CHAPTER 5

The Simulation Environment: Learning to See a Traffic Signal System

Purpose

In Chapter 5, you will learn how the simulation environment can help you to visualize traffic control processes. Simulation, or microsimulation as it is sometimes called, is a very detailed and realistic representation of a transportation system. It is detailed enough that you can directly view individual vehicles traveling along an arterial or through an intersection. Many simulation models even provide for a three-dimensional perspective of a network. In microsimulation models, the decisions of individual drivers are modeled: how fast to travel, how far behind a leading vehicle to follow, when to change lanes, when to stop when the yellow indication is displayed, and when to accelerate when the green indication is displayed. These are the kinds of driver decisions that are modeled in a microsimulation model such as VISSIM, often every tenth of a second in simulation time.

But your work is not about learning how to use a specific simulation model, though the activities that you will complete are conducted using the VISSIM microsimulation model. Nor is it about using a specific traffic signal controller. Rather it is about observing the flow of individual vehicles and how they interact with the individual controller timing processes. This is the perspective that the traffic engineer has when he or she is standing in the field: how is the traffic flowing and what are the timing processes that we can change in the traffic controller to help make traffic flow better?

You will use this simulation environment to directly see the results of the phasing plans and timing parameters that you select. Using VISSIM's animation and movie files, you will visualize the duration of a green interval, the length of a queue, or the delay experienced by vehicles traveling through a signalized intersection with the phasing and timing plan that you design. And you will use this information to make judgments about the quality of intersection performance, and whether you need to make further adjustments to the signal timing to improve intersection operations. It is almost as good as standing out at an intersection, with one eye on the traffic and the other on what is happening in the controller cabinet.

Learning Objectives

When you have completed the activities in this chapter, you will be able to

- Describe the common categories of transportation models and their attributes
- Describe the characteristics of a microscopic simulation model
- Contrast the performance measures produced by a simulation model
- Describe the categories of traffic analysis tools that are commonly used by a transportation engineer
- Describe the application of a simulation model
- Describe the basic features of VISSIM
- Build and use a simulation model network
- Describe the categories of traffic models

Chapter Overview

This chapter begins with a Reading (Activity #25) on microsimulation models. Three activities follow, including an assessment testing you on some of the basic elements of simulation models (Activity #26), an overview of the VISSIM simulation environment (Activity #27), and the preparation of a complete VISSIM simulation network (Activity #28). This network will be used for much of the testing and evaluation that is a part of the design project that you will complete. In Practice (Activity #29) describes various kinds of traffic analysis tools and some of the basic elements of a transportation simulation model that are used by practitioners.

Activity List

Number and Title	Type
25 Microsimulation Models and the Traffic Control System	*Reading*
26 What Do You Know About Simulation Models?	*Assessment*
27 The VISSIM Simulation Model – Learning Your Way Around	*Discovery*
28 Building a Simulation Model Network	*Design*
29 Traffic Analysis Tools	*In Practice*

ACTIVITY

25 Microsimulation Models and the Traffic Control System

READING

Purpose

The purpose of this activity is to give you the opportunity to learn more about microsimulation models and how they can be used to study the traffic control system.

Learning Objectives

- Describe the common categories of transportation models and their attributes
- Describe the characteristics of a microscopic simulation model
- Contrast the performance measures produced by a simulation model

Deliverables

- Define the terms and variables in the Glossary and complete all Glossary items
- Prepare a document that includes answers to the Critical Thinking Questions

Glossary

Provide a definition for each of the following terms. Paraphrasing a formal definition (as provided by your text, instructor, or another resource) demonstrates that you understand the meaning of the term or phrase.

microsimulation model	
network	
performance measure	
traffic analysis tool	
VISSIM	

CRITICAL THINKING QUESTIONS

When you have completed the reading, prepare answers to the following questions.

1. Why do you think it is important to use a microsimulation model to evaluate the performance of your design network?

2. What performance measures do you think are important to evaluate the signal timing alternatives that you develop?

3. What can you learn from the numerical performance data and the visual observations of the simulation model to help you evaluate the performance of a signal timing alternative?

INFORMATION

What is a Model?

A model is a representation of reality that allows us to study a system, to ask questions about the system and its components, and to change the conditions or features of the system and to observe how it will then behave. A model is especially useful for studying transportation systems since we are often asked to consider a range of possible solutions to a given problem and to see how the system will behave under the conditions of each solution. We can classify a model according to a set of categories, each describing attributes or features of a model. Table 11 lists seven ways in which a transportation model can be categorized.

