CE 572 – Spring 2015
Class 21

2015.03.09

Schedule:
- Exam on Friday
- Exam preview on Wednesday; notes will be available sometime on Tuesday afternoon
- For today:
  - Review A28
  - Do A29
  - Homework: A30

Assignment 29 - Model Checking

The purpose of this assignment is to perform several "reasonableness" checks using the model that you have developed for actuated signal control. List three conditions that you know have to be satisfied by the model. Verify that these three conditions are met. Discuss your results.

Assignment 30 - Parametric Analysis

The purpose of this assignment is to conduct a parametric analysis of the actuated signal control model. Clearly define your input assumptions for each of the following studies. Focus your work on one approach only, holding the demand volume or other parameters constant on the other approach.

- For conditions in which demand is less than capacity, construct a plot showing the variation of uniform delay with demand. Provide a brief discussion of your results.

- Study the effect of demand volume on the probability of a phase call. Provide a brief discussion of your results.

- Study the effect of demand volume on the green extension time g_e. Provide a brief discussion of your results.
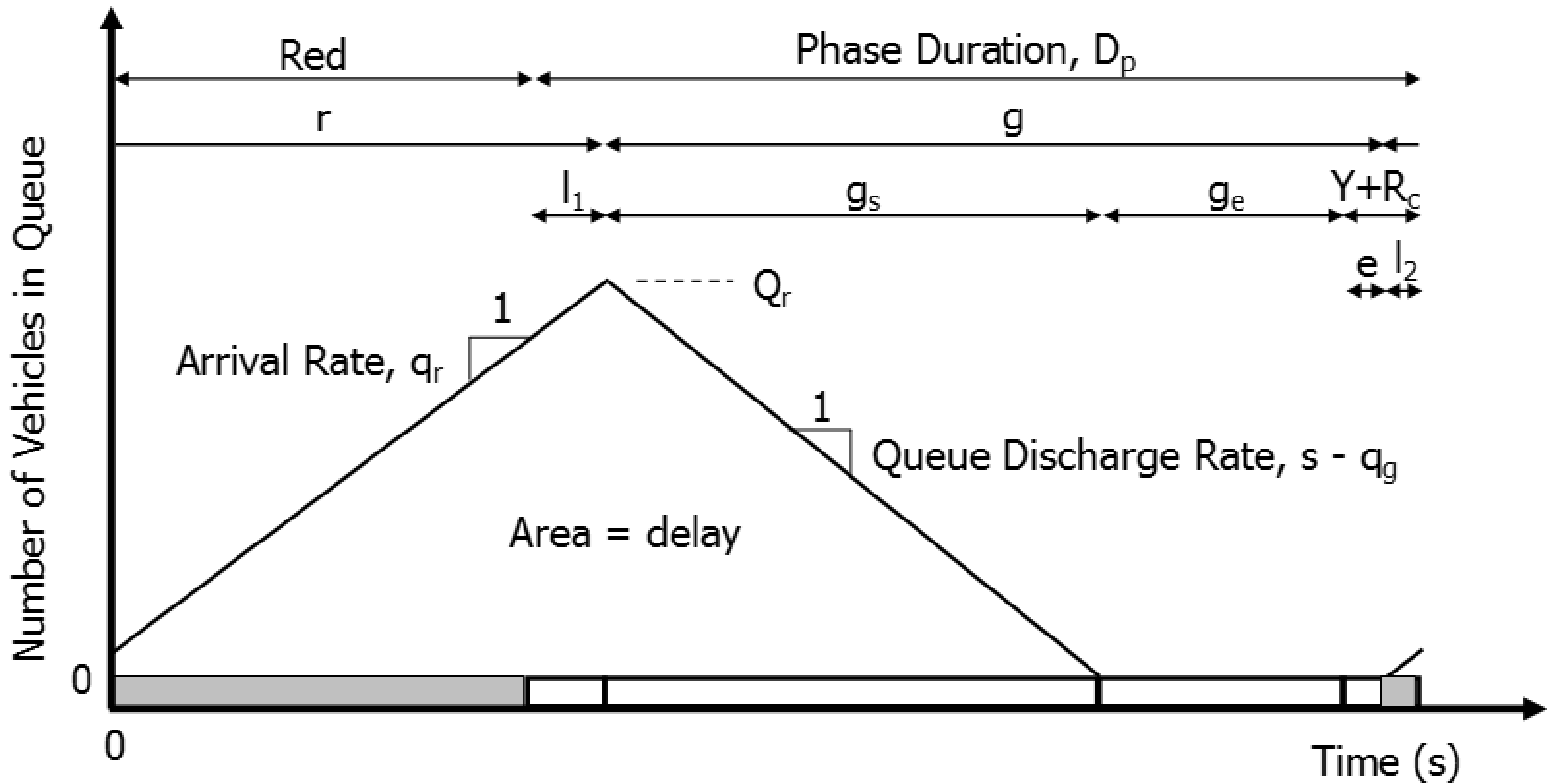
Exhibit 31-7
Time Elements Influencing
Actuated Phase Duration

