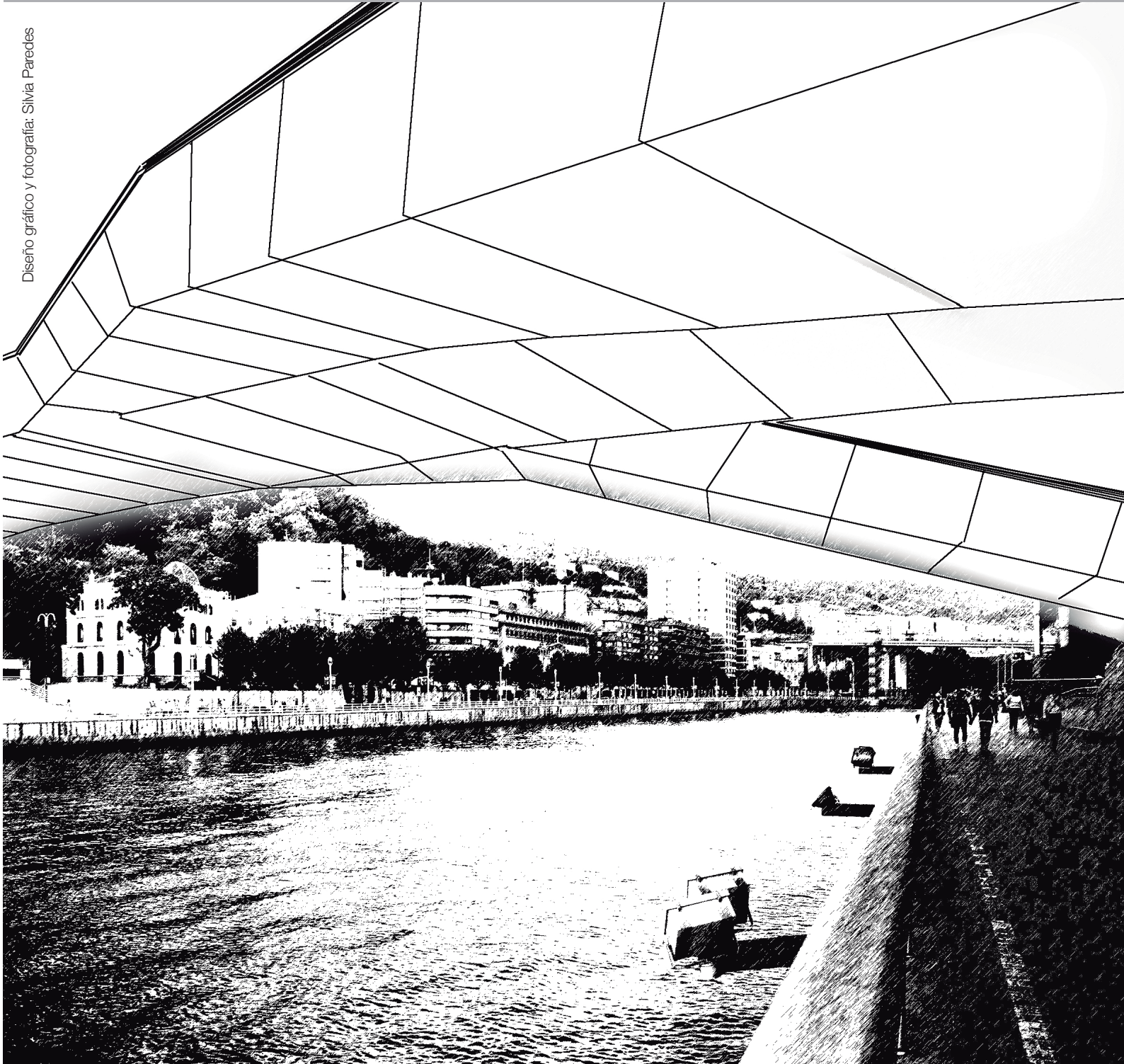


WORKSHOP ON BRIDGE DESIGN 2015

Keynote lectures and workshop with tutors • Madrid, Spain, 23 October 2015

Diseño gráfico y fotografía: Silvia Paredes



Up-to-date info on: <http://issuu.com/geiabse/docs/wobd2015>



Spanish Group of IABSE



Escuela Técnica Superior de Ingenieros de
Caminos, Canales y Puertos



POLITÉCNICA

Organized by the Spanish Group of IABSE

Supported by the Escuela de Ingenieros de Caminos, Canales y Puertos - Technical University of Madrid