Table 11. Model categories (adapted from Byrne, de Laski, Courage, & Wallace, 1982)

Model categories	Attributes and contrasts
Computational or simulation	○ **Computational:** Directly computes results from equations or tables
	○ **Simulation:** Tracks events and processes
Empirical or analytical	○ **Empirical:** Based on field data
	○ **Analytical:** Based on theory
Deterministic or stochastic	○ **Deterministic:** Produces same result for given set of inputs
	○ **Stochastic:** Results can vary based on statistical distributions
Microscopic or macroscopic	○ **Microscopic:** Individual driver decisions
	○ **Macroscopic:** Aggregated flow characteristics
Event scan or time scan	○ **Event scan:** Based on status of events of interest
	○ **Time scan:** Updates made every time step
Evaluation or optimization	○ **Evaluation:** Performance data produced
	○ **Optimization:** Objective function optimized based on performance data

We can also classify a model according to the complexity of the problem that it is designed to address, which we can see from Figure 96 is directly proportional to the difficulty of a given model to use. Some common problems considered by transportation engineers include:

- How many lanes will be needed to accommodate traffic volumes projected five years in the future?
- How much will delay increase at adjacent intersections if a new hotel or shopping center is constructed on this site?
- What signal timing plan will work best with this intersection design?

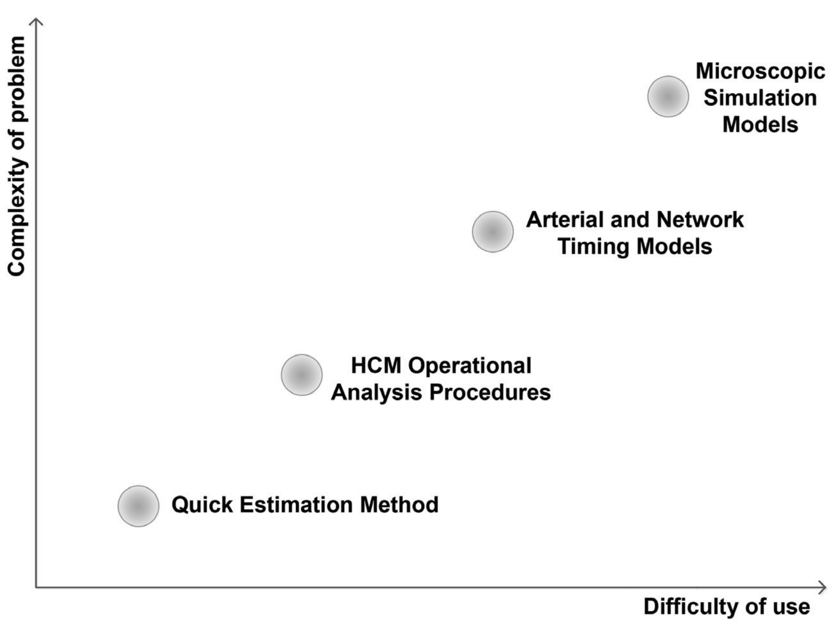

Figure 96. Model classification scheme (adapted from the *Traffic Signal Timing Manual*)

For problems that require only an assessment of whether an intersection has sufficient capacity or not, the Quick Estimation Method (sometimes called the *Critical Movement Analysis*) can be used. For single intersections or when volume is less than capacity, the Highway Capacity Manual (HCM) operational analysis procedures are appropriate. Arterial and network timing models generally produce optimized signal timing plans for a set of signalized intersections. Microscopic simulation models yield a high level of detail on system operation and performance, when details on signal timing plans are important to consider.

It should be noted that the HCM 2010 operational analysis procedure includes a realistic emulation of an actuated signal controller, in which phase sequencing and actuated timing parameters are considered. Thus there is some blurring of the distinctions that appear clear in Figure 96 as the capabilities of models and techniques are increased over time.

Why Use a Microsimulation Model

A microsimulation model *requires* a rich and detailed set of data to describe a traffic facility and its conditions. It requires calibration of the model to these local conditions. But it has the potential to *produce* a rich and complex set of data, both numbers and visuals, which represent how the facility is likely to operate and perform under the given set of conditions. The extent of the data required to run the simulation model, and the time required to develop and test a model network, means that a simulation model should be used to address only the most complex kinds of transportation problems for which very detailed information is needed on system operation and performance. Examples of these kinds of problems include:

- The demand exceeds capacity at an intersection, and the effect of this oversaturation spreads from one intersection to another
- The effect of a specific design element, such as the length of a left turn bay, needs to be tested
- The details of a timing plan for an actuated signal controller needs to be developed, tested, and evaluated

This latter problem is the primary subject of this book and the reason that you will learn to use the VISSIM simulation model.

We also can use a simulation model to visualize the operation of a facility under given conditions, something that is useful for both the traffic engineer and for the general public.

Components of a Simulation Model

A microsimulation model consists of three primary components: (1) input data that describe the facility and conditions of interest, (2) the ways in which users (drivers of passenger cars, pedestrians, or truck drivers, for example) interact with the system or facility, and (3) output data that describe how the system is expected to operate and perform.

