Are you Offsite Ready? online design challenge

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Introduction

This example design brief will show you how you can integrate the Offsite Ready learning materials into a fully digital online student project. This is becoming increasingly important due to the global lifestyle changes in 2020. This document will be refined as the pilot student challenge takes place during 2020, and afterwards will be made available in editable form so that you can replace mentors' names, the site data, and any other information and apply it directly within your institution(s). This project can be integrated into the typical 10 to 12 week design studio project within colleges and universities, it can be used as an extracurricular summer activity, or it can be adapted to a shorter hackathon CPD event for those working in practice.

What you need to do to prepare

- Ideally, you should substitute the scenario of this brief with a location that is close to your challenge participants' context
- Work with a local consultancy or similar practice who have worked on the feasibility of the site to develop the new scenario
- Secure involvement from the clients for mentoring sessions and final review
- Identify people from your professional network who would like to participate as mentors
- Secure the involvement of at least one mentor per week
- Write a short recruitment text to recruit students (sample shown below)
- Administer the students' applications
- Collate information, drawings and any necessary technical data about the site
- Setup a communications and file storage system for the mentors and students
- Ensure the students and mentors are meeting regularly and progressing well
- Invite an external audience to the final online presentations

Sample student recruitment text:

'Do you want to add industry-interfacing experience to your CV this summer while working from home? Do you want to inform the design of a current live design project with a good cause? Then the 'Are you Offsite Ready?' challenge is for you! Over **12** weeks starting in June you will work with peers from Edinburgh Napier University and the City of Glasgow College in a team to design a sustainable visitor hub using offsite construction technologies. You will benefit from weekly support from **12** mentors including architects, engineers, business entrepreneurs and offsite construction scientists. Your journey and your work will be showcased on the offsite ready website www.offsiteready.com, helping to raise your profile. So what are you waiting for? Fill out the simple form to apply.'

Theme

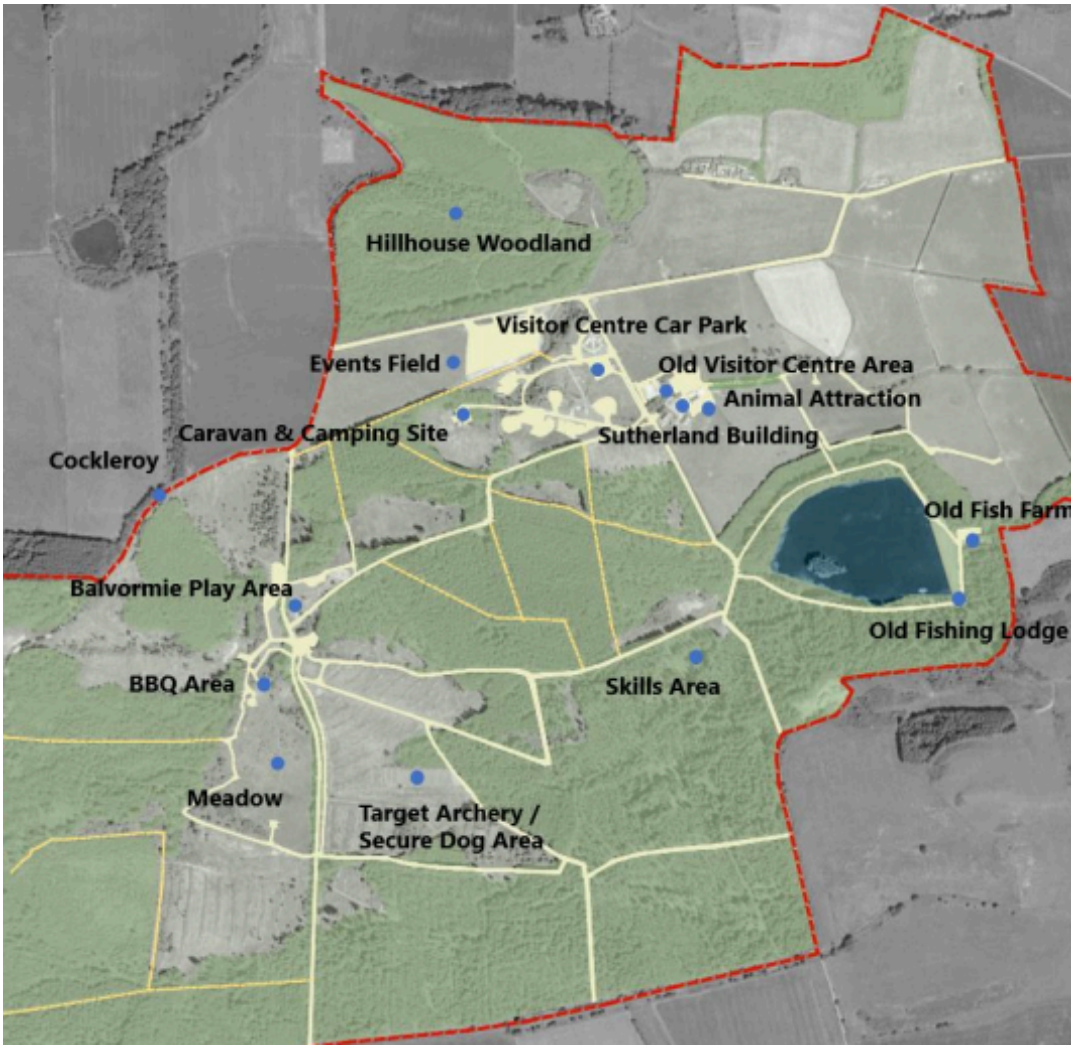
Circular-economy design of an offsite construction project based on social, economic and environmental sustainability.

