

**Fehmarnbelt Fixed Link**

**Positioning System - RTK GNSS Services**

**Information to Candidates**

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## 1. Introduction

The establishment of an RTK GNSS (Real Time Kinematic – Global Navigation Satellite System) service constitutes an element in the implementation of the Fehmarnbelt project.

The RTK GNSS service is by Femern Bælt A/S put into a restricted EU tendering procedure.

A Contract Notice, 2009 / S 15-21353 was published in the Official Journal of the EU on 23 January 2009.

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

- Monumentation of permanent GNSS stations
- Establishment of RTK GNSS services
- Operation and maintenance of RTK GNSS services

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 requirements to the RTK GNSS service. 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 Positioning Reference System and Reference Frame for the Fehmarnbelt Fixed Link project.

Section 5 describes briefly the requirements to the RTK GNSS service.

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.

## **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](http://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 %.

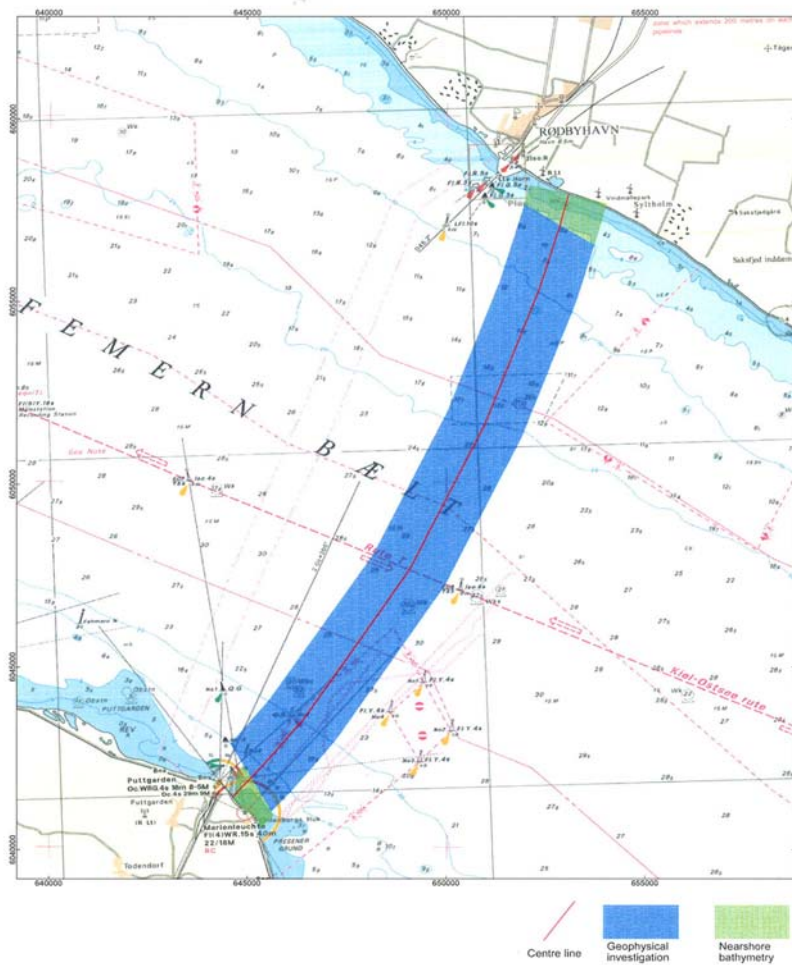
As part of the feasibility studies, preliminary Geological/Geotechnical Investigations were carried out in 1995/96. During these feasibility studies, a number of technical solutions for the fixed link were investigated, including bored tunnels, immersed tunnels, suspension and cable-stayed bridge solutions, 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 RTK GNSS service must be established to be available for planning, design and construction for 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.

## **4. Reference System and Reference Frame**

A reference system and a reference frame including an RTK GNSS service must be established to be used for the entire planning and construction phases of the Fehmarnbelt Fixed Link project.

A project specific coordinate system will be established: Fehmarnbelt Coordinate System (FCS). The plane coordinates will be defined by the geodetic latitude and longitude of four permanent GNSS (Global Navigation Satellite System) stations and defined in ITRF05 or IGS05 by concurrent observations using data from existing permanent GNSS stations. The height will be defined to be close to mean sea level across Fehmarnbelt. A project specific geoid will be calculated.

