

CE 572 – Spring 2015  
Class 19

2015.03.04

## Assignment 25 - Predicting delay when arrivals are non-uniform

The purpose of this assignment is to study how arrival patterns affect the delay at a signalized intersection. Your work for each task should be clearly documented and the spreadsheet should be clearly organized so that it can be easily followed. Use VBA functions as needed. Assume the following input data:

*For both intersections:*

- $C = 60$  sec
- $g/C = 0.5$
- $s = 1900$  veh/hr

*For upstream intersection:*

- Arrival flow = 800 veh/hr

*For downstream intersection:*

- Offset = 0 sec

*Other data:*

- Distance = 1000 ft
- Speed = 25 mi/hr

### Tasks

Task 1. Calculate the departure flow profile for the upstream intersection and the arrival flow profile for the downstream intersection showing 1 sec time steps over a four cycle period.

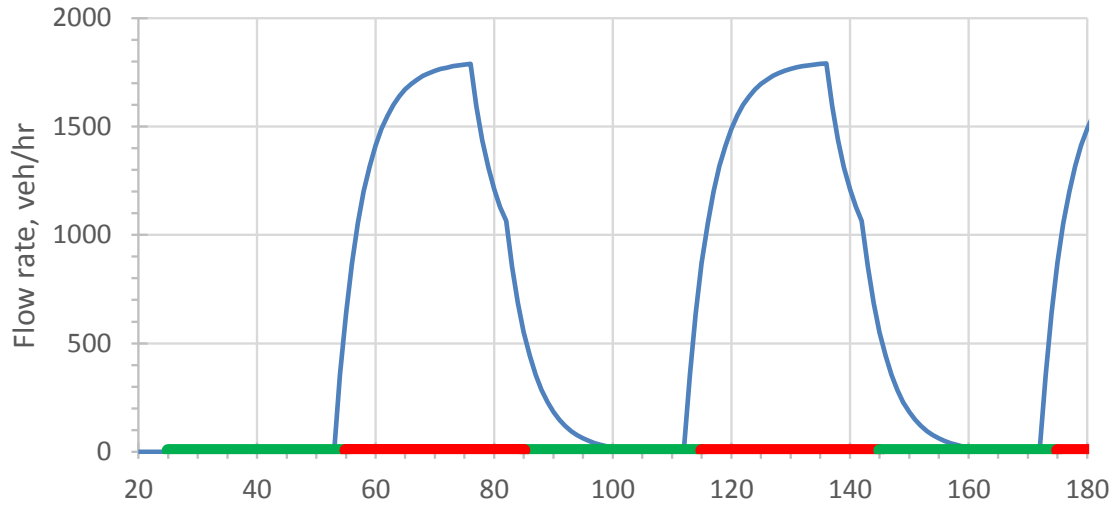
Task 2. Prepare plots of both flow profiles that you calculated in task 1. The plots should also show the four green and red time intervals over time.

Task 3. For each time step, beginning with the start of the second red interval and continuing for one complete cycle, calculate the queue length. Based on these data, prepare a queue accumulation polygon for this cycle.