Problem

How can we design, construct and deconstruct an inclusive, productive and ecologically considerate visitor hub in a country park using offsite construction?

Scenario

Beecraigs Country Park is located near Linlithgow and not far from Edinburgh. It has a variety of attractions however these are disconnected. With a series of interventions suggested by consulting firm SWECO, the park aims to increase footfall/footfall, create a circular route for the main attractions, organise events with catering, and build a new visitor hub. By doing so, the hope is to relieve existing visitor pressure by spreading public use across the park. The Park has over 1million visitors per year.



SWECO West Lothian Council Beecraigs Business Feasibility Study February 2020

Proposed Locations

Team 1 - Vacant plot near “Animal Attraction”, there is no connection to water and electricity - this should be factored into the design.
https://goo.gl/maps/CaDfmC3qQ46mfie69

Team 2 - Skills area, demand is present here and it removes some of the footfall pressure away from the country parks visitor centre.
https://goo.gl/maps/vT5sj3w2kxJw7pH28

Challenge

There will be two teams, each team has to collaboratively design an **offsite construction visitor hub**, at the relevant location above, that includes, although not limited to:

- Multi-functional space with capability to sell from location, host exhibitions or develop crafts and cooking skills for the local community at different times of the day.
- A canopy or similar with external areas bridging the outside to the inside.
- Use of a fabric-first approach mixed with renewable energy (most suited for solar).
- Use of local supply chain and nearby forests.
- Opportunities for upskilling of students and local residents throughout the build e.g. advantages of offering upskilling opportunities post COVID-19.
- A name for the building that captures all the possibilities of the building (named hub throughout this document).
- The client wants to start small and see what opportunities for expansion there will be in future years – within the specified area. If you find this too limiting you can suggest refurbishment and integration of some existing surrounding buildings.
- There may be the opportunity to replicate the design in the sister parks should it prove successful.
- A summer-time demountable pavilion, which can be constructed on either of the two sites, and indeed also on other similar sites in nearby country parks

Spatial Requirements

1. Good focal point of main front door entry and main reception area.
2. Retail Shop e.g. organic, nordic style with unique gifts and artwork
3. WC's Disabled and Baby Change areas capable of being supervised from reception Area – consider requirements of no. of WC's
4. Office space – can double as retail space/workshop space at different times of day.
5. Workshop space – can double as office space at different times of day.
6. Kitchen area and cafe that can be used to prepare food for and host exhibitions.
7. External covered seating area or similar space bridging the outdoors to the indoors

All of the above must comply with Scottish Building Regulations (non domestic).