3

Assignment 28 - Phase Duration Estimation for Actuated Control

The purpose of this assignment is to enhance the computational engine that you developed for Assignment 27 and directly calculate the phase durations for the two approaches (iteratively). Your completed computational engine should accept the input parameters (as per task 3 in Assignment 27) and calculate the required values for each of the two phases:

- queue service time, g_s
- green extension time, g_e
- Displayed green, G
- Phase duration, D_p
- Cycle length, C

The iteration process should be accomplished by constructing a VBA subprogram.

A	B	C	D
1 **Input variables**	**Phase 2**	**Phase 4**	
2 Arrival rate, v	500	400	veh/hr
3 Proportion vehicles arriving on green, P	0.5	0.5	
4 Headway of bunched vehicles, Δ	1.5	1.5	veh/sec
5 Bunching factor, b	0.6	0.6	
6 Lost time, l_1	2	2	sec
7 Passage time, PT	2.5	2.5	sec
8 Detection zone length, L_{ds}	22	22	feet
9 Vehicle length, L_v	20	20	feet
10 Speed, S_a	30	30	mi/hr
11 Maximum green, G_{max}	50	50	sec
12 Minimum green, G_{min}	5	5	sec
13 Yellow time, Y	3	3	sec
14 Red clearance, R_c	2	2	sec
15 Saturation flow rate, s	1900	1900	veh/hr/green
16			
17 **Intermediate values**			
18 Cycle length, C	26.6	26.6	sec
19 Effective green, g	9.1	7.5	sec
20 Effective red, r	17.5	19.1	sec

A	B	C	D
22 **Calculated variables**			
23 Arrival rate, q	0.139	0.111	veh/sec
24 Arrival rate during red, q_r	0.105	0.077	veh/sec
25 Arrival rate during green, q_g	0.204	0.197	veh/sec
26 Proportion of free vehicles, φ	0.882	0.905	
27 Flow rate parameter, λ	0.155	0.121	veh/sec
28 Queue at end of red, Q_r	1.845	1.476	veh
29 Queue service time, g_s	5.691	4.458	sec
30 Number of extension before max out, n	5.876	4.838	
31 ProbSubjectPhaseCalled, p_v	0.975	0.948	
32 MAH	3.452	3.452	sec
33 ProbGreenExtension, p	0.348	0.285	
34 Green extension, g_e	1.332	1.020	sec
35 Effective change interval, $Y + R_c$	5	5	sec
36 Average green interval duration, G	9.023	7.479	sec
37 Phase duration, D_p	14.023	12.479	sec
38			
39 **Final values**			
40 Cycle length, C	26.5	26.5	sec
41 Effective green, g	9.0	7.5	sec
42 Effective red, r	17.5	19.0	sec
43 Displayed green, G	9.0	7.5	sec
44 Displayed red, R	14.5	16.0	sec
45 Displayed yellow, Y	3	3	sec