Organizing Committee: Roberto Cerdeiriña del Tío • José María Goicolea • M. Dolores G. Pulido • José Antonio Lozano Galant • Fernando Madrazo Aguirre • Antonio Martínez Cutillas • Ignacio Payá Zaforteza • Roberto Revilla Angulo • Laurent Rus Jenni

Local Committee: Jorge Bernabéu Larena

WORKSHOP ON BRIDGE DESIGN 2015

Event Overview

After the positive outcome of the Workshop on Bridge Design 2014 (http://issuu.com/geiabse/docs/workshop_on_bridge_design) in Madrid, the Spanish Group of IABSE organizes the next Workshop on Bridge Design 2015. The aim of this event consists of promoting design, inspiring future generations and bringing together young designers with leading designers. It will feature talks by renowned Master and Junior speakers and an innovative workshop on bridge design guided by experts. A problem statement (footbridge) is provided at the end of this brochure for the proper development of the participants' ideas prior to the workshop.

The workshop is aimed at Young Civil Engineers and Architects and students. The participation will be validated with ECTS in several Spanish Universities (such as CEU San Pablo, UPV, UPM, and UCLM, among others).

WHEN?

October 23, 2015

WHERE?

Escuela de Ingenieros de Caminos, Canales y Puertos, Technical University of Madrid, Campus Ciudad Universitaria, C/ Profesor Aranguren, 3, 28040 Madrid

PRICE?

50€ (workshop registration)

For the registration, please send us the filled registration form prior October 23rd.

About IABSE

The International Association for Bridge and Structural Engineering, IABSE, was founded in 1929. Today, IABSE has about 4,000 members in over 100 countries. The mission of IABSE is to promote the exchange of knowledge and to advance the practice of structural and bridge engineering worldwide in the service of the profession and society. To accomplish the mission, IABSE organizes conferences and publishes the quarterly journal Structural Engineering International (SEI), as well as reports and other monographs. IABSE also presents annual awards for outstanding achievements in research and practice. IABSE deals with all kinds of structures, materials and aspects of structural engineering.

More info: www.iabse.org

WORKSHOP ON BRIDGE DESIGN 2015

Schedule

October 23rd

08:30 h – 08:50 h Registration (Sala Verde)
08:50 h – 09:00 h Presentation of the event (Sala Verde)
09:00 h – 11:00 h **M. Dolores G. Pulido** - Chair of the Spanish Group of IABSE
Lectures (Session 1) (Sala Verde)

Javier Manterola and Antonio Martínez Cutillas

El diseño de puentes. Mi visión personal

Sebastian Linden

Design principles for footbridges

Alejandro Bernabéu Larena

A tale of three footbridges

Héctor Beade

Bridge design. Can a methodological approach be defined to guarantee a good solution?

11:00 h – 11:30 h Coffee Break
11:30 h – 12:30 h Lectures (Session 2) (Sala Verde)

Álvaro Serrano Corral

The erection process in composite bridge design

Roel Vernooij

Design choices and changes, and the things that drive them

Roberto Revilla Angulo

Design creativity, the beauty that moves

12:30 h – 14:00 h Round Table (Sala Verde)
14:00 h – 15:00 h Lunch Break
15:00 h – 19:00 h Workshop (Sala 3 y 4)

Héctor Beade

Jorge Bernabéu Larena

Ginés Ladrón de Guevara

Sebastian Linden

Javier Manterola

Antonio Martínez Cutillas

Roberto Revilla Angulo

Álvaro Serrano Corral

Roel Vernooij

November 6th

24:00 h Submission of the elaborated proposals via email (geiabse@ceu.es)

November 15th

21:00 h Communication by email of the winning proposals (a diploma and several books on bridges will be awarded for the best designs)

WORKSHOP ON BRIDGE DESIGN 2015

Registration Form

Title

Last or Family Names

First Names

Date of Birth

Affiliation/Institution

Workshop Fee

☐

50€

E-mail Address

Group Name

Name of Bank:

Bankia

Address of Bank:

C/Rios Rosas 44. 28003 Madrid (Spain)

Account Number:

IBAN ES31 2038 1105 5160 0102 4356

Swift Code:

CAHMESMMXXX

Beneficiary:

Spanish Group of IABSE

The registration must include a copy of the bank transfer receipt and be sent prior to
23rd October 2015 to geiabse@ceu.es
Transfer concept: Participants' name

WORKSHOP ON BRIDGE DESIGN 2015

Participants



Javier Manterola

**CARLOS
FERNÁNDEZ
CASADO, S.L.**

Javier Manterola Armisén is a Spanish civil engineer and professor at the Escuela de Ingenieros de Caminos, Canales y Puertos de Madrid. Manterola is particularly known for his work as a bridge designer of the engineering firm Carlos Fernández Casado. Author of numerous and varied projects, in collaboration with different Spanish architects as Rafael Moneo, has won over his professional career several awards such as the Premio Príncipe de Viana de la Cultura . He is a member of the Real Academia de Bellas Artes de San Fernando. Probably, his best known work is the Puente de La Pepa in Cádiz, recently completed. Another of his most important designs is the Ingeniero Carlos Fernández Casado bridge in the AP-66 which spans a part of the Barrios de Luna reservoir in León, which was a world record for a decade in several categories and still is the longest span in Spain.



