

# EPPro8 Challenge

*Engineer Problem Solve Innovate*

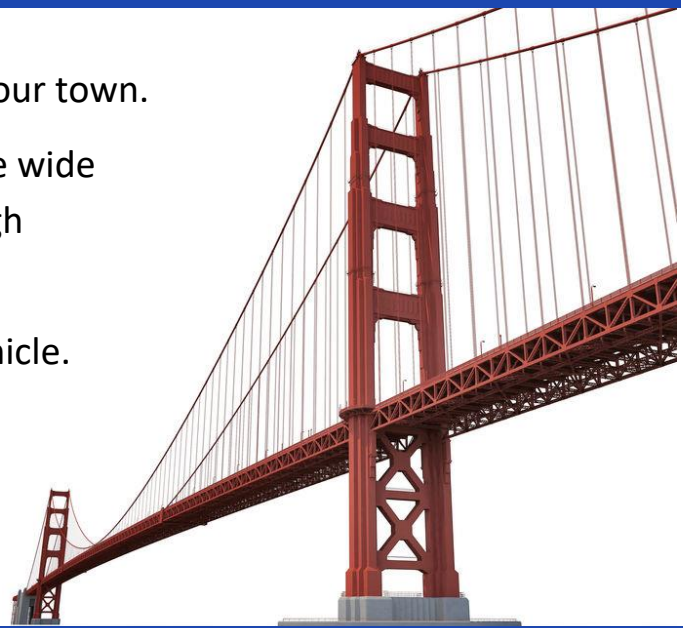
## Bridge

Flooding has destroyed the bridge to your town.

You need to build a replacement bridge wide enough to span the river below and high enough to let boats pass underneath.

It must be strong enough to carry a vehicle.

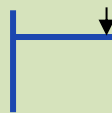

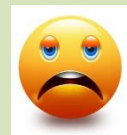
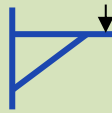
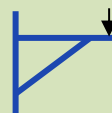

Being a one lane bridge, it needs traffic lights to tell other drivers when to wait.



### Construction – Structure

Criteria	A 400mm wide structure must span the 2.5 metre wide “river”. A 700mm tall object must be able to pass under the bridge. No part of the bridge touches the “river”.
----------	--

## Construction – Rigid

Criteria	<p>If the bridge is pushed horizontally it must deform by less than 20mm.</p> <p>If the bridge is pulled down in the centre it must deform by less than 20mm.</p> <p><i>You can secure the bottom of the bridge's legs using your hands.</i></p> <p><i>A normal bridge would be set into the ground using concrete.</i></p> <p><i>(We might get in trouble if we use concrete in your classroom...)</i></p>
Hint	<p>Two rods connected at an angle will easily deform at the joints:</p>  <p>→</p>   <p>Triangular bracing is very strong as the triangle shape does not deform at the joints:</p>  <p>→</p>   <p>This concept is especially important in large structures that carry lots of weight such as buildings, cranes and bridges.</p>

## Construction – Road

Criteria	<p>The bridge has a corrugated cardboard platform on it that runs the whole length of the bridge.</p>
Hint	<p>Add extra 400mm horizontal rods to support the cardboard.</p> <p>Secure the cardboard by pushing a bolt through (which will create a hole) and attaching a blue joiner to the frame below.</p>

## Test Vehicle

Criteria	<p>Build a four wheeled test vehicle.</p> <p>The test vehicle can be manually pulled and can carry a 2 kg weight.</p>
----------	---

## Test Drive

Criteria	The test vehicle can be pulled along the entire length of the bridge. No part of the bridge deforms or bends by more than 20mm.
----------	--

## Vehicle Counter

Criteria	Use the online electronics simulator, code <b>BRDG</b> . A laser detects every time a vehicle crosses the bridge. A counter counts how many vehicles have crossed the bridge.
----------	---

Hint	The laser has two parts: a transmitter and a receiver. The transmitter needs to be on all the time, so connect this to a switch. Clicking on the number on the counter will reset the counter.
------	---

## Bridge Capacity

Criteria	The bridge is strong enough for a maximum of three vehicles. A counter counts up every time a vehicle drives onto the bridge. The counter counts down every time a vehicle drives off the bridge.
----------	---

Hint	You will need two lasers, one at either end of the bridge.
------	--

## Traffic Lights

Criteria	When the vehicle travels on to the bridge it will trigger a "stop" light. The light remains on until the vehicle reaches the far end. It then turns off automatically.
----------	---

Hint	Use the On/Off box with lasers positioned to sense the location of the test vehicle.
------	--

After you have attempted this challenge watch the tutorial to see our solution at [www.EPro8Challenge.co.nz/Tutorial](http://www.EPro8Challenge.co.nz/Tutorial) and enter the Challenge Code **BRDG**.