

## Tunnel Tactics ( 90 minutes)

### Industry Participant

Ideal Industry Participant:

Someone who has knowledge of tunnelling.

Example Job Titles:

Geotechnical / Geological Engineer, Civil Engineer, Plant Operative, Crane Operative, Quantity Surveyor, Environmental Advisor, Logistics Coordinator, Apprentice Tunnelling Operative.

### Description

In this session students, in groups of 3/4, will design, cost and build a section of reinforced tunnel using card, pipe cleaners, straws, A4 paper and tape.

Students will learn about the Thames Tideway Tunnel and the range of people in STEM careers who are responsible for the designing, planning and building of it.

This is an interactive session that focuses on making students aware of the more sustainable options that could be used during a construction project whilst also highlighting related job roles.

What Year Group or Key Stage is the session targeting?

This session can be delivered to KS3 (Year 7-9) or KS4 (Year 10-11) students

Maximum number of students?

This session would be ideal for 30 students.

What is the goal of the session?

Students will gain a better understanding of tunnel structures and their uses as well as the various careers involved.

### Role of the Industry Participant

The industry participant will deliver the session and manage activities.

### Resource Checklist

USB  
Hard copy of PowerPoint  
Electronic copy of PowerPoint (please note PowerPoint is uploaded in two parts due to document size. Please combine the two parts for session delivery)  
Resource 1 Student Work Sheet Tunnel Tactics  
Resource 2 Tunnel Tactics PowerPoint  
A4 card x 30

A4 copier paper x 30  
Plastic straws x 100  
Rolls of tape x 5  
Pipe cleaners x 30

#### Facilities Required from School

A good sized classroom with access to a computer.

#### Learning Objectives:

Learners will be able to...

- Understand the work of Tideway in relation to the Thames Tideway Tunnel
- Learn about a range of STEM careers are all playing vital roles in designing, planning for and building the tunnel

#### Gatsby Benchmarks

Gatsby Benchmark 4: Linking curriculum learning to careers.  
  
Gatsby Benchmark 5: Encounters with employers and industry employees.

#### National Curriculum Links

English Language: Use discussion in order to learn; they should be able to elaborate and explain their understanding and ideas clearly.  
  
Science: forces as pushes or pulls, arising from the interaction between two objects, opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.

#### Teaching Strategies

Real Life Links: (Cognitive & Affective Domains) Learning & support from built environment industry professionals will encourage confidence and aspiration whilst helping learners recognise transferable skills and qualities that are of value in the world of work.

Visual: (Affective Domain) Printed resources will encourage critical analysis skills.

Collaborative Learning: (Cognitive & Affective Domains) Group work will nurture collaboration & team-work skills.

#### Risk Assessment

Check with school regarding their DBS policy.

| Duration   | Tutor/Industry Participant Activity  | Learner Activity   | Resources                            |
|------------|--|--------------------|--------------------------------------|
| 15 minutes | Slides 1-7: Industry participant to deliver Overview of Construction presentation. This is to provide students with an insight into the industry and | Students to listen | Resource 2 Tunnel Tactics PowerPoint |

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|                   | <p>information on the range of careers that are available.</p> <p>Edit Slide 3: All About Me<br/>Industry participant to introduce themselves and introduce the lesson – Tunnel Tactics</p> <p>After this slide, insert a new slide with images of projects that you and your company have worked on so students can find out more about your work.</p>   |  |  |
| <p>20 minutes</p> | <p>Intro to the lesson/task:</p> <p>Slides 8-9: Ask the students what they think links Tideway and the river Thames and take responses.</p> <p>Reveal that Tideway is the company that will be building the Thames Tideway Tunnel – London's new super sewer</p> <p>Go through the following facts about the Tideway Tunnel:</p> <ul style="list-style-type: none"> <li>• What exactly is it?</li> <li>• Why is it needed?</li> <li>• How long will it take to build?</li> <li>• How much will it cost?</li> </ul> <p>Slide 10: Highlight some tunnel facts to provide context.</p> <p>Slide 11: Explain the different careers available in the sector (Tunnel related careers).</p> <p>Slides 12-15: Have the students guess what forces will act on the tunnel and from what, then show the answers. Prompt students to think about what would happen if the forces were too strong...the tunnel would collapse.<br/>Explain that engineers need to consider the forces that will act</p> |  |  |

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|            | on a structure so they can design one that works as intended and is safe.  |  |  |
| 40 minutes | <p>Slides 16-17: Main Activity</p> <p>Task 1:<br/>Put students in groups of 5 or 6 and explain that the challenge for students today is to design and build a reinforced tunnel section and see how much weight it will support.</p> <p>Show students the building materials they will use but don't hand them out yet.<br/>Stress that they can use tape to join materials but NOT to provide structural strength (e.g. as a material in its own right.)</p> <p>Also show the students the costing sheet that they will be using to track their expenditure.</p> <p>Discuss what structures students could build using them and how each one could contribute strength.</p> | <p>Each group will need:</p> <ul style="list-style-type: none"> <li>• Costing sheet</li> <li>• Test pack of materials to see strength and dimensions.</li> </ul> | <p>Resource 1:<br/>Student Work sheet Tunnel Tactics</p> <p>Hand out tape to each group</p> <p>Resources students will need to purchase<br/>A4 card<br/>A4 copier paper<br/>Straws<br/>Pipe cleaners</p> |
| 15 minutes | <p>Test the different tunnels to see if they are able to hold the weight.</p> <p>Slide 18: Make links to the group task they just did and the STEM careers mentioned previously.</p> <p>Industry participant to round up the session, thank the industry participants (volunteers) and students for their involvement</p>  |  | <p>Resource 2 Tunnel Tactics<br/>PowerPoint</p>  |

| To-Do List   |   |
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| <p><u>Before Session:</u></p> <ul style="list-style-type: none"> <li>• Request that the session take place in a good sized classroom</li> <li>• Go over the session plan</li> <li>• The industry participant should familiarise themselves with PowerPoint</li> <li>• Print all resources before you arrive to the school</li> <li>• Make sure the relevant files are on a USB/sent to the school contact</li> </ul> | <p><u>After Session:</u></p> <ul style="list-style-type: none"> <li>• Collect in resources at the end of the session</li> </ul> |
| Hints & Tips   |   |
| <ul style="list-style-type: none"> <li>• Here is the type of question that you may get asked: <ul style="list-style-type: none"> <li>○ What do you do on a daily basis?</li> <li>○ How did you get into your career?</li> </ul> </li> </ul>  |   |
| Delivery Management  |   |
| <ul style="list-style-type: none"> <li>• The session could be delivered by one industry participant</li> <li>• The teacher will handle behaviour management</li> <li>• Refer to 'How To Contextualise Curriculum' for more guidance on how to deliver this session</li> </ul>  |   |