There are three kinds of input data describing the facility and conditions, including flow characteristics of the users, the geometry of the facility, and the control system parameters. Examples of these data are given in Figure 97.

User flows	Facility geometry	Control settings
Vehicles/hour	Location of nodes	Phasing plan
Percent trucks	Number of lanes	Timing values
Pedestrians/hour	Lane assignments	Timing settings

Figure 97. Example input data for microsimulation model

A facility is represented by a network, a collection of links (representing streets or arterials) and nodes (representing intersections). Figure 98 shows an aerial view of an intersection while Figure 99 shows its link-node representation. Each link is specified by a length, free-flow travel time, capacity, and other relevant geometric and operational characteristics. A node is represented by its control characteristics such as the type of control and the elements that describe that control.

Figure 98. Aerial view of intersection

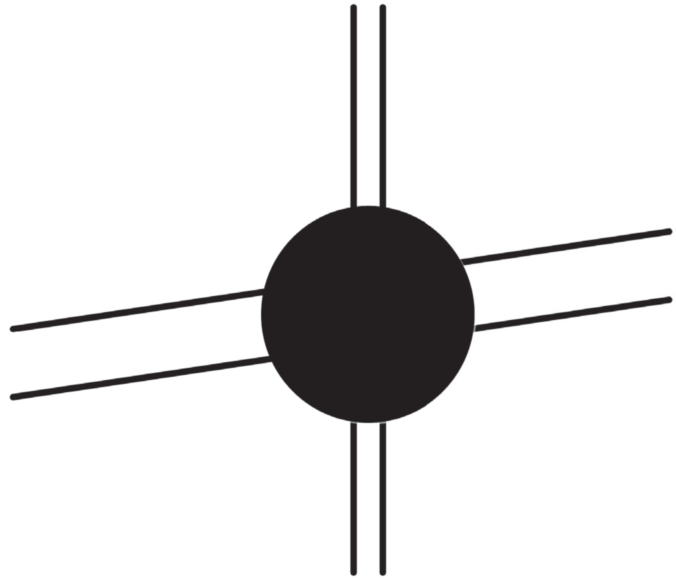

Figure 99. Link-node representation of intersection

Three of the ways in which the users interact with the facility include a range of driver behavior types, the ways in which a "following" vehicle responds to a "leading" vehicle, and the ways in which the user responds to the facility geometry and control system. For example, a user will decide to respond to a change in the control system display (a change in the display from green to yellow) depending on the driver behavior type, the speed that the vehicle is traveling, and the distance that the vehicle is upstream of the intersection. This latter factor was described earlier in this book (in Chapter 1 on the elements of the traffic control system) and is the basis for the construction of the traffic control process diagram.

Performance Analysis Using a Simulation Model

The data produced by a microsimulation model can be extremely detailed. For example, VISSIM can produce performance data for the network, for each intersection and its approaches, and for each movement on the approach. In the system view (Figure 100), the overall speed and delay are shown, as is the time that it takes to travel from one end of the system to the other. The average delay for the intersection approaches and for the individual movements (Figure 101 and Figure 102) provide additional detail that is important in evaluating how the individual components of the system are performing. These figures show a visual comparison of these three levels of data aggregation, each with an important part of the story on how the system is performing.