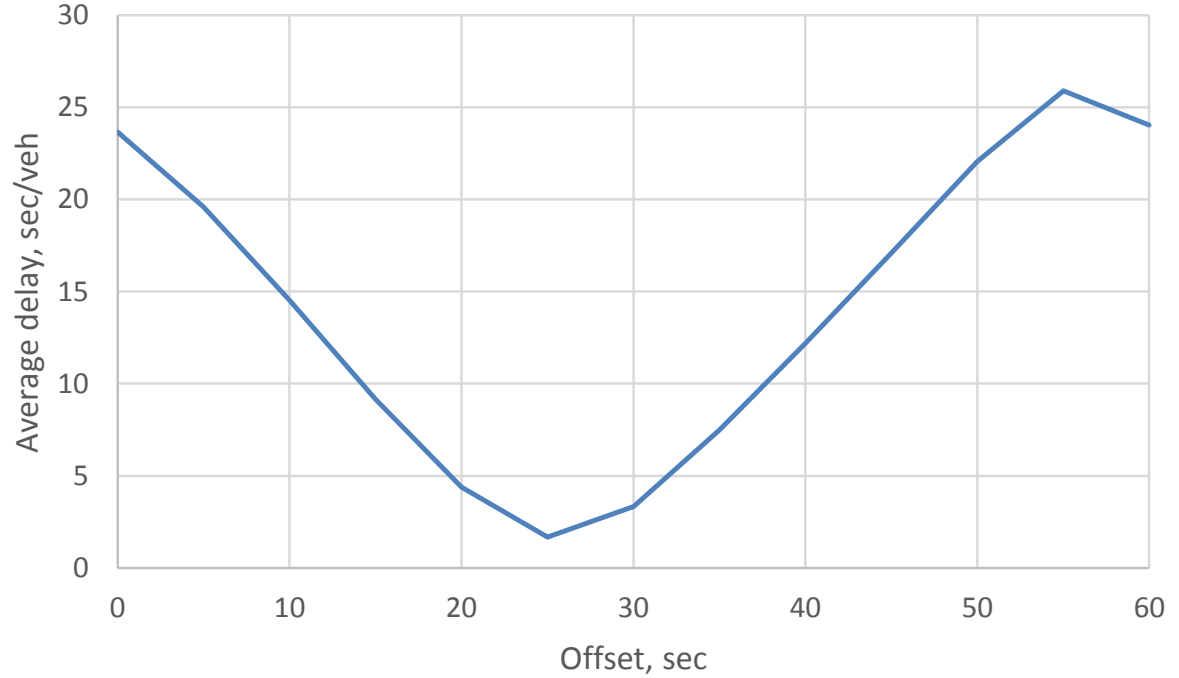
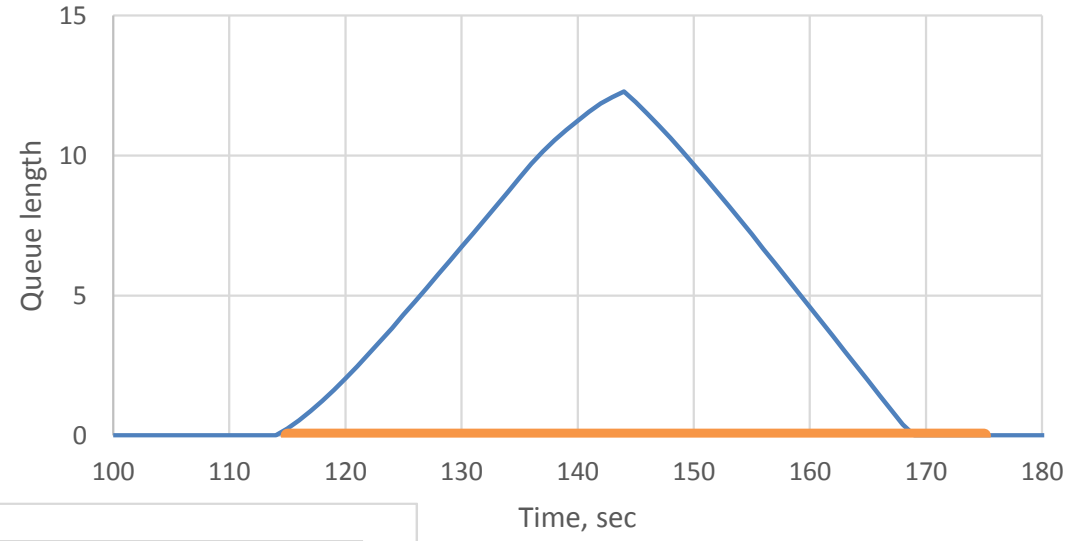
Task 4. For this same cycle, calculate the total and average delays.

