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Student Design & Sustainability Competition 2025



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The Student Design and Sustainability Competition is run and managed by **The Concrete Centre**.

The Concrete Centre is the central development organisation for the UK cement and concrete industry. Its objective is to assist all those involved in design and construction to realise the full potential of concrete as an adaptable and sustainable construction material.

For more information on The Concrete Centre, visit www.concretecentre.com.



The Student Design and Sustainability Competition is sponsored by **Cordek**.

Cordek provides a range of bespoke and complex formwork solutions for creating architectural features, finishes and shapes in concrete, including the construction of arches, columns, staircases, and ribbed slab soffits.

For more information on Cordek, visit www.cordek.com

Introduction

This is a national student competition which encourages students of architecture and the built environment to explore the benefits of designing sustainably with concrete. This year's brief is to submit innovative designs for a re-imagined and inhabited tidal flood defence at the Canvey Island sea front. The competition is open to students studying at schools of architecture, landscape architecture and the built environment in the UK, and is free to enter.

Essential skills

The competition seeks to raise awareness and skills related to the design, specification and use of concrete, highlighting the sustainability considerations required of the built environment to address climate change.

The ubiquitous and versatile nature of concrete means that most, if not all, architects, designers and building professionals in their practicing life will need to specify concrete in some form in their buildings. There are key design and specification decisions that architects and designers can make to enhance the sustainability of the concrete used in their projects. This competition aims to upskill students, giving them agency to make more informed, responsible and sustainable decisions when designing and specifying concrete in practice.

Benefits for students

- Develop an understanding of ways to design with concrete to improve its sustainability credentials.
- Develop an understanding of the ways in which concrete can enhance a building's performance.
- Gain familiarity with innovation in the manufacture design and construction of concrete.
- A chance to enhance portfolios for prospective employers.
- Develop skills in communication, planning and technical design.
- A chance to win a share of the £3000 prize fund.
- A chance for recognition as a short-listed or runner up entry
- An opportunity to gain national recognition for the design work.

Reading list and learning resources

A suggested reading list and learning resources for students participating in this competition can be found at www.concretecentre.com/designconcrete

Front cover image: Under by Snøhetta. Norway. Europe's first underwater restaurant. Image courtesy of Inger Marie Grini/ Bo Bedre Norge

This year's challenge...

Re-imagining tidal flood defences

Tidal flood defences play a vital role in protecting many coastal areas and communities in the UK. Climate change and rising sea levels are shining a light on the importance of the integrity and performance of the UK's tidal flood defences.

"Parts of the UK coast are highly vulnerable to climate change due to coastal flood risk, temperature increases, and increased precipitation but also changes to wave height, storm surges and accelerated coastal erosion."

Health Effects of Climate Change (HECC) in the UK: 2023 report, published by UK Health and Security Agency.

This design and sustainability competition asks entrants to re-imagine new typologies of tidal flood defences, to not only keep the water out, but also provide additional enhanced social, economic and environmental benefits too. Tidal flood defences built to date in the UK, while effective, are often utilitarian, bleak even. They provide an essential role of protecting coastal communities from flooding, but have the potential to do a lot more too.

The UK average projected sea level rise by 2100 relative to 1981 – 2000 is 60cm for a low emission scenario and 103cm for a high emission scenario (based on UKCP18 marine climate change data sheet). Many kilometres of tidal flood defences in the UK will require refurbishment or replacement to cope with these changes, providing a unique opportunity and challenge for architects to reimagine the next generation of tidal flood defences in the UK.

This competition brief is set on the Canvey Island Seafront in Essex and invites entrants to imagine a new inhabited section of sea wall and surrounding context that not only protects the inhabitants of Canvey Island from coastal flooding for the next 100 years, but also creates opportunities for local businesses and communities to thrive environmentally, socially and economically. Further details of the Canvey Island Seafront and site location options are detailed on page 5 of this document.

Entrants are encouraged to be imaginative with their sea wall enhancements and re-imaginings, albeit still creating uses and spaces that are relevant, practical and useful to the local community and environment. The competition welcomes designs that are creative, contextual, and demonstrate how well considered design and construction can provide climate change resilience, encourage good health and wellbeing, reduce inequality and generate biodiversity net gain.

There are no size or building type requirements stipulated. Suggested sea wall building uses are listed below but are purely for guidance and inspiration. Entrants are welcome to select a function(s) from the list below or develop their own building type(s) if preferred:

- Beach huts
- Cycle storage
- Safe swimming facilities
- Ice cream kiosk
- Restaurant / cafe
- Clean energy generation
- Creative arts / performance venue

For the purposes of the design and sustainability competition, students should assume that a minimum 10m long section of existing sea wall is to be removed and replaced entirely by their design proposal.