Figure 100. System performance data

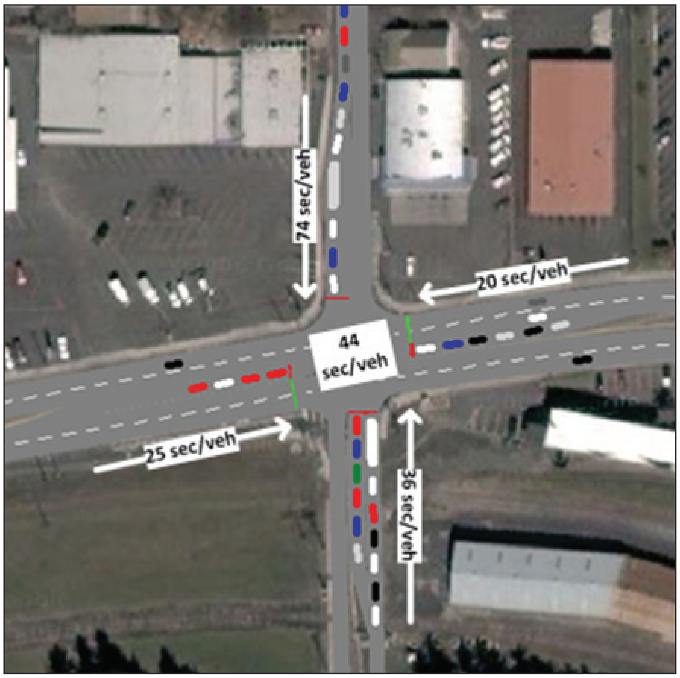

Figure 101. Intersection and approach performance data

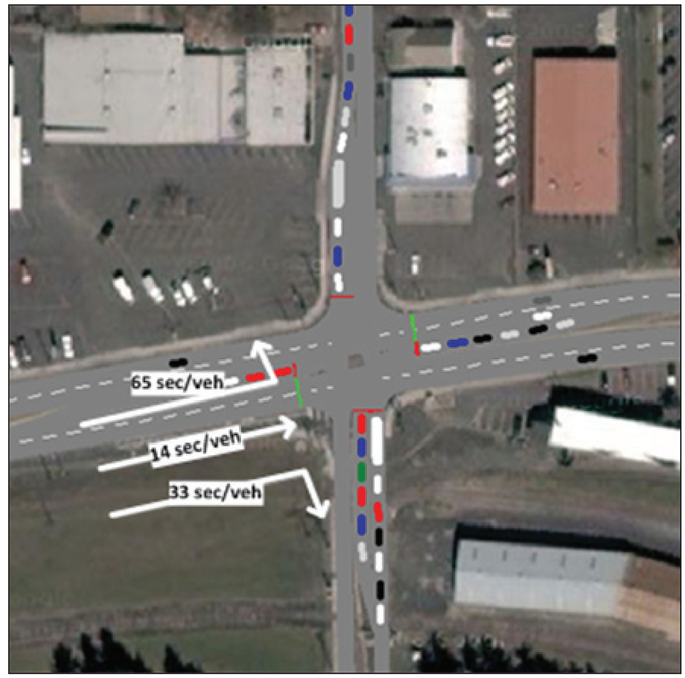

Figure 102. Movement performance data

An even more detailed representation of the system operation is shown in Figure 103 and Figure 104, where the position and speed of a single vehicle is shown. On the left, the table shows the position and speed of the vehicle every 0.1 second over a 1.8 second time interval. The figure on the right shows the time-space representation of these data over this same time interval.

Simulation time	x-coordinates	y-coordinates	Vehicle speed
10.0	-31.5	-347.0	33
10.1	-46.3	-344.5	34
10.2	-61.5	-343.1	34
10.3	-76.7	-342.7	33
10.4	-91.5	-343.2	33
10.5	-106.0	-344.8	32
10.6	-120.3	-346.3	32
10.7	-134.7	-348.9	33
10.8	-149.3	-351.4	33
10.9	-164.2	-353.8	34
11.0	-179.2	-356.2	34
11.1	-193.8	-358.9	33
11.2	-208.2	-361.5	32
11.3	-222.3	-364.0	32
11.4	-236.6	-366.6	33
11.5	-251.0	-369.2	33
11.6	-265.8	-371.9	34
11.7	-280.7	-374.5	34
11.8	-295.5	-377.2	33

Figure 103. Position and speed data for a vehicle

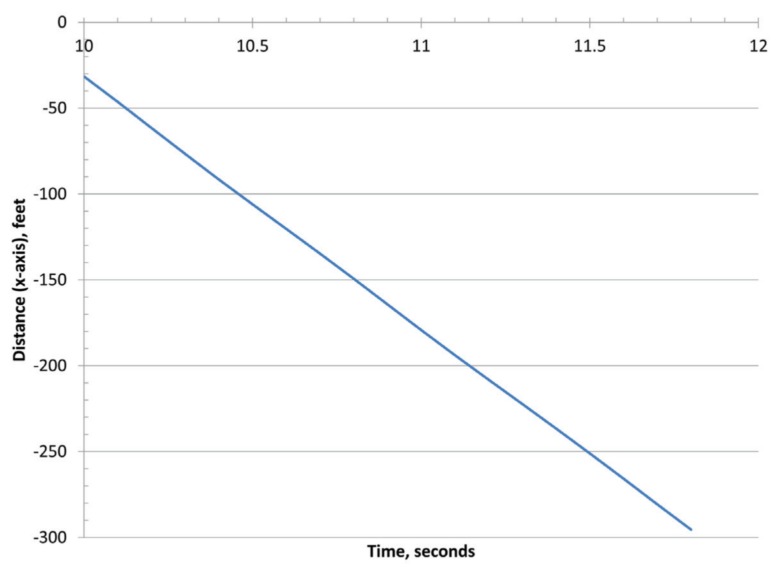

Figure 104. Time-space representation of position and speed

The fact that a microscopic simulation model produces a rich and detailed set of output data is both a strength and a weakness. The strength is clear: we can get a detailed picture of the performance of the system at a variety of levels. The downside is that the construction of this picture is difficult and often time consuming.

For example, suppose we are comparing two alternatives, a base case in which the cycle length has been set to 90 seconds, and a new option in which the cycle length is reduced to 60 seconds and the proportion of green time devoted to each movement is changed. Table 12 shows three system level performance measures in which these alternatives are compared.

