



# GO

# INSPIRE THE FUTURE

**Building Bridges  
CREST Challenge**

ACTIVITY LEAD'S GUIDE



A British Science Association programme





# GETTING STARTED

## How to get involved

The Challenge works best if you decide what you want to get out of it and how you will organise it at the very beginning. This section will help you to do that. It is shaped around the key decisions that you need to take to make this Challenge successful.

### The questions you need to answer are:

- Which participants will take part?
- How will you find a company or engineer to work with?
- How will you allocate the time for participants to complete the Challenge?

## The Challenge

Participants must design a bridge to go across the Learning River, considering the client's expectations regarding drainage, sustainability, aesthetics and the environment.

The Challenge includes a tour of bridges in your town, with an employer.

Participants can enter their Challenge for a CREST Bronze Award.

## Selecting the participants

We recommend a maximum group size of 15-20, with four or five in each team. We suggest that participants taking part in the Challenge are in key stage 3, though participants in key stage 4 may also benefit.

Each team member should take responsibility for leading on one or more tasks. They must all take a role in shaping the solution. In challenges like this, teams work best when participants take ownership of the Challenge by dividing up tasks between themselves.

## HOW TO REGISTER THE PARTICIPANTS FOR CREST AWARDS

CREST Awards is managed by the British Science Association and delivered by a network of local co-ordinators. You need to register the participants for CREST Awards at the beginning of the Challenge.

Contacting your local co-ordinator at the beginning of the Challenge also means you will know who to talk to if you have any problems with CREST during the Challenge.

You will be able to find your local co-ordinator here:

**[britishscienceassociation.org/crest-awards/finding-your-crest-local-coordinator-list-view](http://britishscienceassociation.org/crest-awards/finding-your-crest-local-coordinator-list-view)**

The CREST Bronze Award requires participants to complete a minimum of 10 hours of work on a single project at a level roughly equivalent to key stage 3. It requires the participants to do the work themselves, with support from an activity lead and sometimes a mentor. In this case, you should arrange support from either a local civil engineering employer or an individual civil engineer.

## HOW WILL YOU FIND A COMPANY OR ENGINEER TO WORK WITH?

When looking for help with finding companies, we suggest you start with:

- Your local Strategic Partnership Adviser. To find out your nearest adviser email **[local.strategy@citb.co.uk](mailto:local.strategy@citb.co.uk)**
- Your local education business partnership (EBP), where one exists – if you don't know where to find your EBP, ask a colleague with responsibility for careers or work experience
- One of the bodies that runs ambassador schemes, which may be able to link you with an appropriate person from industry. Examples of ambassador schemes include:

**STEM Ambassadors** – this scheme is managed by your local STEMNET contract holders **[stemnet.org.uk/regions](http://stemnet.org.uk/regions)**

**ICE Ambassadors** – this scheme is run largely by volunteers from the Institution of Civil Engineers. Any request sent to STEMNET will go to all ICE Ambassadors as well

**Chartered Institute of Highways and Transportation** **[ciht.org.uk](http://ciht.org.uk)**

## HOW TO PREPARE THE PARTICIPANTS FOR THE CHALLENGE

**The Challenge has a number of phases:**

- 1 Register with CREST
- 2 Bridge visits
- 3 Challenge briefing
- 4 Project planning
- 5 Research
- 6 Selecting a location for the bridge
- 7 Selecting a design type for the bridge
- 8 Producing the proposal
- 9 Completing CREST Bronze Profiles.



## Scheduling time for the Challenge

We don't stipulate how the time for the Challenge is split up, as in most cases this will depend on your school's timetables. However, here are two examples of how the Challenge could be broken down:

### Example 1: Based on two-hour slots after the site visit

Session	Content
1	Visit several bridges in the local area, with contrasting design styles and types. This should include a minimum of three types of bridge design, although the more bridges the participants see, the better prepared they will be for the Challenge.
2	Challenge briefing and project planning. Teams plan their work and develop an understanding of the Challenge and possible solutions. This should include studying bridge types, associated issues, types of tree to plant on contaminated land and sustainable drainage systems.
3	Begin work on site plan. Teams decide on a site for the bridge and begin to produce their proposal, which includes the sources of information they have used and the outcomes of their research.
4	Complete work on site plan, bridge plan and proposal.
5	Check over site plan, bridge plan and proposal. Participants also complete their CREST Bronze Profiles.

