Q6. Practitioner studies.

For all parts of the question, please provide your answers as bullet points.

Suppose you are a transport consultant. You are being tasked to help design a pedestrian bridge from a public railway station to a large stadium that is used for sports matches, concerts, and political rallies. This bridge will have to deal with high volumes of pedestrian traffic. There are no level changes and the length of the bridge is fixed. Figure1 1 below gives an indication of passenger traffic at the railway station for a typical event starting at 19:00 finishing at 20:30. Your customer is concerned with safety, construction costs, and user experience in this order of importance. The authorities have provided a simple web tool based on a model for pedestrian traffic that you must use in your work. You can find it here:

<https://seis.bristol.ac.uk/~nb14397/TMMcalculation.html>

A graph with blue lines

Description automatically generated

Figure 1: Passengers numbers at the railway station (sum of arriving and departing).

N = 5000 in 5 minute span is max

300 seconds

Approx flow rate of 16.7 pedestrians per second necessary flow rate

If 5 ped/sq meter, need 90m corridor, gives approx flow rate of 16.85 ped/s

Pedestrians per sq meter = 9 (max)

Typical stop and go not observed on 1.5m track

[Observational characteristics of pedestrian flows under high-density conditions based on controlled experiments - ScienceDirect](https://www.sciencedirect.com/science/article/pii/S0968090X19306527)

1. For the benefit of your customer, and for writing your report, you should understand the model in the web tool. Investigate and then describe this model, its properties, and what it predicts about pedestrian traffic by using the output the website provides, calling the website no more than 100 times (to save energetic costs and because we can imagine there may be licensing fees). In your answer, you should focus on how you use the online model output and your justification for this rather than simply stating an inferred model formulation. (4 marks)

* Describe the model
* Model properties
* What it predicts
* How do I use the online model output? Why do I use it in this way?

1. Use the model provided in the web tool and the information provided in the question to make recommendations about the design of the bridge, focusing on elements relevant to foot traffic and considering the relevant stakeholders. You may suggest adapting the model, if necessary. Explain and justify your approach. (9 marks)

* Recommendations to design of the footbridge
* Elements relevant to foot traffic
* Relevant stakeholders

1. If you were to be given access to one other model covered in the lecture slides on microscopic modelling to make your design recommendation, which model would it be, and why? Stick to the same brief as in part (b) and state clearly where in the lecture notes the model was covered. We expect a sufficiently detailed explanation as to why you choose this model including an explanation on how it would be used. (7 marks)