Performance measure	Base case (C = 90 sec)	Option 1 (C = 60 sec; green times changed)	Percent change
Speed (mi/hr)	10	14	+37%
Travel time on arterial (sec)	29	21	–27%
Average delay/vehicle	24	16	–33%

Table 12. Example of system level performance data

It can be concluded from this comparison that the average delay per vehicle was reduced by 33 percent and that the average speed was improved by 37 percent. However, we need to look more deeply into the data to get a more comprehensive picture of the results of these changes. Evaluating the performance at the system level may mean that we miss some of the important changes and trade-offs that would occur in this change to the signal timing.

Table 13 shows the average delay per vehicle for each of the four approaches at this intersection. We can begin to see the trade-offs that would actually result from this change. Users on the main street (eastbound and westbound) would see reduction in their delay, while side street users would see an increase in theirs. Two points should be made here. First, we need to be able to define what amount of change in delay is significant and could be perceived by the user. Second, some increase in delay for the minor street may be acceptable for both policy reasons (we often emphasize the quality of flow on the main street) and because volumes are often significantly lower on the side street than on the main street.

Approach	Delay (sec/veh)	
	Base case (C = 90 sec)	Option 1 (C = 60 sec; green times changed)
Northbound	8	13
Southbound	14	21
Eastbound	22	13
Westbound	30	18
Average for system	24	16

Table 13. Example of approach level performance data

Drilling down one more level provides even more insights on the difference in performance of the base case and the signal timing change as shown in Table 14. We can now see that the main street through movements (eastbound and westbound) have improved more significantly than was evident when just looking at the approach data. Further, we may have made delay to the minor street left turn movement too high, unfairly penalizing these users. This may point to a further refinement that is needed to the timing plan that we have developed as part of Option 1.

How do we know the quality of service that is delivered to the various users of this intersection? One standard, given in the Highway Capacity Manual (HCM), provides level of service ranges that can be used to provide a relative performance standard that we can use to compare the base case with Option 1. In this case, the level of service improves for some of the main street (the east-west) movements, while it stays the same or degrades from some of the minor street (north-south) movements.

System component	Delay, sec/veh (level of service)	
	Base case (C = 90 sec)	Option 1 (C = 60 sec; green times changed)
Approach		
Northbound	7 (A)	11 (B)
Southbound	13 (B)	19 (B)
Eastbound	12 (B)	19 (B)
Westbound	13 (B)	17 (B)
Movement		
NBLT	5 (A)	10 (A)
NBTH	11 (B)	15 (B)
NBRT	5 (A)	10 (A)
SBLT	4 (A)	8 (A)
SBTH	20 (B)	30 (C)
SBRT	4 (A)	4 (A)
EBLT	10 (A)	5 (A)
EBTH	30 (C)	15 (B)
EBRT	10 (A)	10 (A)
WBLT	25 (C)	19 (B)
WBTH	35 (C)	20 (B)
WBRT	5 (A)	5 (A)

Table 14. Performance data

Visualization and Numeric Data

The final step in the description of the performance of a system, and in the comparison of a base case with a proposed change, is what you would "see" in the field and how you would describe what you see. You could use such descriptions as:

- The standing queue on the eastbound through lanes clears before the end of green
- The traffic on the southbound left turn lane backs up out of the left turn pocket, thus delaying all traffic on the southbound approach
- Much of the green time on the eastbound through lanes is not utilized indicating a possible misallocation of time for this approach and the others
- Vehicles on the westbound through lane must wait through two cycles

This gets us to the final step in the "learning to see" process, integrating the visual observations that you make (and your description of them) with the numerical data that you collect in the field or from a simulation model. You will learn in this chapter when you construct your simulation model to see both the "visual" and the "numbers" and the conclusions that you can make from one reinforcing the other.

Learning to integrate the visual and the numbers also takes us to the experience of the traffic engineer, and understanding the connection between the traffic controller and its effect on the user. What do you see in the field and thus what should you change in the traffic controller? This is learning to be in the mode of the traffic engineer standing in the field: one eye on the traffic flow and other on the controller. Making these connections is what this chapter is all about.

26 What Do You Know About Simulation Models?

ASSESSMENT

Purpose

The purpose of this activity is to provide you with the opportunity to learn more about the variety of traffic analysis tools that are available to the transportation engineer. A traffic analysis tool is a "software-based analytical procedure and/or methodology that supports different aspects of traffic and transportation analysis" (Alexiadis, Jeannotte, & Chandra, 2004).

