ACTIVITY 9

What Do You Know About Queuing Systems?

ASSESSMENT

Purpose

The purpose of this activity is to provide a framework for you to think about traffic flow at signalized intersections. In this activity, you will build a base of knowledge of modeling traffic flow at a signalized intersection using queuing theory as your model framework. You will learn to recognize patterns through visualizing arrivals and departures at a signalized intersection. You will also make connections between words and charts, finding alignment between alternative ways of representing traffic flow patterns.

Learning Objectives

- Connect your observation of traffic flow at a signalized intersection with a model framework
- Represent and interpret queuing diagrams for a range of traffic flow and control conditions

Required Resource

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

Deliverable

- A document with the required sketches from Tasks 1 and 2, plus your answer to the Critical Thinking Question

Critical Thinking Question

1. What insights did you gain about intersection operation or performance from these cases?

TASK 1

Complete the following sketches.

Make a sketch showing the flow profile of the arrival flow and departure flow at a signalized intersection for a period of one cycle. Assume that the arrival flow is uniform. Label the axes and the important parameter values on the sketch.

Make a sketch that shows the cumulative vehicle arrivals and departures during one cycle. Again, assume that the arrival flow is uniform.

Based on the two sketches that you made above, sketch the queue accumulation polygon for these same conditions.

Task 2

Draw a flow profile diagram, a cumulative vehicle diagram, and a queue accumulation polygon for the following three cases and describe how each of these cases differs from the original case that you drew in Task 1.

Case 1: Uniform vehicle arrivals throughout the cycle with the queue clearing just at the end of green.
Flow profile diagram
Cumulative vehicle diagram
Queue accumulation polygon

Case 2: Uniform vehicle arrivals throughout the cycle but the queue does not clear before the end of green.
Flow profile diagram
Cumulative vehicle diagram
Queue accumulation polygon

Case 3: No vehicle arrivals during red; a platoon (or group of vehicles) arrives during the first half of the green interval only, with no arrivals during the second half of the green interval.
Flow profile diagram
Cumulative vehicle diagram
Queue accumulation polygon

Student Notes: