ACTIVITY
11 From Model to the Real World: Field Observations

FIELD

Purpose

The purpose of this activity is to provide a framework for you to think about traffic flow at signalized intersections, both in a model representation and in connecting this model to what you observe in the field.

Learning Objective

- Represent and interpret queue accumulation polygons for a range of traffic flow and control conditions

Required Resources

- Activity #8: "Modeling Traffic Flow at Signalized Intersections"

Deliverable

- Using an Excel spreadsheet, summarize your field observations, including your field notes and the data that you've collected. The spreadsheet should include the following sections, integrating field data and answers to the questions from Tasks 1 through 4.

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

  Tab 2: Summary of your general observations and sketch

  Tab 3: Table 4 data and a description of the sequence of movements that you observed

  Tab 4: Table 5 data and a discussion of the queue pattern that you observed, including a chart of the queue accumulation polygon that results from your data and a description of how you would compute total delay using this information

  Tab 5: Table 6 data and a summary of the headway data that you've observed. Description of the efficiency of the intersection timing for the lane that you observed, including an estimate of the green utilization time and the number of cycle failures. Note that (1) green utilization time is the ratio of the duration of the green interval during which the queue is clearing to the total duration of the green interval, and (2) cycle failure occurs when the queue fails to clear during the green interval.

- Summary of traffic flow problems that you observed

Equipment Needed

- Phone that records time to the nearest second

Tasks

These tasks should be completed during both the morning and afternoon peak periods.

Task 1

Walk or drive to your assigned intersection. Spend 15 minutes observing the operation of the intersection. Record the physical elements of the intersection, including the intersection geometry, lane striping, the location of the cabinet and other signal furniture, and other features that you consider to be important. Prepare a sketch of the intersection and note each of these items on the sketch.

Task 2

Observe the operation of the intersection for three full cycles. Record the duration of the green, yellow, and red clearance intervals for each movement served at the intersection to the nearest second for each of these cycles. Prepare a chart summarizing the sequence of the movements served (in order) and the mean duration of each of these sequences. The following table shows an example of data collected for this task.

Table 1. Example phase durations

Cycle number	Movement (direction)	Duration (sec)		
		Green	Yellow	Red Clearance
1	NBLT, SBLT	5	3	2
	NBTH, SBTH	25	3	2
	EBLT, WBLT	11	3	2
	EBTH, WBTH	30	3	2
2	NBLT, SBLT	4	3	2
	NBTH, SBTH	20	3	2
	EBLT, WBLT	5	3	2
	EBTH, WBTH	25	3	2
3	NB LT, SB LT	5	3	2
	NBTH, SBTH	20	3	2
	EBLT, WBLT	10	3	2
	EBTH, WBTH	23	3	2

Task 3

Continue to observe the operation. For one through lane (the most heavily traveled lane based on your earlier observations), record the length of the standing queue for **five cycles**. The length of the queue should be recorded **every ten seconds**. During green, the queue should only be considered non-zero if it is stopped or is beginning to move at the beginning of the green. Once the initial queue that has formed during red has cleared, the queue will be zero during the remainder of the green interval. Table 2 shows an example of data collected during a two minute period for one lane of an intersection approach. Using these data, prepare a queue accumulation polygon for each of the five cycles that you observed.

Table 2. Example queue evolution

Beginning of time interval (hh:mm:ss)	Number of vehicles in standing queue	Display status
2:00:00 pm	3	Red
2:00:10 pm	5	Red
2:00:20 pm	7	Red
2:00:30 pm	7	Red
2:00:40 pm	7	Red
2:00:50 pm	7	Red
2:01:00 pm	5	Green
2:01:10 pm	2	Green
2:01:20 pm	1	Green
2:01:30 pm	0	Green
2:01:40 pm	0	Green
2:01:50 pm	0	Green

Task 4

Observe the operation of the same heavily traveled lane for another five cycles. Record the beginning and ending clock time for the green interval for each of the five cycles. During the green period, record the clock time that each vehicle in this lane passes by the stop bar. The following table shows an example of data recorded for one cycle when six vehicles entered the intersection during green. Estimate the green utilization and determine the number of cycle failures (when the queue doesn't clear before the end of green). An example of the headway data is shown in Table 3.

Table 3. Example headway data

Cycle	Clock time (hh:mm:ss)	Event
1	2:20:30	Beginning of green interval
	2:20:33	Passage of vehicle 1
	2:20:35	Passage of vehicle 2
	2:20:38	Passage of vehicle 3
	2:20:41	Passage of vehicle 4
	2:20:43	Passage of vehicle 5
	2:20:47	Passage of vehicle 6
	2:20:59	Beginning of yellow interval

Table 4. Data collection sheet for phase durations

Cycle number	Movement (direction)	Duration (sec)		
		Green	Yellow	Red Clearance

Table 5. Data collection sheet for queue evolution

Beginning of time interval (hh:mm:ss)	Number of vehicles in standing queue	Display status

Table 6. Data collection sheet for headway data

Cycle	Clock time (hh:mm:ss)	Event

Student Notes: