CE 572 – Spring 2015

Intersection Traffic Operations

Class 04

26 January 2015

Assignment 06 – AWSC Intersection Computational Engine for Simplified Scenario #2

The objective of this assignment is to construct a spreadsheet that computes the capacity for a four-leg single-lane approach AWSC intersection. The spreadsheet should satisfy the following requirements:

- Accepts the flow rates on each approach as inputs.
- Computes lambda (veh/sec) for each approach.
- Computes the x_S, x_O, x_{CL}, and x_{CR} for each approach iteratively.
- Computes P[C_i] for each of the five degree of conflict cases for each approach iteratively.
- Computes the departure headway h_d for each approach iteratively.

Once you have completed the spreadsheet that meets the above requirements, complete the following task:

- Assume an intersection with 300 veh/hr on each approach. Use the spreadsheet to determine the capacity of the NB approach

Notes:

- Your spreadsheet will have a circular reference. You may need to use the re-calculation key (F9) to obtain convergence of the departure headway.
- The degree of saturation X can never exceed one. How do you control for this in the spreadsheet tool that you are developing?

	A	B	C	D	E
1	**AWSC Intersection Model - 4 Legs**				
2					
3	**Given Conditions**	**Volume**			
4	NB				
5	SB				
6	EB				
7	WB				
8					
9	**Calculations**	**NB**	**SB**	**EB**	**WB**
10	Volume				
11	Lambda				
12					
13	xS				
14	xO				
15	xCL				
16	xCR				
17					
18	P[C1]				
19	P[C2]				
20	P[C3]				
21	P[C4]				
22	P[C5]				
23					
24	**Results**	**NB**	**SB**	**EB**	**WB**
25	Departure headway				
26	Degree of utilization				
27					

1. What happens when the volumes on each approach are set to 500 veh/hr?
   - What are the results from the spreadsheet?
   - Describe what you would observe in the field.
   - What should X be for these volumes?
2. Suppose the NB volume is 500 veh/hr and the volumes on the other approaches are zero. What is the capacity of the NB approach?
3. What is the condition (DOC case) at which the intersection volume is maximum?
4. Verify the five boundary conditions for this model.
5. Why can X be different in rows 13-16 and in row 27?
6. What is the condition at which the volume on any one approach is maximum?

Assignment 07 - Field Observation

TWSC intersections are intersections that are characterized by a major street that always has the right-of-way, and a minor street that must always stop before entering the intersection, yielding the right-of-way to all vehicles on the major street. To prepare you for this section, spent 15 minutes observing the operations of a TWSC intersection in Moscow. Prepare a set of bullet points that summarize what you observed. Be particularly aware of the driver behavior on the minor street and how it is affected by the major street operations. This assignment should be emailed to me before 900 am on January 28th.

Assignment 08 - Reading

The purpose of this assignment is to provide you with an understanding of the basic queuing model used for evaluating the performance of TWSC intersections. Be prepared to discuss this reading in class.

Reading: "The Potential Capacity of Unsignalized Intersections", Karsten G. Baass. [Available on the class web site, "Resources" page]. [Only read pages 43 and 44, through the paragraph that ends "…and the follow-up gaps (measured in Hannover, Germany". We will not cover the other material in the paper.

Once you have completed the reading, answer the following questions; bring your answers to class:

1. Define the following variables: Critical gap, follow up time or follow up gap, conflicting flow rate, and potential capacity.
2. Write the expression that describes the probability of a gap being larger than a value of t.
3. Write the expression for potential capacity developed by Grabe (and Major and Buckley), defining each of the terms in the expression.
4. Write the expression for the potential capacity developed by Harders, defining each of the terms in the expression
5. Explain each of the columns in Table 2.