### Example 2: Based on one-hour slots after the site visit

Session	Content
1	Bridge tour, as above, totalling two hours.
2	Challenge briefing and project planning. Participants receive the Challenge briefing and plan their work for the project.
3	Research bridge types, associated issues, types of tree to plant on contaminated land and sustainable drainage systems.
4	Finish off research and begin discussing where the different elements will be placed on the site.
5	Develop site plan and bridge plan.
6	Review and complete site plan and bridge plan, while beginning to work on the proposal documents.
7	Complete proposal, check over all documents and plans, then review content.
8	Discuss proposal, make any required changes and begin completing CREST Bronze Profiles.
9	Complete all work.

In our experience, the key to success is giving participants a clear, up-front schedule of when they can work on their projects, and ensuring that, at the end of each session, each team spends 5 to 10 minutes bringing together all their tasks.





## INTRODUCING PARTICIPANTS TO CIVIL ENGINEERING

One of the purposes of this Challenge is to introduce participants to civil engineering as a discipline. Having real civil engineers in the classroom is the best way to do this but you may also find the following resources useful in supporting participants' understanding of civil engineering.

Civil engineering careers profiles  
**[goconstruct.org](http://goconstruct.org)**

Tomorrow's Engineers resource pack  
**[tomorrowsengineers.org.uk/resources/](http://tomorrowsengineers.org.uk/resources/)**

Institution of Civil Engineers resources for teachers  
**[ice.org.uk/what-is-civil-engineering](http://ice.org.uk/what-is-civil-engineering)**

The Royal Academy of Engineering's Engineering engagement programme  
**[raeng.org.uk/education/eenp/engineering\\_resources/Teaching\\_and\\_Learning\\_Resources.htm](http://raeng.org.uk/education/eenp/engineering_resources/Teaching_and_Learning_Resources.htm)**





## THE BRIDGE TOUR

The Challenge includes a tour of the bridges in your town, with an employer. Before you arrange the tour you need to have a partner company in place, whose input is crucial to the success of the tour.

The idea of the bridge tour is to give participants an impression of several different types of bridge. This means that the visit needs to be carefully planned and that it may involve driving between sites if your local area does not have sufficient dissimilar bridges in close proximity.

There are several websites that you may find useful in identifying appropriate bridges:

### **[canalrivertrust.org.uk/canals-and-rivers](http://canalrivertrust.org.uk/canals-and-rivers)**

The Canal and River Trust is the navigation authority for half of Britain's rivers, and all canals. The map on this site will help you find local canals and rivers.

### **[canalrivertrust.org.uk/in-your-area](http://canalrivertrust.org.uk/in-your-area)**

This map will show bridges on canals or Canals and River Trust controlled waterways in your area. Bridges are only shown at quite high levels of magnification so be sure to zoom in sufficiently to see them.

If you can't find information on all the waterways in your area through the Canals and River Trust, check if there is a specific navigation authority for your area. Major rivers with industrial ports tend to have their own navigation authority. Sometimes this is a port authority; for example, the Port of London Authority or the Port of Tyne Authority.

### **[abports.co.uk](http://abports.co.uk)**

Associated British Ports controls ports in several parts of the UK.



If your visit includes access beyond normal public access to any of the bridges, you will probably have to arrange this with the appropriate authority. It is your responsibility to ensure that all necessary safety precautions are taken, and, although the authority may provide you with a risk assessment for visits, you should ensure that it includes sufficient controls to keep the participants safe when adopting it as part of your visit protocols.

If participants are required to wear Personal Protective Equipment, you may be able to obtain it from the company or authority with which you have arranged the visit. Whether or not this organisation can provide the necessary equipment, the responsibility for the participants' safety still rests with you. You should ensure that appropriate risk assessments are completed, and put the necessary controls in place.