**Alejandro
Bernabéu Larena**

**BERNABÉU
INGENIEROS**

Alejandro Bernabeu is a Ph D Civil Engineer, expert in structures in singular building, with more than fifteen years of experience. He leads his own consultancy firm, BERNABEU Engineers. Previously he has being Director of structures of the Architecture & Building department at IDOM, and Director at NB35 Engineering. He has work with well-known architects, designing and developing the structure of projects like Caixaforum Madrid (Herzog & de Meuron), Deusto University Library (Rafael Moneo), the Lima Convention Centre (ACXT) or three stress ribbon footbridges in Toledo (Burgos y Garrido). He has developed projects in more than 15 different countries, including France, United Kingdom, Australia, China, Nicaragua, Chile and Peru. He is Professor at the School of Architecture and author of several articles and congress papers on structural design, and on the relationship between structures and architecture. He has being awarded with the IABSE prize 2015, and with the prize for outstanding young engineers 2013, by the Spanish Civil Engineers Association in Madrid.



**Álvaro Serrano
Corral**

MC-2

Álvaro is Director of MC2 Engineering Consultant Office, part of the Tyspa Group. He joined in 2002 after obtaining his Civil & Structural Engineering degree in the Technical University of Madrid. In MC2, he developes all manner of structural projects and construction procedures for both civil works (Widening of the Bridge over the Rande Strait, the Nalon Viaduct in the A-8 highway) and building structures (Espacio Tower, PwC Tower). Álvaro also colaborates, as Adjunt Professor, with the Technical University of Madrid.

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**Jorge Bernabeu
Larena**

IDOM

Dr. Eng. Jorge Bernabeu Larena is a graduated Civil Engineer (1996) with a Ph D in the same field (2004) and works besides his managing position in IDOM as a Lecturer at the Technical School for Civil Engineering of the Polytechnic University of Madrid in the subjects of Steel Structures, Art and Aesthetics of Engineering, and Landscape in Civil Engineering. As a project manager at IDOM, he has developed numerous transports infrastructure projects among which are numerous bridges and railway stations. He has worked in projects in a variety of countries such as Great Britain, Slovenia, Macedonia, Chile, Morocco, Algeria and Kingdom of Saudi Arabia. He is furthermore the author of publications and research projects on the history of construction, the landscape and the heritage value of public works.



**Ginés Ladrón de
Guevara
Méndez**

MC-2

Ginés is Director of MC2 Engineering Consultant Office, part of the Typsa Group. He joined in 1997 after obtaining his Civil & Structural Engineering degree in the Technical University of Madrid. In MC2, he develops all manner of structural projects and construction procedures for both civil works (extension of the stadium La Peineta in Madrid) and building structures (ORONA Ideo Building).



**Roberto Revilla
Angulo**

**ESTUDIO DE
DISEÑO RA
ENG & ARCH**

Roberto has just established his own Bridge Design Company, Studio Design ra Eng & Arch. He has been working in APIA XXI from 1995 to 2011 after graduating as Civil Engineering, being head of the Structures Department since 2000. He also has a PhD and a degree in architecture. He is working as Associate Professor in the Technical University of Madrid. He was awarded in 2010 with the IABSE Prize to the professional career. He is well known for his work on the design and construction of many major bridge projects, especially for his contribution in Montabliz Viaduct and in the New bridge over Llobregat river.



Roel Vernooij

ARUP

Roel Joined Arup Amsterdam in 2013, after a bachelor in Civil Engineering in Amsterdam and a Master in Structural Engineering in Edinburgh. After joining Arup Roel has been involved in the renovation design of large steel bridges in the Netherlands. These include the longest bridge, the longest span, and the busiest bridge in the Netherlands. These projects involved an overlay of high strength concrete, to solve fatigue issues, and strengthening of the global system to carry the extra load. Roel has also designed the first (non-self-anchored) suspension bridge in the Netherlands.

