

PURPOSE

The prerequisite for this course is the completion of an introductory course in transportation engineering. This activity will give you the opportunity to assess and strengthen your understanding of that critical prerequisite knowledge so that you can reliably recall and use it, even as you continue to build on it.

LEARNING OBJECTIVES

- Determine your current level of competency with traffic signal system concepts

DELIVERABLE

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

CRITICAL THINKING QUESTIONS

1. Assume that traffic arrives at a signalized intersection with uniform flow (equal space between each vehicle). At what point during the cycle will the queue length (number of vehicles in the queue) be at its maximum?
 - a. At the beginning of red?
 - b. At some other point during red?
 - c. At the beginning of green?
 - d. At some other point during green?[explain your answer]

2. What is the effect of long cycle lengths at a signalized intersection (as compared with shorter cycle lengths)?
 - a. The delay is reduced.
 - b. The delay is increased.
 - c. There is no effect on delay.
 - d. Other[explain]

3. What is the purpose of the yellow indication at a signalized intersection?

- a. To provide adequate time for a vehicle to stop.
- b. To provide adequate time for a vehicle to safely clear the intersection.
- c. Both a and b.
- d. Neither a nor b.

[explain]

4. Which factors should be considered when determining the duration of the yellow indication?

- a. The speed of vehicles approaching the intersection.
- b. The width of the intersection.
- c. The mean length of vehicles approaching the intersection.
- d. Some combination of a, b, and c. [specify] _____

[explain]

5. Suppose traffic signal control will replace stop sign control at an intersection. Which of the following will likely result?

- a. All movements will experience less delay with signal control.
- b. All movements will experience more delay with signal control.
- c. Some movements will experience more delay and some movements will experience less delay with signal control.

6. Suppose a platoon of ten vehicles departs from a signalized intersection when the signal display turns green. When this platoon arrives at the next signalized intersection downstream, the length of the platoon as measured from the front of the first vehicle to the end of the last vehicle will have:

- a. Changed little.
- b. Increased.
- c. Decreased.

[explain]

7. If the green time is increased for one approach at a signalized intersection, the delay for the approach will likely:
- Increase.
 - Decrease.
 - Stay the same.

[explain]

8. If the green time is increased for one approach at a signalized intersection, the delay for the entire intersection will likely:
- Increase.
 - Decrease.
 - Stay the same.

[explain]

9. Prepare a sketch showing the relationship between delay and cycle length showing cycle length on the x-axis and delay on the y-axis.

10. The time that the green interval is displayed should be based on:
- The time required to serve the vehicles that arrived during the previous red interval.
 - The time required to serve all vehicles that arrived during red and that continue to arrive during green.
 - It should be fixed and not depend on traffic demand.

15. Consider that you are the traffic engineer responsible for the signal timing operation for the intersection shown in Figure 23. Citizens have called your office and complained that they often have to sit through three or more cycles during congested periods and this makes a significant difference in their travel times and fuel costs.



Figure 23. Aerial view of a signalized intersection

- a. What information or data would be required to properly analyze the situation?

- b. How would you quantify the performance of the signal system with the data you collect?