Design interventions can be above or below ground, landward, seaward, above or below water or a combination of all.

The design must feature concrete as a significant component of the proposal. The key design deliverables which will be assessed by the judging panel are outlined on page 4 of this document.



Fig.01 Milford-on-Sea Beach huts UK, image courtesy of Snug Architects

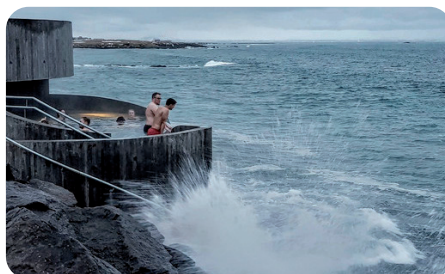


Fig.02 Guðlaug Baths, Iceland, image courtesy of BASALT Architects



Fig.03 Kustwerk Katwijk coastal reinforcement and underground parking in the Netherlands, image courtesy of ZJA Architects

"Flooding is one of the most important climate change challenges facing the UK, and people affected by flooding are more likely to experience adverse health outcomes including long-term impacts on mental health and wellbeing"

Health Effects of Climate Change (HECC) in the UK: 2023 report, published by UK Health and Security Agency

Key Design Deliverables

Entrant's designs must feature concrete as a significant component of the proposal, demonstrating an understanding of how concrete can be used to reduce whole life carbon, provide climate change resilience and support a more circular economy. The judges will also be looking for design creativity and flair with proposals that exploit concrete's potential for unique forms, pattern, texture and colour. Entrants must also demonstrate their investigation into manufacturing and construction processes of concrete.

Entries will be judged against the following three design deliverables:

Design Deliverable 01 – Sustainability

The concrete structure / building must demonstrate, material efficiency, lower carbon cement, responsibly sourced materials, climate change resilience, support of circular economy principles, support of biodiversity, and reduction of whole life carbon emissions through passive design features such as thermal mass, adequate ventilation and passive solar shading.

***Hints:** Concrete's role in delivering a sustainable built environment through performance benefits is increasingly recognised and utilised by design teams. The use of local lower carbon concrete mixes, aggregates, recycled content, lean low-waste forms, and modern methods of construction, together with concrete's potential to provide passive climate change resilience and energy efficiency, are just some of the ways in which concrete can be used within highly sustainable buildings. Concrete's role in providing flood resilient construction is of particular benefit for this brief.*

Design Deliverable 02 – Creativity

The design must demonstrate the entrant's understanding of concrete as a material. The concrete should be designed with imagination, flair, aesthetic appreciation and innovation in mind. Exploration of colour, texture, pattern, shape and form are encouraged.

***Hints:** Concrete does not need to be boxy or grey! It offers great scope for achieving a range of textures, forms, colour and pattern. The possibilities are almost endless. Check out The Concrete Centre's case study web page www.concretecentre.com/Case-Studies and Concrete Quarterly magazine www.concretecentre.com/Concrete-Quarterly-magazine for inspiration*

Design Deliverable 03 – Manufacturing and Construction

The entrants must outline what methods of concrete manufacture and construction they propose would be used for their design or different parts of their design. They must provide critical and reflective written narrative on why they have selected certain methods of manufacture and construction over others. Annotation and narrative should also be provided on the type(s) of formwork that would be used on the project.

***Hints:** Understanding the process of making concrete and the materials that are used, either in the factory or on site, is key to exploring concrete's potential. Concrete can be used in many different parts of a building, including foundations, structural frame, walls, cladding, floors, roof and even furniture. It can be cast or sprayed in-situ, using formwork (moulds) or pre-made (precast) in a factory to be assembled on site. The concrete can be made especially for your project or selected from premade elements. Buildings often utilise a combination of techniques (hybrid construction).*

Other more innovative manufacturing and construction techniques include use of alternative formwork, glass reinforced concrete, rammed or 3D printed concrete. The texture of whatever concrete is poured into will be imprinted into the surface of the concrete. Conventionally concrete is poured into plywood or steel formwork, but it can also be cast against fabric, rubber, plastic, wax, cardboard, almost anything really provided you can remove the formwork. More often than not, concrete is left 'as struck' straight out of the formwork, but concrete's texture and colour can also be altered after it has been cast. These 'post-finishing' techniques include acid-etching, bush-hammering and grit-blasting to achieve varying degrees of roughness, revealing the colours of the aggregates within.