Learning Objectives

- Describe the categories of traffic analysis tools that are commonly used by the transportation engineer
- Describe the application of a simulation model

Deliverable

- Prepare a document with your answers to the Critical Thinking Questions

Required Resources

- *Traffic Analysis Toolbox, Volume 1: Traffic Analysis Tools Primer*
- *Traffic Analysis Toolbox, Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software*

Task 1

Read pages 1-18 from the *Traffic Analysis Toolbox, Volume 1: Traffic Analysis Tools Primer* (Alexiadis, Jeannotte, & Chandra, 2004) and pages 35 to 43 from *Traffic Analysis Toolbox, Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software* (Dowling, Skabardonis, & Alexiadism 2004). Prepare answers to the Critical Thinking Questions.

Critical Thinking Questions

When you have completed the reading, prepare answers to the following questions.

1. What are the categories of traffic analysis tools and what are the basic attributes of each category?

2. What is a microsimulation model?

3. Under what conditions would you use a microsimulation model?

4. What are the strengths and limitations of the Highway Capacity Manual methodologies?

5. What are the strengths and limitations of simulation?

6. What are the differences in how the Highway Capacity Manual and simulation models report performance measures?

7. What is a link/node diagram and what do links and nodes represent?

8. What kinds of driver behavior are modeled in a microsimulation model?

9. What are some of the new features available in the current version of VISSIM?

10. What kind of model would you use to determine the number of lanes needed at a signalized intersection to meet a desired level of service?

11. If a time-scan model is based on scanning time on a regular basis, what is an event scan model based on? For a signalized intersection, list some events of interest that would be the basis for an event scan model.

12. For what kinds of problems or system conditions would you consider using the following models: Critical Movement Analysis, Highway Capacity Manual, and VISSIM?

13. Which model would you use to test signal timing strategies for a congested arterial with three closely spaced signals? Why?

ACTIVITY

27 The VISSIM Simulation Model: Learning Your Way Around

DISCOVERY

Purpose

The purpose of this activity is to introduce you to the VISSIM simulation environment and to give you the opportunity to explore some of its features.

Learning Objective

- Describe the basic features of VISSIM

Required Resources

- Movie file: A27.mp4
- PTV America website: www.ptvamerica.com

Deliverable

- Prepare a document that includes your answers to the Critical Thinking Questions

Critical Thinking Questions

1. What are some of the components of the VISSIM model that are accessible through the toolbar?

2. What are some of the traffic signal timing parameters that are required to specify the operation of the RBC controller?

3. What kinds of evaluation data are produced by VISSIM and which ones might be most important in evaluating a design?

4. Why would you consider various simulation speeds when you run VISSIM?

5. What did you learn about VISSIM from the PTV website?

Information

VISSIM will be the primary tool with which you will test and evaluate your signal timing design options. VISSIM is one of several commonly used and very powerful simulation models on the market today. VISSIM includes components for how drivers interact with the roadway design, the control system, and with other drivers. It includes several options for emulating the traffic control system. While this book is not about learning to use any particular simulation model, including VISSIM, it is important for you to learn some of the key features of VISSIM and how you will use them as you do learn about traffic signal timing.

In this activity, you will learn about some of the basic features of the VISSIM simulation model. The main VISSIM screen (see Figure 105) shows the representation of the geometry, the flow of vehicles, and the control devices. Driver behavior is modeled based on car-following logic, lane changing logic, and response to the status of control displays. The signal controller operation is based on actuated control timing processes that are linked to detector inputs. The status of all vehicles, the controller timing processes, and the signal displays are updated every tenth of a second. Uncertainty in driver responses is based on probabilistic modeling of driver behavior. Evaluation and performance statistics are collected during the simulation and are available to the user both during and after the simulation period.

Task 1

Open the movie file and start the movie. Write down questions that you have on what you observe. As you watch the video, take notes on what you see and the important features of the model that are shown.

Task 2

Browse the VISSIM portion of the PTV America web site. Watch at least one of the VISSIM video demonstrations on the web site. Find and read a section of the web site that describes some of the new features on the latest VISSIM release.