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**Héctor Beade
Pereda**

**KNIGHT
ARCHITECTS**

Héctor Beade-Pereda is a bridge designer at Knight Architects, with an academic background in structural engineering (graduated from the University of A Coruña in 2000). Over the course of his 15-year career (more than nine of them at Arenas & Asociados), he has had the opportunity to be involved in every stage of the bridge-building process, from conception to construction. Apart from his customary role as a conceptual and structural designer, Héctor has worked as a structural engineer, supervised construction works on-site, provided support to contractors, and has led and managed a number of projects. Such comprehensive expertise in diverse lines of bridge-related work has allowed him to design bridges that, with a fair investment, are structurally coherent, aesthetically pleasant, constructible, durable and sustainable. He has been responsible for the conception of a number of bridges ranging from small footbridges to world-record High Speed Rail viaducts, many of them competition-winning designs and innovative solutions, always trying to meet all the project requirements while simultaneously adopting an aesthetically and structurally holistic approach to design. He is committed to excellence in all the work he undertakes, regardless of the magnitude of the challenge.



**Antonio Martínez
Cutillas**

**CARLOS
FERNÁNDEZ
CASADO, S.L.**

Antonio Martínez Cutillas is working for Carlos Fernández Casado, S.L. since 1987 on bridge design and analysis. He has performed some research on the dynamic behaviour of bridge abutments. He has a long experience in the design of prestressed concrete bridges and composite steel-concrete bridges. He has been involved in more than 40 projects most of them which have been built. The summary of the most significant as senior engineer are: Bridges across the Ebro river in Zaragoza (1991): two incrementally launched curved concrete bridges of 48m span and Segura river bridge, Spain (1992): tied arch bridge with a span of 64 m.



Sebastian Linden

**schlaich
bergemann
partner**

Sebastian graduated as a Structural Engineer from the Technical University of Dortmund in 2002. He joined schlaich bergemann partner just after receiving his diploma and hence looks back on being part of the office for more than thirteen years. During this time he has taken part in a wide range of projects, designing light-weight membrane roofs, stainless steel shell structures or bridges throughout different countries. His record includes the renewal of the suspended, insulated membrane roofs at the Olympic Swimming Pool and the Olympic Hall - both being part of the historic Munich Olympic facilities - and the design of the apparently floating double layer membrane roof of "Pabellón de Estado" at Madrid-Barajas airport. In fields of bridge-design he has been responsible for the realization of several award-winning footbridges such as the Grimberg-Footbridge in Gelsenkirchen, the Sassnitz-Footbridge on the Island of Rügen or the Boy Scouts-Bridge in Glen Jean, West Virginia.

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Design Competition

Garrick's Ait Footbridge over the Thames River

A pedestrian bridge is required to link the Garrick's Ait with Garrick's Lawn in the North bank in Hampton (Surrey, UK), see Figure 1. Garrick's Ait, in which multiple bungalows can be found that serve as permanent residence to several families, can only be accessed by boat. Hence, a new pedestrian footbridge is proposed to increase the accessibility of the Garrick's Ait neighbours.

Location

Garrick's Ait is named after David Garrick, the actor whose Temple to Shakespeare and Villa are on the Hampton bank and as such is the only island in the country named after an actor. In common with most Thames islands near developed places, it became used for growing and harvesting willow trees when they arrived in the country in the 18th century. Wood from pollarding could be used for cricket bats, paddles, ladders, gun stocks, crates and poles for fences. Harvested branches, called osiers, are strong, flexible and resistant to rot – they were used for fish traps, basket making and for reinforcing riverbanks. In more recent years, many properties have been developed in the ait. These properties are for private use and can only be accessed by boat. Indeed, each property has its own quay or pier.



Figure 1: Plan view of the location of the footbridge

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The Garrick's Lawn, which is located in the North bank, was developed by Garrick to provide his house with a garden, see Figure 2. It is widely believed that Garrick was advised by the landscape architect Lancelot Capability Brown in the design. The gardens are home of the Garrick's Temple to Shakespeare, a little octagonal building built in 1756. Garrick built the Temple to celebrate the genius of William Shakespeare, commissioning the sculptor Roubiliac to provide a life-size statue of his hero to be placed inside. The recent restoration reinstates the statue in replica and also houses a display that celebrates David Garrick's acting career and his private life in Hampton.



a)



b)

Figure 2: Two pictures of the Garrick's Lawn with the Temple and the tree. The exact locations from which these pictures are taken are plotted in Figure 2

Technical requirements

A new pedestrian bridge is proposed to give access to Garrick's Ait (South bank) from the North bank (Garrick's Lawn), see Figure 3. Since the footbridge is not part of any route, it is not required to provide any path for bicycles, but designs that allow for the integration of a future cycle path will be positively valued. Apart from serving as a connection between the ait and Hampton, the footbridge should also allow pedestrians to enjoy the magnificent views of the surroundings. A minimum width between handrails of 3 m should be provided. In Garrick's Lawn a 250-year-old tree can be found, and the footbridge should be designed to avoid chopping it down. However, a new location for the tree in Garrick's Lawn can also be proposed. Owing to accessibility reasons, the slope of the footbridge must be limited to 6%. However, the access to the footbridge in the South bank (Garrick's Ait) does not need to satisfy this condition since the neighborhood community might provide a private elevator in the future if the need arises.

