ACTIVITY 40 What Do You Know About Maximum Green Time, Cycle Length, and Delay?

ASSESSMENT

Purpose

The purpose of this activity is to help you understand the role of the maximum green time in providing efficient intersection operations. You will also validate your understanding of how to use the uniform delay equation to determine the relationship between the delay and cycle length (and thus the maximum green time).

Learning Objectives

- Describe the maximum green time setting and timer process
- Determine the optimal maximum green time (based on the optimal cycle length) at a signalized intersection

Deliverable

- Prepare a spreadsheet with the following information:

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

  Tab 2: Summary of the results of your analysis from Tasks 1 and 2 and your answers to the Critical Thinking Questions

Task 1

A model for computing the average delay when traffic is arriving at a signalized intersection at a uniform rate was described in Activity #39. It is reproduced below. Using an Excel spreadsheet, develop a VBA function to compute average uniform delay as a function of red time, green time, cycle length, volume, and saturation flow rate. See the Excel Tutorial for assistance in creating a VBA function.

$$d_a = \frac{0.5C(1-g/C)^2}{1-v/s}$$

Task 2

Assuming a volume from one of the major street approaches of your simulation network, compute the average uniform delay per vehicle as a function of cycle length, with a range of cycle lengths from 40 seconds to 100 seconds. Prepare a graph of delay vs. cycle length for this range of values. Assume g/C = 0.5 and s = 1900 vehicles per hour of green.

Critical Thinking Questions

1. Prepare a brief discussion of the implications of your analysis for the maximum green time setting for your network. What limitations exist in this analysis that must be considered when you set the maximum green time? Include the discussion and answer in your spreadsheet.

2. The reading in Activity #39 emphasized the importance of keeping the cycle length (and thus the maximum green time) as low as possible. But what happens when the cycle length becomes too short? List one possible downside of a very short cycle length.