A wide range of learning resources to support the competition, including publications, webinars and case studies are available free of charge on The Concrete Centre website: www.concretecentre.com.

This also includes the back catalogue of Concrete Quarterly magazine at www.concretecentre.com/archive where students and tutors can find inspirational precedents and useful technical advice.

A specific list of resources useful for students and tutors taking part in the competition can be downloaded from www.concretecentre.com/designconcrete

The Site

The location for the project is on the Canvey Island Seafront in Essex.

Canvey Island is very low lying with ground levels nearly two metres below the daily high tide level in the Thames estuary. This means that much of Canvey Island is at risk of flooding. This risk is managed by 14 miles (23km) of tidal defences which provide a very high standard of protection and were built in response to the last tidal flood event to impact the Island in 1953. The tidal defences play a critical role in reducing the risk of flooding to people, property and infrastructure on the island.

In 2022 The Environment Agency began work to renew the flood defence revetment on the southern shoreline of Canvey Island. The work being carried out will extend the lifetime of the sea defences in this area for another 50 years whilst also improving public access to the seaward walkway and foreshore. Work is ongoing and due for completion in 2025. The extent of the Environment Agency renewal project is outlined in red on fig. 04

The site consists of flat and sloping terrains, daily tidal variations and proximity to existing infrastructure and housing, all providing students with exciting opportunities for contextual design. See fig. 05 for a typical aerial photograph of the seafront. **Student's designs must be informed by and respond to these special and unique landscape features.**

Students are given the option of locating their design proposals in two different locations along the sea wall. Site 1 [fig. 06] or Site 2. [fig.07]

Site 1 is located towards the western end of the seafront where Thorney Bay meets the Thames Estuary. The sea wall articulates from a North westerly trajectory to a West/ East trajectory at

this point. There are steps down to the shoreline and a series of benches along the sea wall promenade.

Site 2 is located at the Eastern end of the seafront. The sea wall articulates from a West / East trajectory to a North / South trajectory at this point. There is a pumping station within this site and open green space on the landward side of the sea wall. The open green space is the Canvey Island B17 memorial ground dedicated to those who lost their lives on the 19th June 1944 in a B17 aircraft collision off Canvey Point.

For the purposes of the design and sustainability competition, students should assume that a minimum 10m long section of existing sea wall is to be removed and replaced entirely within their selected site.

Site information

A full pack of site information including scaled drawings, photographs and film footage can be downloaded at: www.concretecentre.com/designconcrete

The site is open to the public. Whilst there is no specific requirement for students or tutors to visit the Canvey Island Seafront to take part in the competition, entrants are welcome to visit the publicly-accessible areas of the site, under their own supervision, should they wish to do so.

Visitors should note the risks associated with coastal environments and take necessary precautions to remain safe. Access is not permitted, under any circumstances, to the working areas of the adjacent Environment Agency construction works.



Fig. 04 Location plan with extent of Environment Agency work outlined in red [image courtesy of The Environment Agency]



Fig. 05 Aerial photo of part of the the Canvey Island seafront [image courtesy of The Environment Agency]



Fig. 06 Site 01 boundary outlined in red



Fig. 07 Site 02 boundary outlined in red

Assessment criteria

Design Deliverables checklist

The entries will be judged using the following assessment criteria:

Design Deliverable 01 – Sustainability

- The concrete structure / building must demonstrate, material efficiency, lower carbon cement blends, responsibly sourced materials, climate change resilience, support of circular economy principles, support of biodiversity, and reduction of whole life carbon emissions through passive design features.

Design Deliverable 02 – Creativity

- The design must demonstrate the entrant's understanding of concrete as a material. The concrete should be designed with imagination, flair, aesthetic appreciation and innovation in mind. Exploration of colour, texture, pattern, shape and form are encouraged.

Design Deliverable 03 – Manufacturing and Construction

- The entrants must outline what methods of concrete manufacture and construction they propose would be used for their design or different parts of their design. They must provide critical and reflective written narrative on why they have selected certain methods of manufacture and construction. Annotations and narrative should also be provided on the type(s) of formwork that would be used on the project.

The interpretation of the above criteria by the award judging panel will be final and formal feedback will not be provided.

Submission stages

Step 1 – Registration

17th June 2024 - 6th January 2025

Universities and independent students should register their interest to enter the competition by filling in the online form at www.concretecentre.com/designconcrete by 6th January 2025.

