schedule

It is Femern Bælt A/S' current intention that the tender procedure will follow the following milestones:

Selection of candidates	April/May 2009
Issuing of enquiry documents	May 2009
Closing date for receipt of tenders	June 2009
Completion of evaluation of tenders	June 2009
Contract award	July 2009