Expanding STEM Outreach Resources for the Young Crossrail Programme

- Seth MacDonald
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Project **Overview**

Build your own city

- Design bid build
- Real-world
- Hands-on activities
- Multiple roles
- Collaborative
- Career advice

Objective 1

Identify effective approaches for designing and implementing a successful STEM outreach programme.

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Stakeholder	Major criteria
Young Crossrail and IStructE liaisons	• singular, multi-faceted programme • structural engineering based • low budget • learning legacy
STEM programme ambassadors	• hands-on programme • student engagement • strong supplemental materials
STEM professionals	• model real-world problems • inform about engineering • academic and career advice

Objective 2

Design a low-cost and age-appropriate outreach programme, with associated implementation guides, based on simplified engineering problems.

Our **Programme Materials**

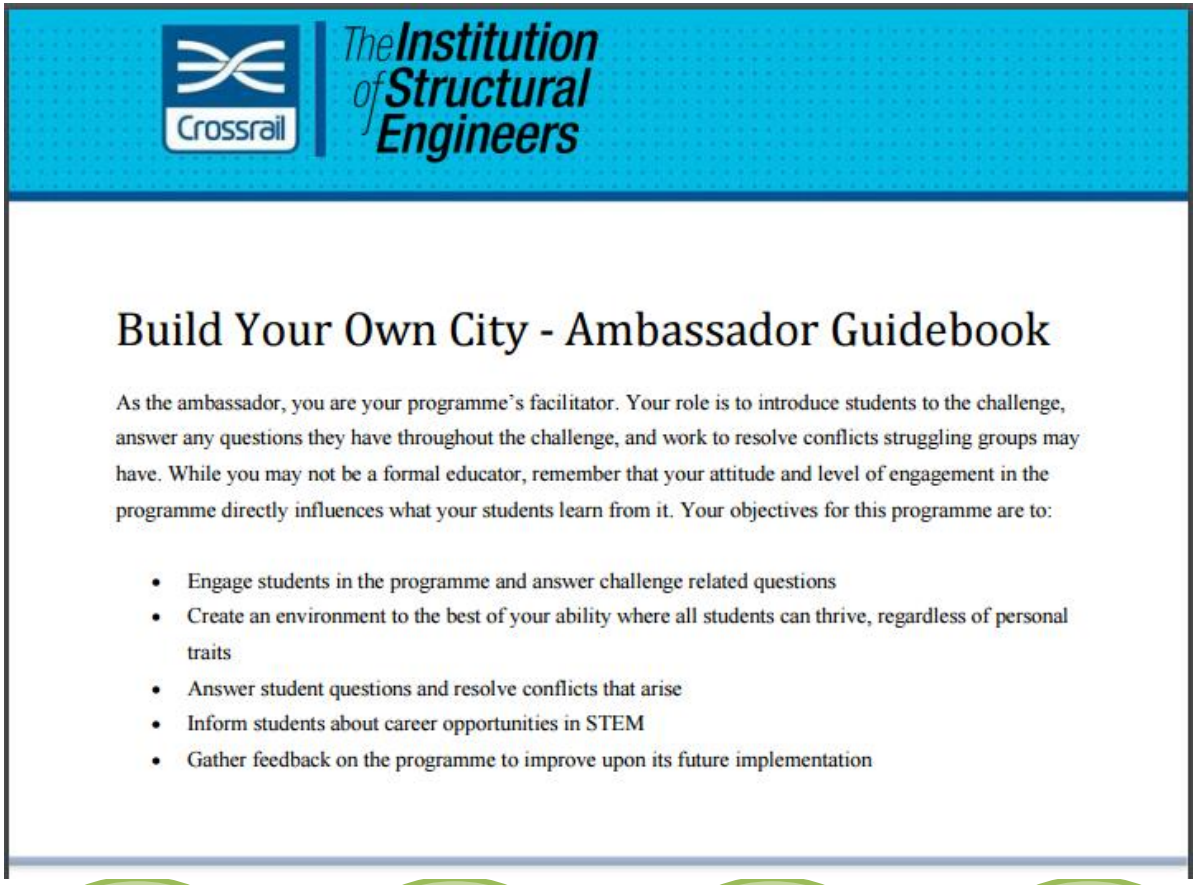
BUILD YOUR OWN CITY

Overview | Identify | Design | **Programme** | Assess & Improve | Closing

Our **Programme Materials**

Ambassador Programme								
Roles	**Design Phase**				**Bid Phase**			**Build Phase**
	Concepts	**Decision**	**Development**		**Analyse**	**Combine**	**Present**	**Construct**
Architect	**Design structure aesthetics**	**Share the concepts and decide on one**	**Design room plans**	**Design floor plan**	**Finalise floor plan**	**Combine their work in one presentation and get team goal statement**	**Present to ambassadors**	**Build the building with the help of design**
Project Manager			**Design timetable**	**Check prices & adjust to crisis**	**Finalise budget finalise timetable**			
Structural Engineer	**Work with materials**		**Design building structure**		**finalise structure**			
Aprox. time required	**around 2 hours total**				**around 1.5 hours total**			**around 2 hours total**