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Figure 3: Plan view of the area. Two layouts of the footbridge are proposed, and these should only be taken as a reference; there is no need to follow these exact alignments. The numbers represent the locations from which the pictures of Figure 4 have been taken

The area at which the footbridge should arrive at the South bank is located at a height of +5.50 m AOD¹. In the North bank, two pedestrian pathways are found: the first one in close proximity to the bank at +5.25 m AOD and 4 m wide; and the second one parallel to the river bank and next to the A308 road at +11.25 m AOD and 6 m wide. The minimum distance between the edges of both pathways is 25 m, see Figure 4.

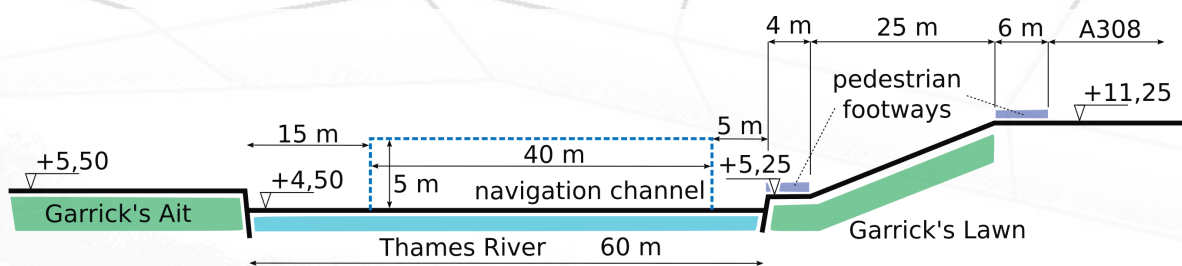


Figure 4: Elevation view of the area. All the height levels are expressed in m AOD. The drawing is not scaled and it should be taken as a reference

¹AOD stands for Above Ordnance Datum and it is the height relative to the average sea level at Newlyn, Cornwall, UK.

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The distance between the North and South bank is 60 m, and due to the boat traffic a navigation channel must be maintained. The expected traffic and a riverbed inspection suggest that the navigation channel must be 40 m wide (in the direction perpendicular to the water flow), and its limits must be 15 m from the South bank and 5 m from the North bank. Moreover a vertical clearance of 5,00 m over the maximum tidal level must be provided in the entire width of this navigation channel. The highest tidal level is expected to be +4,50 m AOD. Some exceptional boats, which are higher than this clearance limit, are also expected, but these can be directed to the channel located South Garrick's Ait.

Solutions that minimize the time the channel is closed during the construction will be valued. Moreover, apart from the footbridge itself, some extra elements might be designed to improve the integration of the footbridge in the surroundings, such as approach ramps, illumination and modification of paths.

Judging criteria

A jury comprising engineers and architects will assess the designs. Submissions must satisfy the previously mentioned technical requirements and the judgement will be made based on the following criteria:

- Integration in the environment and the site
- Structural feasibility and efficiency
- Aesthetics
- Buildability and minimization of interruptions
- Innovation
- Clear description of the proposal and originality of submissions.

Submission requirements

Participants will form teams of 1-3 members. Each team will prepare a short presentation consisting of a maximum of five slides for the Workshop on Bridge Design. The aim of the presentation is showing the conceptual design and structural typology before the final submission. These initial designs will be discussed with the tutors, and some improvements might be suggested for the final design.

Final proposals must be submitted in digital format, consisting of a maximum of three A3 panels. The main aspects to be included in these panels are:

- Technical report that explains the idea behind the design. This report will include explanations about the structural typology, different alternatives considered and the materials employed. It should also include how the integration of the footbridge in the environment is achieved, as well as construction aspects.
- Sketches showing the overall design of the footbridge and the integration within the environment. Even if the submission format is digital, hand sketches and drawings will be positively valued.
- Sketches with details and dimensions of the footbridge. Again, hand sketches will be positively valued.

Teams are encouraged to submit any other information they may consider relevant. All submissions must be submitted to geiabse@ceu.es.