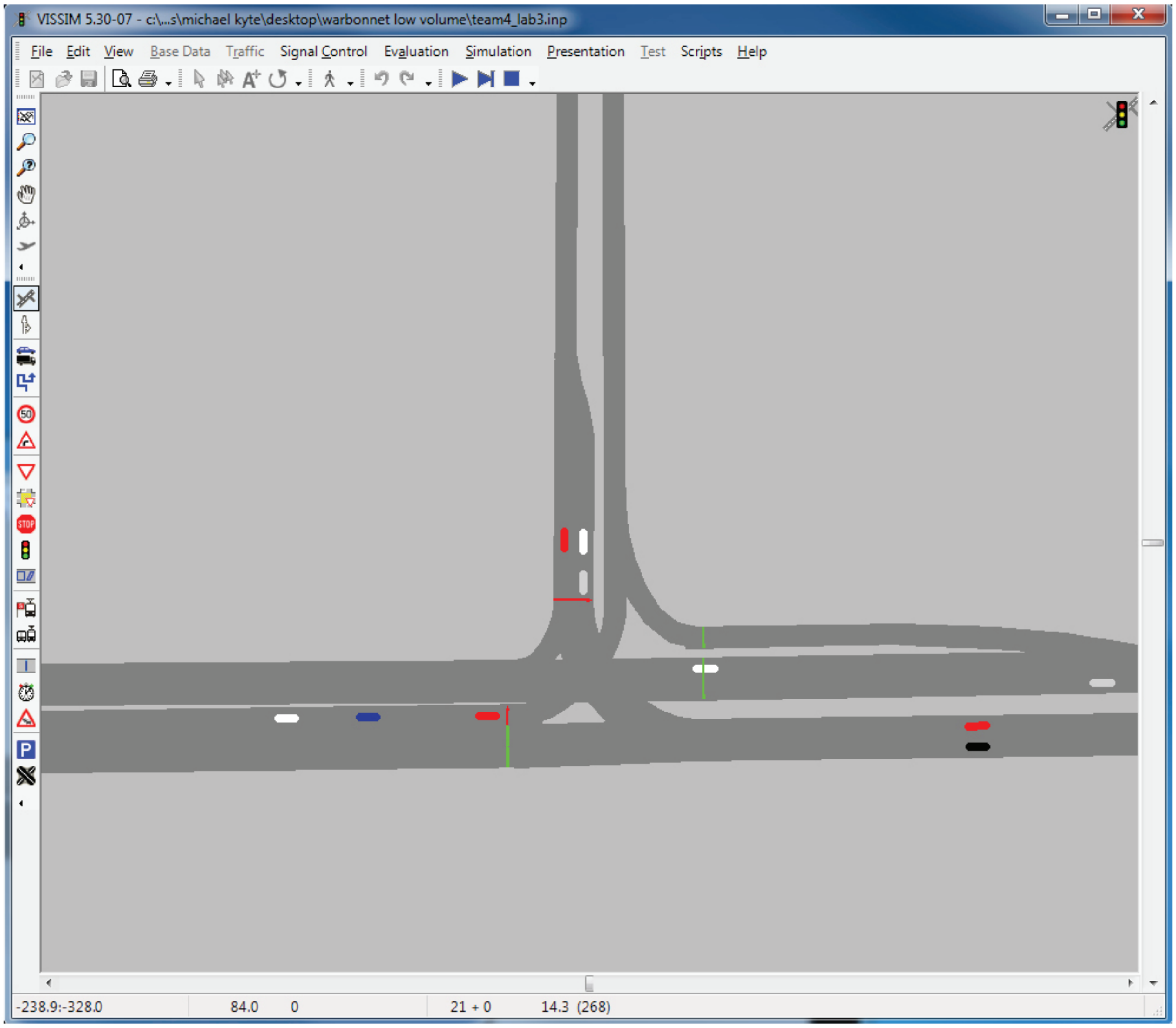

Figure 105. VISSIM display

Student Notes:

ACTIVITY
28 Building a Simulation Model Network

DESIGN

Purpose

The purpose of this activity is to give you the opportunity to learn how to build and use a simulation model network. You will use this network as you prepare a design for an isolated signalized intersection.

Learning Objective

- Build and use a simulation network

Required Resources

- Base VISSIM network (VISSIM .inp and other files)
- VISSIM tutorial

Deliverables

- Modified VISSIM files
- Prepare an Excel spreadsheet that includes the data that you have collected, the sketches that you made, and your observations of the data and the simulation. This information represents the base data for the beginning of your design work, and against which you will compare the design plans that you develop. The spreadsheet should include tabs for each of the following:

  Tab 1: Title page with activity number and title, authors, and date completed

  Tab 2: Sketches as per Task 1

  Tab 3: Evaluation data as per Task 6

  Tab 4: A summary of the traffic flow characteristics that you observe in the animation

  Tab 5: A summary of the evaluation data that you have collected, including your comments on the evaluation data and what you learn from these data

  Tab 6: Answers to questions from Task 6

Critical Thinking Questions

1. Are your observations of the animation consistent with the output data produced in Task 6?

2. What traffic problems do you observe? (Some example traffic problems might include: queues not clearing before the end of green, or queues spilling out of a left turn pocket and into a through lane).

TASK 1

Prepare two electronic sketches for your subject intersection:

- Sketch #1: Prepare a sketch that shows the lane geometry, the numbered directional movements for each lane, and the phase numbers that control the movement in each lane. Add to this sketch a stop bar detector in each lane, numbering each detector with two digits, the first number equal to the phase number controlling that lane. The second number should correspond to the lane number beginning with one for the left most lane for that approach. For example, if you have two northbound lanes controlled by phase 2, your detectors would be numbered 21 for the left lane and 22 for the right lane as shown in Figure 106.
- Sketch #2: Prepare a ring barrier diagram that represents a standard eight (or five, if T-intersection) phase NEMA pattern, with protected leading left turns, for the intersection

Figure 106. Signal head and detector numbering example

TASK 2

Download the VISSIM network that you have been assigned, unzip it, and copy it to your hard drive. Open the VISSIM network. This network includes the link and node structure, a background photograph, priority rules governing vehicle interactions, vehicle routing decisions, and traffic volumes. Load the .ini file from "View," then "Load Settings." Run the network (by selecting the "Simulation Continuous" button) and observe the operation. What is missing?