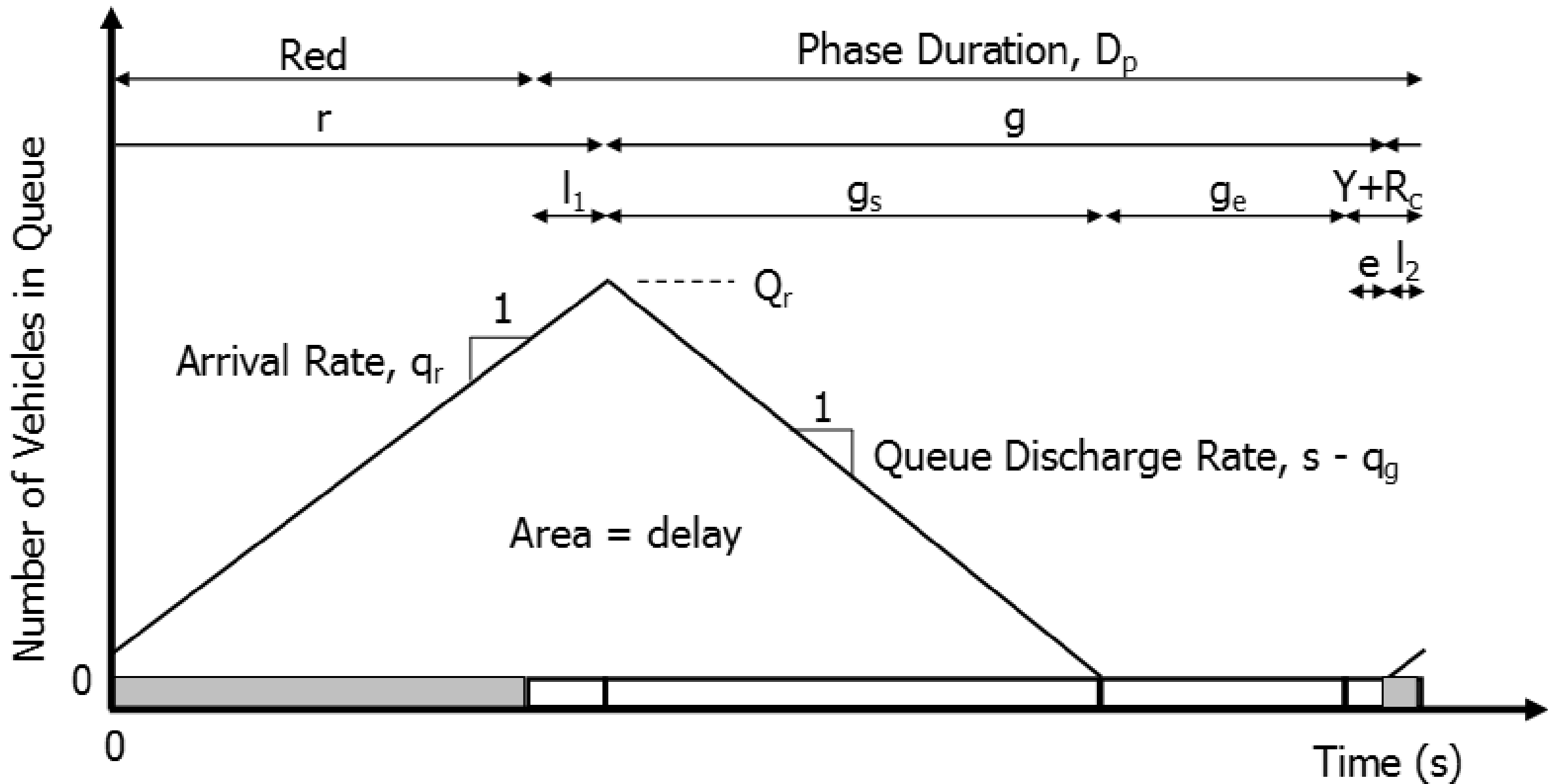
Task 5. For this same cycle, and for a range of offsets from 0 to 60 sec in intervals of 5 sec, show how average delay varies as a function of the offset.

### Arrival Flow Profile



### Queue Accumulation Polygon





**Exhibit 31-7**  
 Time Elements Influencing  
 Actuated Phase Duration

## **Assignment 27 - Phase Duration Estimation for Actuated Control**

The purpose of this assignment is to set up a computational engine to predict phase duration for a simple system (two intersecting one-way streets) under actuated control.

Task 1. Document all parameters, both input and calculated, required for this procedure under the simplified conditions for this scenario. This can be handwritten.

Task 2. Document the calculation sequence for phase duration in flow chart form. This can be handwritten.

Task 3. Create a spreadsheet with space for the input parameters that you identified in task 1. The space should include the parameter name, the value, and the units.

Task 4. Add to the spreadsheet the calculated parameters that you identified in task 1, again including the parameter name, the value, and the units. Use VBA functions as needed for the calculated parameters.