The permanent GNSS stations will also form the basis for the RTK service which is the focus of this document. The stations will be established by the RTK GNSS Service Contractor and coordinates for the stations will be determined by the National Survey and Cadastre in Denmark.

Levelling, geoid adjustment and establishment of coordinate transformation parameters to existing coordinate systems will be carried out by National Survey and Cadastre, Bundesamt für Kartographie und Geodäsie, and the National Space Institute in Denmark. Contractor must provide data from the GNSS stations to these tasks as specified.

The definition of the coordinate system, the geoid model and the coordinate transformation parameters will be made available to Contractor.

As most of the work will be carried out in sequential and parallel subprojects during 2009 a close cooperation between Contractor, Femern Bælt A/S, and the organisations mentioned above is required.

## 5. RTK GNSS service

### 5.1 *Scope of works*

The purpose is to establish a system - an RTK service – based on GNSS data that will ensure unambiguous and accurate positioning and navigation during all phases of the Fehmarnbelt Fixed Link (FFL) project.

The permanent GNSS reference stations shall be established and commissioned during 2009 and the RTK system shall be operational until decommissioned by the end of the construction phase in 2018. The current contract will include establishment of the RTK service and the first operational phase running until the end of 2012. As an option, three extensions of the contract, each of three years duration, can be utilized, the first extension to be effective in 2013.

The RTK service will comprise:

- Observation segment
- Telemetry segment
- Rover segment
- Control segment

The scope of work for the RTK service will comprise:

- Establishment of the observation segment including four permanent GNSS stations, two on either side of Fehmarn belt. Requirements on settlement are only slightly lower than for a geodetic network, and the stability can for instance be obtained by drilling and/or driving a reinforced concrete pile into the stable deposits.
- Procurement, preparation and installation of station equipment such as GNSS receivers, antennas, power lines and power backup, communication equipment and communication lines etc.
- Establishment of auxiliary benchmarks suitable for terrestrial measurements.
- Establishment of the telemetry segment which shall utilize one or more telemetry systems suitable for ensuring a reliable and uninterrupted transmission of RTK data to the entire working area regardless of e.g. atmospheric conditions.
- Preparation of the rover segment - a number of RTK rover units including GNSS and communication equipment as well as operating manuals to be made available for other contractors working in the area.
- Establishment of the control segment to be used for continuous monitoring and surveillance of the RTK service as well as for logging and storage of carrier phase data from the GNSS stations at a high data rate (1 Hz or higher). A web site must be established for immediate access to system status and carrier phase data download.
- Development of contingency plans and procedures for system operation and maintenance.

- Systems tests, reporting, and documentation.
- Commissioning
- Operation and maintenance

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

## **5.2 Tentative Overall time Schedule**

June/July 2009:	Contract award
July to September 2009:	Station monumentation Data collection for station coordinates Establishment of telemetry segment Development of control segment Contingency plans Preparation of rover units Development of user's manual
October to November 2009:	Test operation Station coordinate verification
End of November 2009:	Commissioning
December 2009 to December 2012:	Operation and maintenance

## **6. Legal, economic, financial and technical information**

A Request to Participate in the tendering procedure for the RTK GNSS service 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 importance of the RTK service for the construction of the Fehmarn Belt Fixed link, presentation of appropriate evidence of the candidate's state-of-the-art technical capability (incl. skills, 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 RTK service contract relates i.e. establishment and operation of RTK services preferably 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 planned/proposed equipment including GNSS receivers, antennas, and communication equipment for permanent stations and rover units, and their suitability for 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:

<b>Selection criteria</b>	<b>Weighting factor</b>	<b>Rating</b>	<b>Score</b>
<b>References</b> Experience of similar type of services and assignments. See section 6.3, item a.	4		
<b>Organisation</b> Relevant experience and skills of organisation in general and quality control systems in general. See section 6.3, items b, c and d.	3		
<b>Equipment</b> Applicability of proposed equipment. See section 6.3, item 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.

The up to five candidates with the highest score will be selected to participate in the following tendering procedure.

## **8. Administrative information**

### **8.1 *Queries***

Questions shall be addressed to Mr. Jens Kammer, [jka@femernbaelt.dk](mailto:jka@femernbaelt.dk).

### **8.2 *Closing date***

Time limit for receipt of Request to Participate is 11 March 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  
Positioning system - RTK GNSS Services  
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
- Special Conditions
- General Conditions

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,

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 time schedule below:

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