

Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software

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Appendix C: Estimation of the Simulation Initialization Period

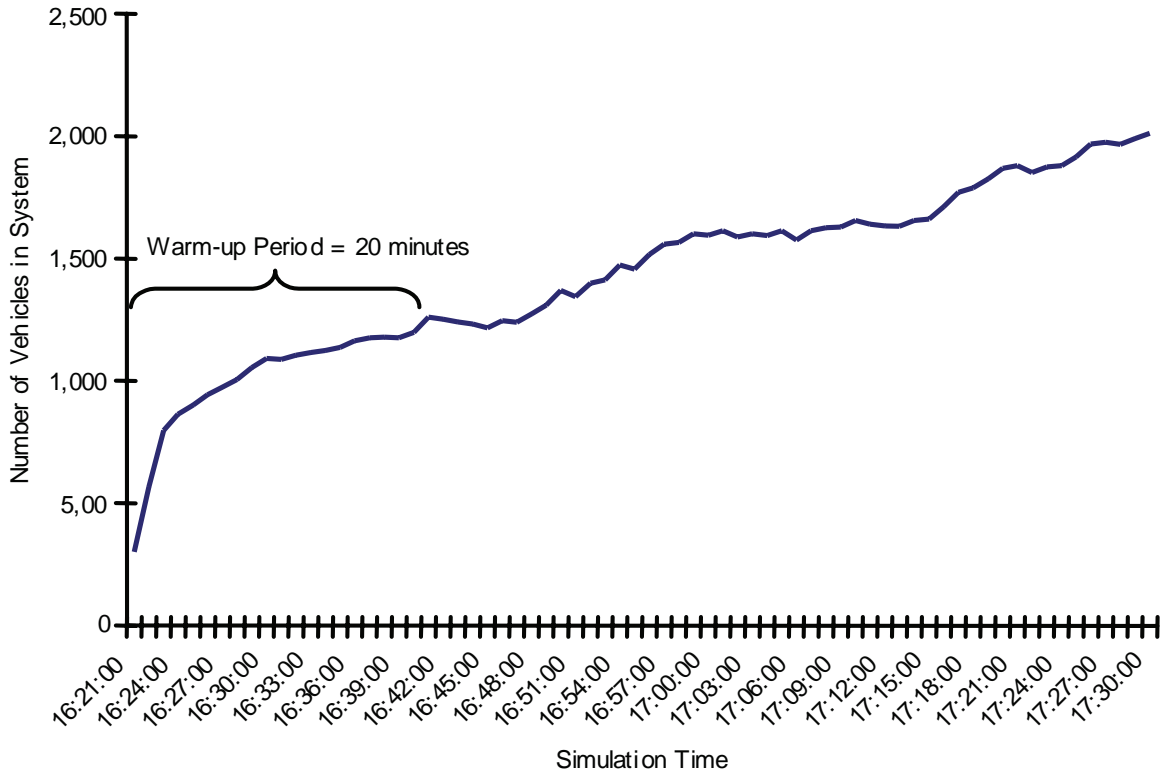
Simulation model runs usually start with zero vehicles on the network. If the simulation output is being compared to field measurements (as in calibration), then the artificial period where the simulation model starts out with zero vehicles (the warmup period) must be excluded from the reported statistics for system performance. Some software programs will do this automatically. For others, the warmup period must be computed offline by the analyst. This section explains how to identify the warmup period.

The number of vehicles present at any one time on the network is used to determine whether the model has reached equilibrium and, therefore, can start tallying performance statistics for the network. Once the number of vehicles present on the network ceases to increase by a minimum specified amount, then the warmup period is deemed to have been concluded (see figure 15).

If the number of vehicles and the mean speed do not level off within the first 15 min, it could be that the demand coded by the analyst for the system is greater than the system capacity. In this case, congestion will never level off. This will result in less accurate congestion statistics since the system never clears the congestion. The analyst should consider extending the starting and end times of the simulation to incorporate lower demand periods before and after the peak period.

If it is not feasible to extend the simulation period to uncongested time periods, the analyst should choose a warmup period that is equal to at least twice the estimated travel time at free-flow conditions to traverse the length of the network. For example, if the freeway being modeled is 8.1 km (5 mi) long, it takes roughly 5 min to traverse its length at the free-flow speed, so the warmup period is set at 10 min.

Note that in this example, the number of vehicles in the system is generally steadily increasing. The system never reaches equilibrium. Initialization is achieved when the number of vehicles entering the system is approximately equal to the number leaving the system (even though this slight decline is later superseded by greater increases). The generally increasing trend in the number of vehicles present in the system suggests that the simulation period should be extended earlier and later to incorporate lower demand periods at the beginning and the end of the peak period.



Source: I-680/I-580 Interchange Microsimulation Model, Dowling Associates, 2002

Figure 15. Illustration of warmup period.