Our **Programme Materials**

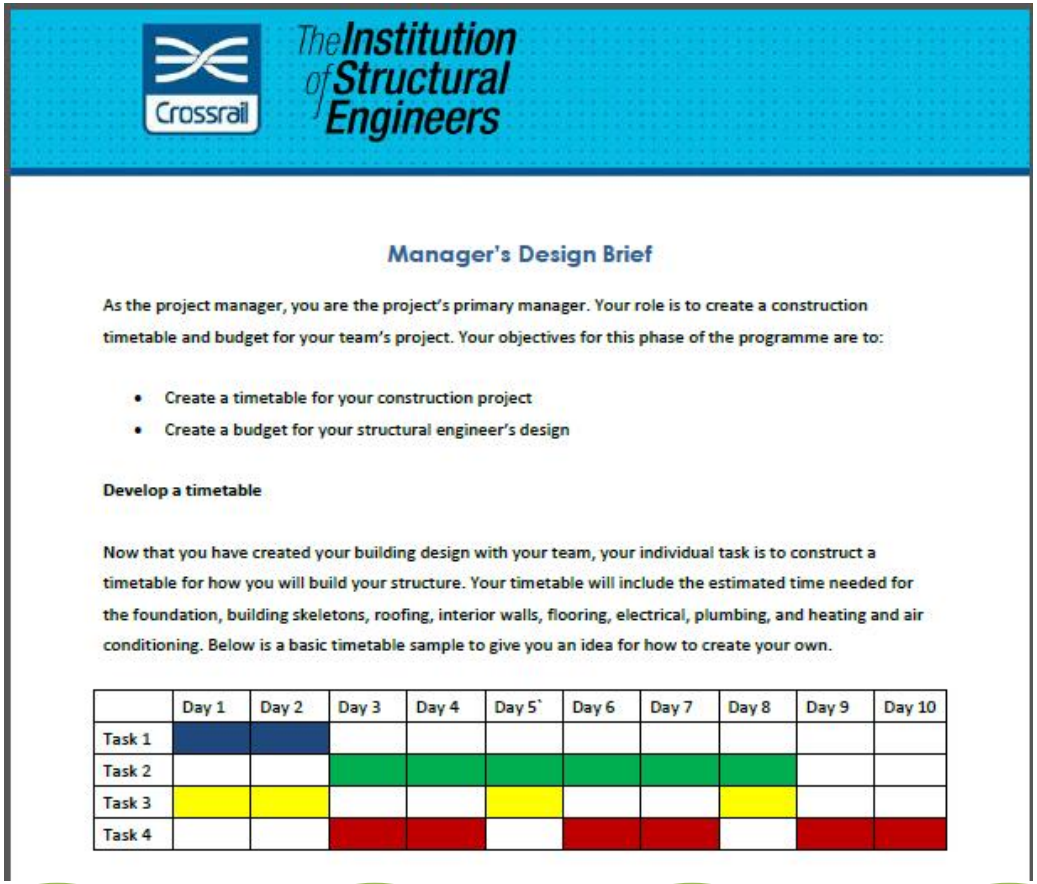


Build Your Own City - Ambassador Guidebook

As the ambassador, you are your programme's facilitator. Your role is to introduce students to the challenge, answer any questions they have throughout the challenge, and work to resolve conflicts struggling groups may have. While you may not be a formal educator, remember that your attitude and level of engagement in the programme directly influences what your students learn from it. Your objectives for this programme are to:

- Engage students in the programme and answer challenge related questions
- Create an environment to the best of your ability where all students can thrive, regardless of personal traits
- Answer student questions and resolve conflicts that arise
- Inform students about career opportunities in STEM
- Gather feedback on the programme to improve upon its future implementation

Our **Programme Materials**



Manager's Design Brief

As the project manager, you are the project's primary manager. Your role is to create a construction timetable and budget for your team's project. Your objectives for this phase of the programme are to:

- Create a timetable for your construction project
- Create a budget for your structural engineer's design

Develop a timetable

Now that you have created your building design with your team, your individual task is to construct a timetable for how you will build your structure. Your timetable will include the estimated time needed for the foundation, building skeletons, roofing, interior walls, flooring, electrical, plumbing, and heating and air conditioning. Below is a basic timetable sample to give you an idea for how to create your own.

	Day 1	Day 2	Day 3	Day 4	Day 5`	Day 6	Day 7	Day 8	Day 9	Day 10
Task 1										
Task 2										
Task 3										
Task 4										

Overview | Identify | Design | **Programme** | Assess & Improve | Closing

Objective 3

Assess and improve the programme.