### Before the tour

- Tell the participants that they are going to take part in a CREST Challenge.
- Explain that the tour is an opportunity to gather information to help them with the Challenge.
- Brief participants on how you expect them to behave, and how to stay safe during the tour.

### Taking the tour

The tour is intended to be a learning experience. It forms part of their research for this Challenge, so participants should be gathering information on the worksheet provided. If participants cannot demonstrate how they found certain information, they will reduce their chances of gaining a CREST Bronze Award.

During the tour, the employer will help the participants to understand how the bridge structures work. As the employer is not familiar with your participants' level of knowledge, there may be points during the tour when you feel some additional explanation is necessary.

### Alternative visits

We believe a visit of some kind is an essential part of this Challenge and, for the visit to be useful to the participants in completing the Challenge, it must include an opportunity to learn about several different kinds of bridge structure. However, we understand that it may not be possible to tour a selection of bridges in your area. If so, we strongly recommend that you arrange for a civil engineer to visit to talk about types of bridge structure and use the worksheet provided for participants to allow them to gather information about different types of bridge. The worksheet is provided as a Word document so that you can edit it to fit the circumstances.

If you feel the participants may benefit from receiving the information in two different ways, it may be wise to arrange both a tour and a talk in school at the beginning of the Challenge. As with many aspects of this Challenge, we leave it to your professional judgement to determine what is best for the participants.





## PLANNING AND RESEARCH

To help participants to plan their time, we have provided a Critical Path Planning Table. It is worthwhile encouraging them to complete it because it addresses one of the CREST assessed skills. It's very simple to use, and, if participants use an Excel spreadsheet to type up their plan, they can use the filter and sort functions to produce individual task lists.

As part of the Challenge, the participants need to research:

- Types of bridge, and the requirements of a site for each type of bridge
- Materials for bridges that will be both visually appealing and low maintenance
- Trees that will grow on acid soil
- Sustainable drainage systems.

## PRODUCING THE PROPOSAL

- Details of what participants need to include are in the participant brief.
- The choice of format is open, as we wish participants to select it for themselves.
- When writing about research, we want participants to summarise information in their own words. Copied and pasted text will be detected during moderation and can result in participants not receiving a CREST Bronze Award.
- The key point for participants to remember in their proposals is that civil engineering projects require consideration of many factors when creating a design.
- Proposals should be focussed, simple and short.
- The client is only interested in how the proposal will meet their requirements. Encourage participants to leave out anything which does not achieve this.

## REFERENCING INFORMATION

At the end of their proposal, participants need to include a list of sources of the information they used. We don't require full details, but we do want to see that participants have consulted a range of sources. Each source should include:

<b>Website</b>	Web link
<b>Book</b>	Author(s) and title
<b>Article</b>	Publication title, date of article, article author(s) and article title. Where appropriate, we are happy for articles consulted online to be included as a web link.





## COMPLETING AND ASSESSING CREST AWARDS

Upon registration with CREST you will receive a number of documents including:

1. A personalised Bronze Student profile
2. A copy of the CREST Criteria to inform of the requirements for a CREST Bronze Award
3. CREST Bronze Award: What educators need to know: this document provides guidance on assessing CREST Bronze projects.

To get their CREST Bronze Award, each participant needs to contribute to the team proposal and then, individually, to complete a CREST Bronze Award Profile. The team can use the checklist to help them make sure they have provided information about each of the CREST assessed skills. The 'personal reflections' section guides participants through reflecting on their own performance. There is guidance within the profile document on how to complete it. More information about CREST Awards can be found on [britishscienceassociation.org/crest](http://britishscienceassociation.org/crest)

Make sure you are familiar with the Bronze assessment process and assessment criteria. Contact your local co-ordinator for advice if you are uncertain.

At the end of the Challenge you may choose to celebrate the participants' achievements and invite the employer back to review the project outcomes.

To find out about other activities and CREST Awards, contact [experience@goconstruct.org](mailto:experience@goconstruct.org)



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# MAKE A DIFFERENCE

For more information on  
CREST Awards and Go Construct

Please visit  
**goconstruct.org**

Or contact  
**experience@goconstruct.org**

CITB operating as Go Construct. CITB is registered as a charity in England and Wales  
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