ACTIVITY 31

# What Do You Know About Detection Zone Length and Passage Time?

ASSESSMENT

## Purpose

The purpose of this activity is to test your understanding of the relationship between detection zone length and the basic actuated timing parameters.

## Learning Objectives

- Describe the timing processes for actuated traffic control
- Describe how the length of the detection zone affects the setting of the basic timing parameters

## Deliverable

- Prepare a completed spreadsheet with the results of your analysis from the following tasks

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

  **Tab 2:** Answers to the Critical Thinking Questions

  **Tab 3:** Tool prepared in Task 1 and results from Tasks 2, 3, and 4

## Critical Thinking Questions

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

1. What is the relationship (in equation form) between unoccupancy time and maximum allowable headway (MAH)? What are some of the issues involving the computation of the unoccupancy time for a given intersection approach? Provide your answer in a complete paragraph.

2. What is the process for setting the passage time, given the MAH? Describe in complete sentences.

3. What are the pros and cons of a detection zone that is 100 feet in length? Provide your answer in one or more complete paragraphs.

4. How would the determination of the MAH change if you considered lane by lane detection for a two-lane approach (that is, detectors in each lane, operating independently)?

## Task 1

Prepare a spreadsheet tool that implements the relationship between the MAH, detection zone length, and unoccupancy time as shown in Figure 110. The tool should accept the following parameters as input: vehicle speed (mph), detector length (ft), vehicle length (ft), and headway (s). The spreadsheet should produce the unoccupancy time(s) as an output. The spreadsheet should also show a graph that shows the relationship for two vehicles traveling at a specified headway (as shown Figure 110).

## Task 2

Using your spreadsheet tool with a MAH of three seconds, determine the unoccupancy times that would result from detection zone lengths varying from 6 feet to 90 feet. Assume a vehicle length of 20 feet and a speed of 30 miles per hour. If the length of your detection zone was 60 feet, what value of passage time would you select and why?

## Task 3

Using your spreadsheet tool, what would you set the passage time to be, given the following conditions? Describe the assumptions that you made and the method that you used to answer this question.

- $L_D$ = 22’
- $L_v$ = 19’ (80 percent of the vehicles), 30’ (15 percent of the vehicles), or 55’ (5 percent of the vehicles)
- $v$ = 29 mi/hr (mean)
- $h$ = 1.5 – 2.9 sec, mean = 2.2 sec, 85$^{th}$ percentile = 2.5 sec

## Task 4

Using your spreadsheet tool, what would you set the passage time to be, given the following conditions? Describe the assumptions that you made and the method that you used to answer this question.

- $L_D$ = 60’
- $L_v$ = 19’ (80 percent of the vehicles), 30’ (15 percent of the vehicles), or 55’ (5 percent of the vehicles)
- $v$ = 29 mi/hr (mean)
- $h$ = 1.5 – 2.9 sec, mean = 2.2 sec, 85$^{th}$ percentile = 2.5 sec

Student Notes: