Case Study Project: Pedestrian Footbridge Analysis

Client: Public Transport Authority

Overview

Perth is in the process of planning for a new 60,000 seat sporting stadium to be located on the Burswood Peninsula.

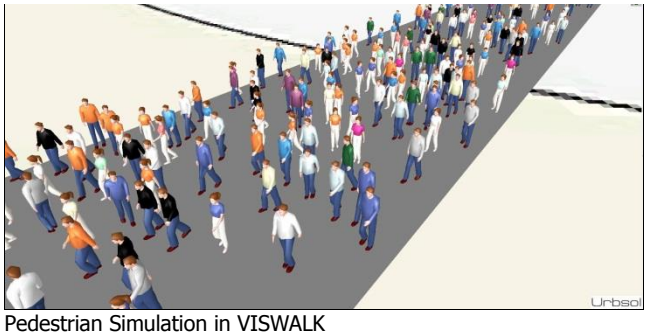
As part of meeting the necessary mode share targets for this facility and ensuring a safe and comfortable pedestrian environment two major pedestrian footbridges are being planned and delivered.

1. A 575m long 10m wide structure on the western side linking the Peninsula over the Swan River to East Perth designed to process 12,500 people

2. A 230m long 15.3m wide structure on the eastern side linking the facility with the car park designed to process 14,000 people

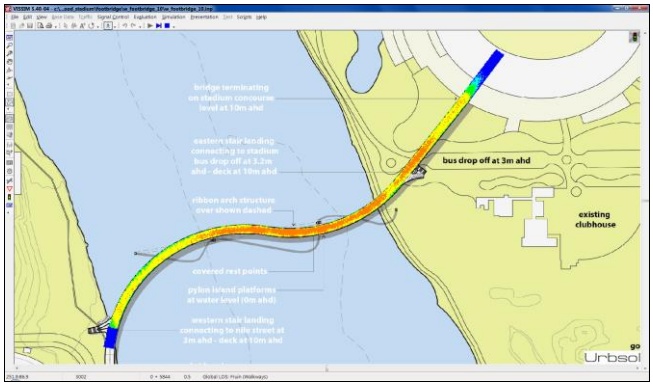
The Study

Urbsol were engaged by the PTA through BG&E to undertake a pedestrian capacity analysis of the two key pedestrian footbridges to ensure their operation would remain within acceptable levels of service during peak loading or unloading times.



Pedestrian Simulation in VISWALK

The peak loading/unloading times scenario meant that unidirectional pedestrian simulation needed to be applied on both footbridges. Due to the length of the first bridge and slow speed of pedestrians coupled with crowding the pedestrian density increases and converges towards the end of simulation.



Example of Pedestrian density on footbridge

The true footbridge capacity within acceptable level of service and the time required to discharge the target number of spectators was tested under these dynamic conditions.

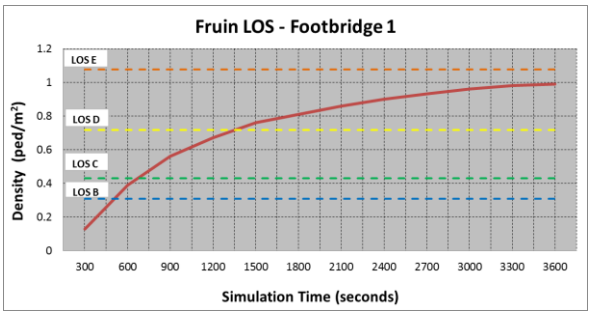
Simulation

Urbsol used VISWALK pedestrian simulation software to assess the pedestrian performance and the throughput of the two structures; The simulation based approach allowed for the true system dynamic to be accounted for and considered the following parameters:

- Densities
- Speeds
- Travel times

As part of the simulation a sensitivity analysis was carried out where the effects of increasing the footbridge width in one scenario and installing seating benches (obstacles) along the walkway in another were tested.

Due to the dynamic nature of the pedestrian crowding phenomenon the simulation outputs were aggregated in five minute intervals for plotting and subsequent analysis.



Fruin LOS example output

VISWALK was chosen as the most suitable tool for this work for a number of reasons:

- Well-developed pedestrian algorithms derived from the Social Force Model (Helbing and Molnar, 1995)
- Fruin Level of Service reporting based on density
- Robust data collection and extraction

The project demonstrated that the proposed designs of both footbridges would operate within acceptable limits during peak times.