

## Computer Exercise 1

### CIVL6415 Traffic Analysis and Simulation

Due Date: 02/09/2025, Tuesday 4pm

Computer Exercise 1 will build on the microscopic simulation model that we started developing in the tutorial session in Weeks 2-4. Your task is to make changes in the simulation model to capture the real traffic conditions, evaluate a few scenarios and create a short report to answer/discuss the below questions. You will also be asked to submit the simulation file(s).

Please read the relevant sections in the Aimsun help documentation to develop your model.

Please keep the same numbering structure as below in your report. Note that you are preparing a technical report that summarizes the main aspects of your work. Feel free to use figures/screenshots where necessary, but do not overdo it. **The report should be at most 4 pages!**

'Com1\_FieldData.xlsx' includes field data with respect to the signal timing observations, upstream and downstream traffic counts at the intersection between Sir Fred Schonell Drive and Coldridge Street. Please see below the approaches at the intersection, and the locations for the upstream and downstream counts.



1. Present the intersection geometry with a screenshot of your model. (1 mark)
2. Replace the traffic states in the microsimulation with the upstream counts from the field data (2 marks)
  - Although traffic counts are given for every minute, consider 5 min intervals (e.g., 0:00-5:00) and compute the average traffic states. This will reduce the number of

states that you have to define. Note that you need to calculate the traffic states in [veh/h], while the traffic counts are for each minute.

- You also need to calculate turn percentages for each 5 min traffic state, i.e. the ratio of turn volumes to total volumes. Hint: Consider the downstream traffic counts to calculate turn percentages..
- Choose an approach (e.g., Sir Fred Westbound, Coldridge St Northbound), and present the traffic states and turn percentages over time in a chart. Excel > Insert > Charts, 2D lines can be useful.

**3. Incorporate the real signal timings into the microsimulation (2 marks)**

- Determine the phase plan from the signal timing observations.
- Present the final phase plan you use in the simulation (see Slide 10 in Tut\_W2.pdf file for how to present a phase plan). You may create your plan in Excel, PowerPoint or as a hand drawn diagram.
- Hint 1: Can you identify the cycle time from the observations? The phase times should repeat over the signal cycles.
- Hint 2: If you would like one signal group to yield to another within the same phase, you can implement yellow flashing lights. This option can be selected from the 'Flashing' list when creating your cycle plan.

**4. Analyse the simulation results (2 marks)**

- Aimsun is a stochastic simulator; each replication is a single realization of a random process. You may need more than one replication to reach reliable conclusions. Run 5 replications of the model.
- Choose 3 summary statistics that you consider the most important (e.g., total delay, total travel time, etc.), and present them in a table format, where the results from each individual replication can be seen. Report the average and standard deviation values across 5 replications for each summary statistic.

**5. Replace the existing signalised intersection with an unsignalized intersection where Coldridge Street has a stop sign. Compare this scenario with the previous signalised intersection scenario. (2 marks)**

- Present the same 3 summary statistics in the same format as in Step 3.
- In this scenario, vehicles on Coldridge St should come to a full stop and give way to the vehicle on Sir Fred Schonell Drive. Additionally, vehicles turning right from Sir Fred Westbound approach should yield to vehicles from the opposing direction.
- Hint: Refer to Exercise 4.2 in Aimsun Manual to introduce yield and stop signs. Note that this also requires disabling of traffic signals at the intersection. The type in the control plan should be adjusted accordingly.

**6. Discuss the limitations of the traffic simulation model that you have developed (1 mark)**

- Give two examples of the phenomena that you observe in real-world but you do not model in the traffic simulation environment.
- Discuss the implications.

**Both simulation files (.ang) and the report (.pdf) must be submitted.**

*Please zip your simulation file(s) and your report and submit it at Blackboard > Assessment > Computer Exercise 1*