TASK 3

You will need to add several components to the network, including a signal controller (with a set of given timing parameters), one detector for each lane, and a signal head for each lane. The process for adding the signal controller, the detectors, and the signal head is described in the "VISSIM tutorial."

- Add a Ring Barrier Controller (RBC) with the following signal timing parameters: yellow time = 3 seconds, red clearance time = 1 second, passage time = 5 seconds, minimum green = 15 seconds, and maximum green = 100 seconds
- Add stop bar detection in each lane with length of 22 feet, and numbered according to the sketch that you prepared
- Make sure that the detectors are correctly mapped to the phases
- Add signal heads numbered as per the detector numbers that you have prepared
- "Dual entry" should be set for through movements that have been designated as the "start phases"

Task 4

Verify that Node Evaluations have been added (to measure delay and queue length, and green time distribution). The process for adding evaluations to your network is described in the ”VISSIM tutorial.” Set the data collection period to begin at 300 seconds and continue to 3600 seconds. Set the interval to 3300 seconds.

Task 5

Run your network and debug as needed. When the network is debugged, complete a final run to collect your data. The following tests can be considered to determine if the network is debugged and operating correctly: (1) phases operate in sequence and for the expected durations, (2) vehicles respond to the signal displays in an appropriate manner, and (3) there are no conflicts between vehicles from different streams.

Task 6

Review the evaluation data produced by the simulation run. These data files will be in the same folder as your input files. Refer to the “VISSIM tutorial” and the VISSIM help file to learn more about the evaluation data. Your review should include an analysis of the delay data, the queue length data, and the green time distribution data.

- Prepare a table showing a summary of the delay and queue length data
- Prepare a histogram of the length of the green intervals for the through and left turn phases of your network, choosing the bin size so that your graph conveys a clear picture of the distribution. Note the mean green duration for each phase. Discuss the variations about the mean based on your histogram plot and why this variation occurs.
- These data will be used as the base case evaluation for comparison with your final design (that you will finish in Chapter 10)

Task 7

Demonstrate your completed (and working) network to your instructor. “Working network” means that traffic flows in response to displays, detectors respond to traffic, the controller responds to detectors, and the displays respond to the controller.

Things to Check (Common Problems)

Preparing a simulation file for the first time is a complex process requiring attention to a number of details. Following is a list of common problems that are often encountered during the preparation of a VISSIM simulation file:

1. Check carefully that the detectors have been mapped to the correct phases.
2. Make sure that you add the correct signal group (phase) number to the signal heads.
3. Don’t double extend phase calls (note process in RBC controller setup).
4. Detectors shouldn’t be in connectors.
5. Verify that evaluation nodes have been added.
6. Be sure that the signal heads are placed in front of a connector.

Student Notes:

Traffic Analysis Tools

PURPOSE

The purpose of this activity is for you to learn what kinds of models are used in practice.

LEARNING OBJECTIVE

- Describe the categories of traffic models

REQUIRED RESOURCE

- *Traffic Signal Timing Manual*

DELIVERABLES

Prepare a document that includes

- Answers to the Critical Thinking Question
- Completed Concept Map

LINK TO PRACTICE

Read the sections of the *Traffic Signal Timing Manual* assigned by your instructor.

CRITICAL THINKING QUESTIONS

When you have completed the reading, prepare answers to the following questions:

1. How does the description of models from the Traffic Analysis Toolbox compare and contrast with the discussion in the *Traffic Signal Timing Manual*?

2. What could you learn from the four model types described in the *Traffic Signal Timing Manual* if they are used to evaluate a signal timing plan?

IN MY PRACTICE...

by Michael Kyte

Computer modeling tools are commonly used by the transportation engineer to both evaluate alternative designs as well as to visually demonstrate, through advanced animation techniques, how a transportation facility will perform under a given set of conditions. Even though many computer models are easy to set up, run, and produce "results", often the engineer is under pressure to produce results quickly. This means that such important steps as calibration of a model to the conditions of a local area are often skipped or not given sufficient time. The results from a model are only as good as the input data used and the time spent to fine-tune the model itself. Be skeptical of results. Ask questions before you believe what "the model says." It is a tool. You are the engineer.

Concept Map

Terms and variables that should appear in your map are listed below.

microsimulation model	performance measure	VISSIM
network	traffic analysis tool	

Student Notes: