

## CIV102 – Matboard Bridge Design Project – Frequently Asked Questions:

***What does “The deck of the bridge must be horizontal, be at least 100 mm wide, and permit unhindered passage of a vehicle over it.” mean?***

Before being loaded under load case #2, your bridge must first carry a steel train passing over it. When performing calculations to demonstrate the factor of safety against failure under the train load, you should state your assumptions about where the train is positioned.

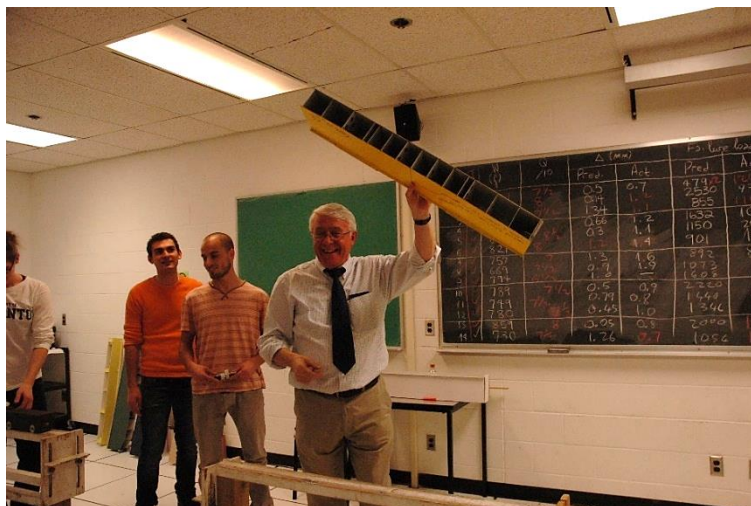


Bridge being subjected to the “Train Test”

***What are diaphragms? Why do we need them?***

Diaphragms are required to prevent the bridge from collapsing under point loads/reaction forces, and to restrain the webs from shear buckling.

In the photo shown below, you can see the inside of a bridge which had a “pi” shaped cross section. Periodically along the span, the group inserted diaphragms which “filled in” the cross section, providing rigidity to the cross section, and helping avoid shear buckling. Your bridge must also have diaphragms, with a minimum of two at each support/ point load.



The insides of a “pi-shaped” beam, showing its diaphragms

***Can we build a different shape instead of a box girder?***

Yes you can! You will need to check its strength for the usual failure modes (tension, compression, shear, etc.) as well as the plate buckling loads. Don't forget to consider how constructable your design is, as other solutions (i.e., a truss bridge) may be harder to build than the conventional box design.

***Do we need to check for plate buckling?***

Yes you do! Plate buckling is the main reason these bridges fail and has led to some spectacular failures in the past.



Web buckling under high moments and shears



Catastrophic failure of a bridge