STEM Workshop

STEM Workshop

Friday 22 Apr 2016

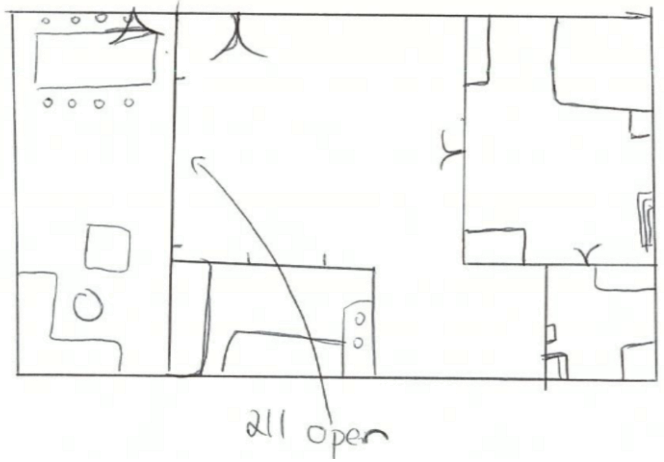
On 18 April three university students from the Worcester Polytechnic Institute in Massachusetts, USA came in to Sherborne Girls to pilot a science workshop that they are developing. Seth, Reed and Vato are working with Crossrail and The Institution of Structural Engineers to produce a workshop aimed at 14-16 year olds to design, develop, plan and then build a model of the additional housing that will be required in London once Crossrail has been completed. The girls were in teams of three – an architect, a structural engineer and a project manager – and despite having limited time some of the designs and their development were very creative as well as practical.

The boys commented: *"We enjoyed our time at Sherborne Girls' immensely; not only were the students helpful and courteous, but they were far more creative and organized than we could've ever hoped. Thank you for testing out our programme with us and we hope that you found it fun and informative!"*

Share this story

Bedrooms x 2 = 20m²
Bathrooms x 2 = 20m²
Living room x 1 = 20m²
Kitchen x 1 = 12m²
Hallway x 1 = 10m²
82m²
Family of 3 = 82 x 20 = 1640

Single Flat



Objective 3

Assess and improve the programme.

Closing remarks

Recommendations:

- Full pilot testing
- Continued development
- Computer aided design
- Additional programmes

Closing remarks

Thank you to:

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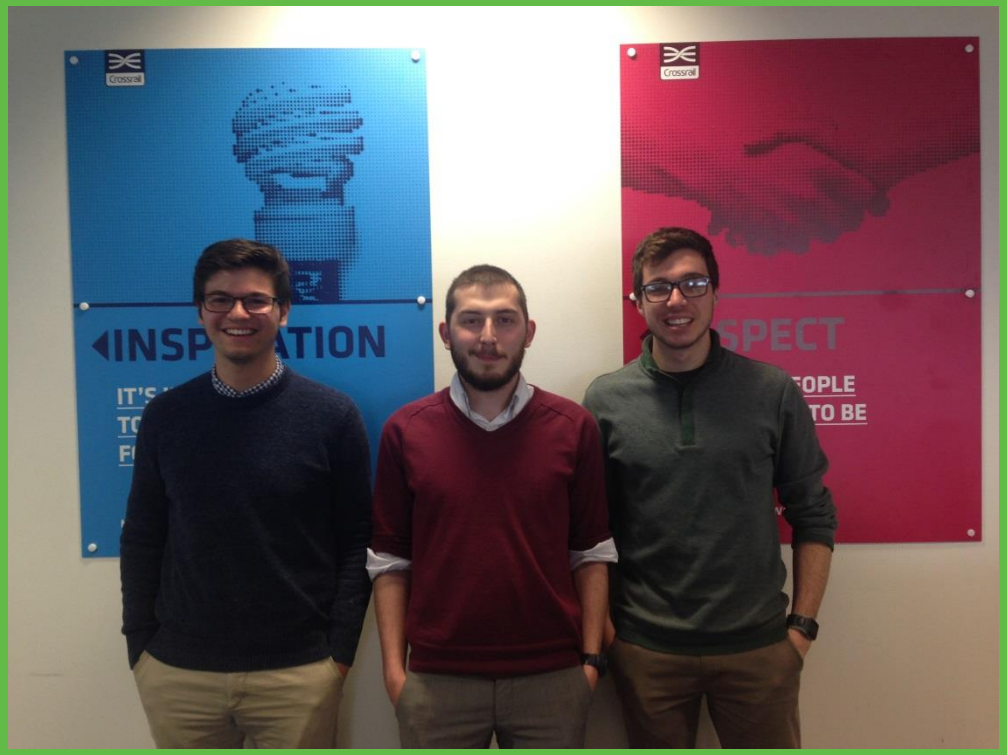
Steven Leung, Adam Usher, Josh Milton, Matthew Chang, Andreas Schoeler, Matthew Langdown, Cathy Groom, Helen McCarthy, Joseph Kanu, Hannah Sexton, Charlotte Homer, Rosie Goldrick, Steven Watkins, and Jo Massey

Questions?



WPI

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