CE 572 – Spring 2015
Class 22

2015.03.11

Schedule:
- Exam on Friday
- For today:
  - Review A29, 30
  - Exam preview

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.

Preparation for Exam #1 – 13 March 2015

As you prepare for this examination, review the list below. The examination will be based on the knowledge, skills, and abilities included in this list for AWSC intersections, TWSC intersections, and signalized intersections. The operation of roundabouts will not be covered on the examination.

AWSC Intersections

- Describe the concepts that form the basic capacity model including degree of conflict and the interaction between traffic streams.
- Define and describe the driver behavior parameter: saturation headway for each degree of conflict case.
- Apply and interpret the expected value of the departure headway for one approach.
- Interpret the results of a capacity analysis for an AWSC intersection with one lane on each of four approaches.

TWSC Intersections

- Describe the concepts that make up the basic gap acceptance model.
- Interpret the gap acceptance model and the parameters that constitute the model.
- Define, describe, and apply the driver behavior parameters: critical headway and follow up headway.
- Describe and interpret the events that are used to construct gap acceptance and rejection data.
- Define and apply the concept of Impedance.
- Interpret the results of a capacity analysis for a TWSC intersection with one major street TH movement, one major street LT movement, and one minor street LT movement.

Signalized Intersections

- Describe and apply the basic capacity concept: the product of saturation flow rate and green ratio.
- Apply and interpret a critical movement analysis for a signalized intersection with two lanes on each approach (one LT lane and one TH lane) with protected LT phasing.
- Apply and interpret the calculation of delay assuming either uniform arrivals or platooned arrivals.
- Apply and interpret a capacity analysis for permitted LTs from an exclusive LT lane.
- Construct and interpret a queue accumulation polygon for various arrival and departure patterns.
- Explain and interpret the calculation of queue service time and green extension time for one approach of a signalized intersection operating under actuated signal control.

	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