Once registered, each university will be provided with three unique finalist entry reference numbers to be included on their submissions along with instructions as to where the final submissions should be uploaded. Each independent student (i.e. those not at a university running the competition in their course) will receive their unique entry reference number and instructions on how to submit directly once registered.

Eligibility

- Design Concrete is open to undergraduate and postgraduate students enrolled in UK schools of architecture, landscape architecture and the built environment.
- Entries can be single, joint, or from teams of up to four students.
- The competition is aimed at students in their second and third years of undergraduate study although postgraduate and alternative course structures are also eligible if agreed in advance.

University submissions

Each university will be asked to select a maximum of three students' work for submission.

Independent submissions

Independent submissions of work from students whose universities are not embedding the competition brief within their course will also be reviewed and considered but only ten such submissions will be shortlisted for judging at the national level alongside university submissions. Entries cannot be entered via both routes. Students submitting independently of their university must provide proof of an active university email address.

Step 2 – Submission

Deadline: 17th April 2025

Each university/student is to upload their anonymous submissions and separate contact details forms to the online storage platform provided by The Concrete Centre. For team submissions, the contact details for every student involved in each submission must be provided. Submissions can be uploaded at any time during the competition period but must be uploaded before 5pm on 17th April 2025.

Submission requirements

A maximum of three A1 digital presentation boards are permitted for each student/team submission. The competition entries should be submitted as digital PDF files. It is essential that all submissions are anonymous from both a student and university perspective. Each entrant's unique entry reference number should be clearly marked on all boards forming the design entry. No other form of identification or distinguishing mark should appear on any part, or file name of the submission.

Presentation boards should visually communicate the design, sustainability proposals and the supporting ideas in a persuasive and descriptive way.

Entrant's designs must feature concrete as a significant component of the proposal. This should include the following as a minimum:

Scaled drawings

Scaled, annotated drawings should be included in the student's submission. Drawings may be prepared using appropriate CAD software, or by hand. In either case, notes and dimensions should not be smaller than the equivalent of an 11pt font when printed at A1.

Drawings must be to an appropriate scale. The drawings should show the following:

- i. Site plan.
- ii. General arrangement floor plans of all levels.
- iii. Section(s) through the proposed design showing relationship to site context, methods of inhabitation and scales of space.
- iv. Elevations of the proposed design showing its form shape and materiality in relation to the existing context.
- v. Construction detail(s) showing interconnection of concrete building elements with themselves and with the surrounding context.
- vi. A timeline series of section drawings showing the proposal during construction, 5 years after completion and 50 years after completion.

Models and views

Images of 3d modelling (either digital or physical) should be included on the student's submission boards. All 3d modelling must show the design proposal accurately located to scale in its surrounding context. 3d images should convey the unique atmosphere, character and inhabitation of the spaces and places being created by and within the design proposals.

Students are also encouraged to include referenced and annotated precedent images of existing concrete to illustrate inspiration of form, texture and colour and construction.

Awards

A shortlist of entries will be selected, from which the winners of the national competition will be chosen. Every winning and shortlisted student will receive a signed certificate and each prize winning university will receive a signed certificate.

A prize fund of £1500 is available for each of the undergraduate and postgraduate student categories. The judges reserve the right to award joint winners or a series of prizes in each category, in which case the awarded funds will be divided at the judging panels' discretion.

Presentation

The prizes and certificates will be presented at an event organised by The Concrete Centre. The prize winners and tutors will be notified of further details regarding date and location in advance. Extracts from the winning and shortlisted entries will also be exhibited and publicised on The Concrete Centre's social media platforms and website along with credits.

Rules

1. Complete design entries must be received by the final deadline of 5pm on the 17th April 2025. Late or incomplete submissions will not be accepted.
2. Each student will be allocated a unique entry reference number which should be clearly marked on all pages forming the design entry. **No other form of identification or distinguishing mark should appear on the boards or any part or file names.**
3. A successful competitor must be able to satisfy the judges that he or she is the bona fide author of the design that he or she has submitted.
4. Competitors should retain the originals of the designs and drawings submitted.
5. Any entry may be excluded from the competition if:
 - The competitor does not meet the eligibility requirements.
 - The entry is received after the competition closing date.
 - The competitor discloses his or her identity in the submission.
 - The entry does not comply with all of the submission requirements.
 - The competitor attempts to influence either directly or indirectly the decision of the award judging panel.



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First published 2024
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The Concrete Centre is part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and industrial sand industries.

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Close up of a textured concrete panel at the Settlers of Porthcawl project by Blue Cube Marine



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