You can determine the building gross internal floor area based on the available site. You are encouraged to make the footprint as small as possible using multi-functional spaces as suggested in brackets above.

There are no exact spatial requirements for the pavilion, but it should be able to serve as a pop-up workshop, shop for local entrepreneurs, or as an exhibition space.

Outputs

Monthly short vlogs (circa 2 to 5 mins) on progress so far, what you have learnt, or what challenges you are encountering - sent to Louise, the Building Information Manager.

Final online pitch presentation, with a walk-through video of the digital model, to the client and members of the private and public sectors. They will have the opportunity to provide feedback in the form of voting for the preferred proposal. Final pitch content:

Topic	Content
Digital design	Proposed site plan - the site plan should consider site analysis building orientation, sun path), 2 x sections (minimum), 4 x elevations, 2 x building envelope details (roof, window head, window cill, foundation) and 2 x deconstruction connection drawings in 2D or 3D. **Hint:** there should be good views of the Forth Valley and the bridges, you can try and maximise these.
Estimating / Commercial	Bill of quantities and procurement process.
Logistics	Supply chain management for materials, transportation of offsite components from the factory to the site, transport strategy for visitors from the local area. **Hint:** Construction Scotland Innovation Centre - their Innovation factory has a panel assembly line and a mass timber press
Offsite manufacture	Manufacturing location(s) map, manufacturing process flow chart showing key equipment used at each stage and offsite components de-construction process (circular economy).
Onsite placement and assembly	Onsite construction sequence in 3D showing the substructure, superstructure, internal and external works, and onsite works de-construction process (circular economy).
Management and integration	Executive summary showing the project impact in numbers and figures (e.g. this amount of embodied and operational carbon saved, this sustainability accreditation targeted, use of local supply chain equals this many new/secured jobs in the area, this many unemployed local people upskilled), and managing responsibilities between the team members. **Hint:** you can use this or other similar free tools to create an infographic for the executive summary: https://www.canva.com/create/infographics/
As a team	2-minute video of the final hub design showing a fly-through of your BIM model(s).
Summer pavilion (optional)	Plan, section, elevation, 3D views, manufacturing, transportation, construction & de-construction shown in PDF, slides, and/or video
Context and community	Site investigation of the local area, showing content relevant to the final hub and pavilion designs

Teams

The roles of the teams should correspond to the Offsite Ready modules, so that the students can use the learning materials from each module during this challenge.

Team 1

Role	Student	Offsite Ready module
Digital designer 1	Callum Nicolson (CoGC)	Digital Design
Digital designer 2	Zarja Krevelj (ENU)	Digital Design
Quantity surveyor	Aida Pashko (CoGC)	Estimating / Commercial
Logistics manager	vacant	Logistics
Production manager	Euan Matthews (ENU)^	Offsite Manufacture
Site manager	Mohsin Khan (CoGC)^	Onsite Placement & Assembly
Project manager	Liam Joseph O'Donnell (ENU)	Management & Integration
Summer pavilion*	Bartosz Belch (ENU)^	All modules
Context and community*	Danny Milton (ENU)^	Offsite Fundamentals

Team 2

Role	Student	Offsite Ready module
Digital designer 1	Andrew Lennie (CoGC)	Digital Design
Digital designer 2	Calum Stuart (ENU)	Digital Design
Quantity surveyor	vacant	Estimating / Commercial
Logistics manager	Ali Ridha (ENU)^	Logistics
Production manager	Emily Rankin (ENU)	Offsite Manufacture
Site manager	Phil Alves de Sousa (CoGC)^	Onsite Placement & Assembly
Project manager	Callum MacGillivray (ENU)	Management & Integration
Summer pavilion*	Agata Gaspari (ENU)	All modules
Context and community*	Sufiyan Gour (CoGC)^	Offsite Fundamentals

Students may venture out of your role to help others where your skillset will be useful - this challenge is all about cooperation. For example, more senior students will likely naturally help those who are earlier on in their studies. This project is all about collaboration!

* Shows roles which were created for students who wanted to participate and had the necessary skills, but had limited time or other requirements.
^ Shows student who chose to withdraw due to work or other life commitments
(ENU) = Edinburgh Napier University students; (CoGC) = City of Glasgow College students

Timetable

Starting Monday June 8 2020 with an online video call introducing students to the project.

		Mentor Meeting		
Thur	Wk	Team 1	Team 2	Student Activities
11/6	1	R Hairstans, M. Duncheva, B. Stirling & E. Hopewood		Video case studies analysis
18/6	2	Rebecca McLean	Emma Cooper	Research the context
25/6	3	Caitriona Jordan	Pat Langdon	Initial concepts
2/7	4	Pat Langdon	Caitriona Jordan	Discuss and agree way forward
9/7	5	Beverly Stirling	Eirwen Hopwood	Draft designs collaboratively
16/7	6	Matt Stevenson	Matt Stevenson	Refine designs collaboratively
23/7	7	Wojtek Plowas	Wojtek Plowas	Refine designs collaboratively
30/7	8	Caitriona Jordan	Caitriona Jordan	Final design
6/8	9	Andrew Livingstone	Andrew Livingstone	Draft outputs
13/8	10	Beverly or Eirwen	Beverly or Eirwen	Refine outputs
20/8	11	Louise Rogers	Louise Rogers	Practice run for pitches
27/8	12		-	Online pitches

The scheduled mentor meetings are students' opportunity to discuss queries related to the mentors expertise, so they should watch the relevant mentor video. Students must use the time wisely and prepare any questions/content prior to the meeting. Students should prepare work-in progress that they can show mentors using share-screen.

Learning outcomes

1. Analyse a case study and its offsite construction specification according to Design for Manufacture and Assembly (DfMA) principles.
2. Design a visitor hub project according to social, economic and environmental sustainability principles.
3. Design the offsite construction technology for the project with consideration for the whole building life-cycle from digital design to management & integration.
4. Work collaboratively with multi-disciplinary peers using digital tools.
5. Critically reflect on own and peers' work on DfMA.

Mentors

Each mentor records a 10-minute introduction video so that from the start students know who to direct their questions to. These videos are viewed by the students in week 1.

1. Louise Rogers, Edinburgh Napier University
    a. Building Information Manager
    b. Coordinate day-to-day with students and keep them on-track
    c. Coordinate mentor sessions
    d. Push for monthly vlogs, edit videos and send for upload onto website
    e. Escalate any questions to mentors when necessary
2. Victor Henquel, Edinburgh Napier University
    a. Building information manager
    b. How to use SketchUp
    c. Digital components library creation
3. Dr Andrew Livingstone, Edinburgh Napier University - Trimble technology and structural timber design
4. Dr Mila Duncheva, Edinburgh Napier University - Productivity and constructability of offsite construction
5. Wojtek Plowas, Edinburgh Napier University - Mass timber products, markets and manufacture
6. Caitriona Jordan, City of Glasgow College - Architectural design and technology process
7. Prof Robert Hairstans, Edinburgh Napier University - Strategic context of offsite construction
8. Prof Pat Langdon, Edinburgh Napier University - Inclusive design
9. Matt Stevenson, SNRG - Offsite timber engineering
10. Rebecca McLean and Emma Cooper, SWECO - Sustainability in the built environment
11. Eirwen Hopwood and Beverly Stirling, West Lothian Council - The vision for Beecraigs Country Park

Lessons learnt

Student participation

Experience: At the start we decided that this project is all about inclusivity, and we wanted to give everyone interested a chance. If students' applications were not very inspiring, we arranged phone calls to follow-up and find out more about their skills. If students said they had limited time, we created custom tasks with a lower impact on the team's work such as analysing the context or creating a temporary structure.

Solution: In retrospect, being too accommodating at the start created follow-on challenges during the team's work. Many of the student participants with limited time ended up withdrawing in week (or were notified that they were withdrawn), due to low to none participation in teamwork. The remaining team members were happy with this solution. In

future such projects we recommend changing the application process. A workshop similar to the Business Case meta skills one can be used as the main application process for this online summer challenge. This would be similar to a ‘taster’ session of what is to come benefiting students with more knowledge on what to expect in the summer challenge, and the academics or facilitators can make a judgement on individuals’ teamwork and presentation skills.

Communication systems

Experience: At the beginning of the project we were looking for 1 communication system that could meet all the needs of this challenge. After a review of several systems’ functionality and accessibility by team members from different institutions, we decided to use Trimble Connect as the sole file management and communication system for teams’ work. During their first 4 weeks the teams found that Trimble Connect was great for SketchUp models viewing and overlaying, but did not have collaborative documents writing and images/videos preview functionality. This, combined with people’s natural personal preference towards systems they had already used, led to some team members starting to communicate in silos on different platforms.

Solution: Accepting the fact that no 1 system can have all the functionality needed for a collaborative offsite student challenge, we recommend that each team makes a decision on the systems they will use in the first 1 to 2 weeks of the challenge. Once decided as a team, these systems must not be changed in following weeks. From our experience student teams should choose up to 3 systems. For example, Trimble Connect can be used for the digital design of 3D models, Google Drive can be used for collaborative documents creation, and Slack, or another messenger system with desktop and mobile phone app functionality, can be used for day-to-day communications. The project facilitators should have access to the main files of both teams, but not to their day-to-day communications.

Vlogs and intermediate outputs

Experience: Reflection and presentation are important parts of the learning process for professionals in the built environment. Unfortunately, students did not take the ask to create weekly vlogs to heart and instead facilitators were chasing students for vlogs. We think this is most likely due to a lack of confidence in presenting. We all had to move away from the initial nervousness of presenting in front of a large audience at some point in our lives, and projects like this are a great opportunity to build confidence.

Solution: We found that scheduling the vlogs making at the end of online meetings with mentors worked best. This ensured that most team members were present, they had become comfortable with discussing their progress, and a facilitator was there to ask questions in a Q&A interview style. The questions were simple prompts around what students had done recently, what they found interesting and what they thought their next steps should be. And we changed the vlogs to monthly intervals, which in retrospect was more realistic and less disruptive of the teams’ weekly workflow.

Roles in teamwork projects

Experience: In offsite construction projects, different team members will typically have specific roles relevant to their area of work (for example, representing the manufacturer, the logistics partner or one of the design teams). With this in mind, we created student roles mapped onto each of the modules in the Offsite Ready project (digital designer, logistics manager, production manager, etc.). We intentionally left little guidance on the different roles, so that the students could get experience in working as a team and planning their work collaboratively. We encouraged students to look at the Offsite Ready modules if they were unsure of their role. As the teams' work progressed we found that students were less likely to help each other, because each team member worked only on their allocated role.

Solution: Instead of the typical allocation of roles in teamwork projects, we changed the project outputs table to include 'topics' instead of 'roles'. This meant that the team as a whole had to decide how and when the content would be created, and that there was less rigid separation of responsibilities. In this way students could experience a variety of roles and this encouraged cross-disciplinary collaboration. This also eliminated typical teamwork issues such as people with responsibility for site management, bills of quantities or production layouts waiting for designers to complete their work.