

# CE 474 – Class 05

September 2, 2015

**Class 05 (9.02)**

Discuss: A09

Do: A10 [group] (due 9.09)

# TRANSPORTATION ... in the news

## Tilikum Crossing

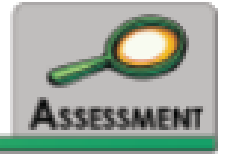
*Bridge of the People*



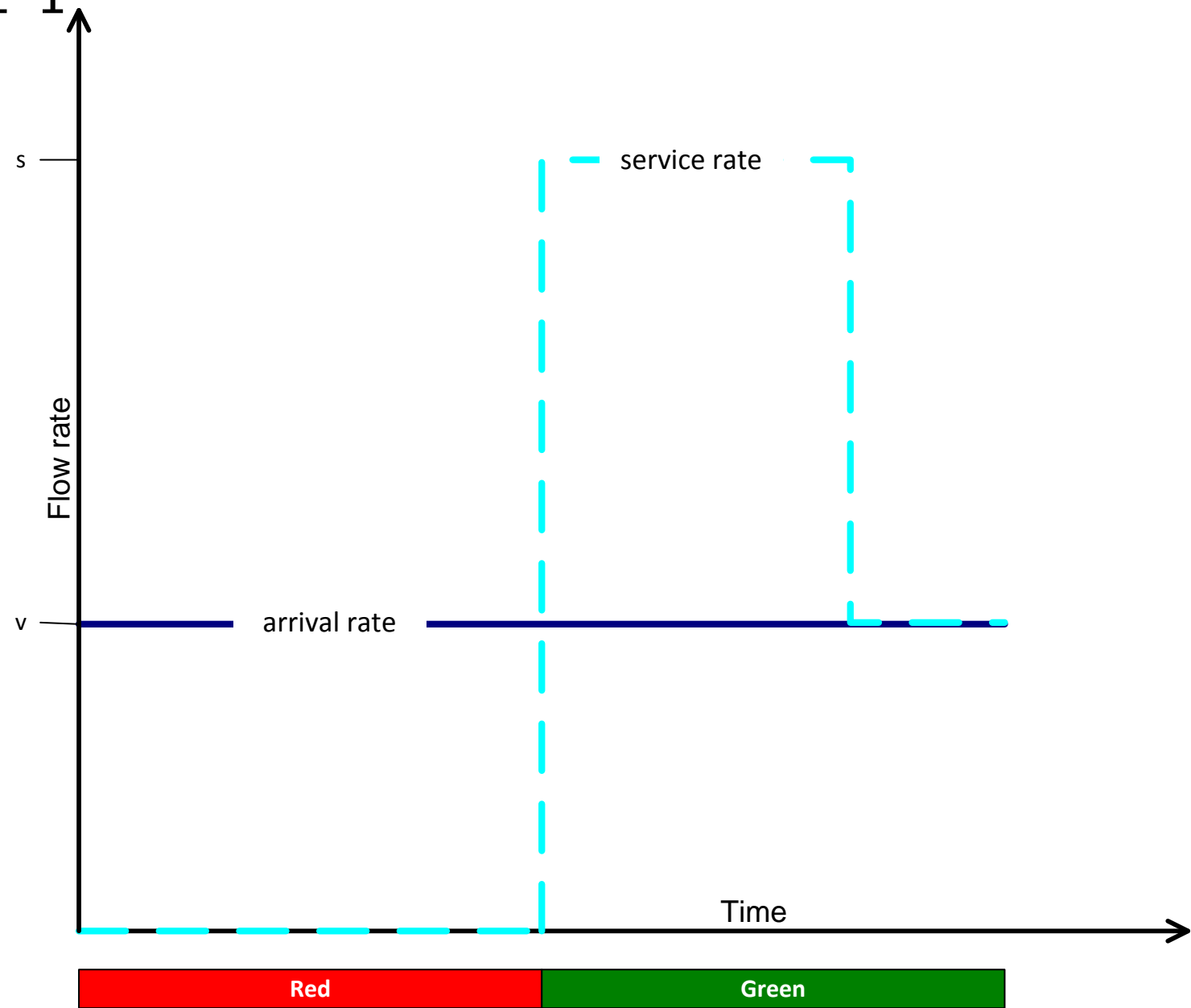
ACTIVITY

9

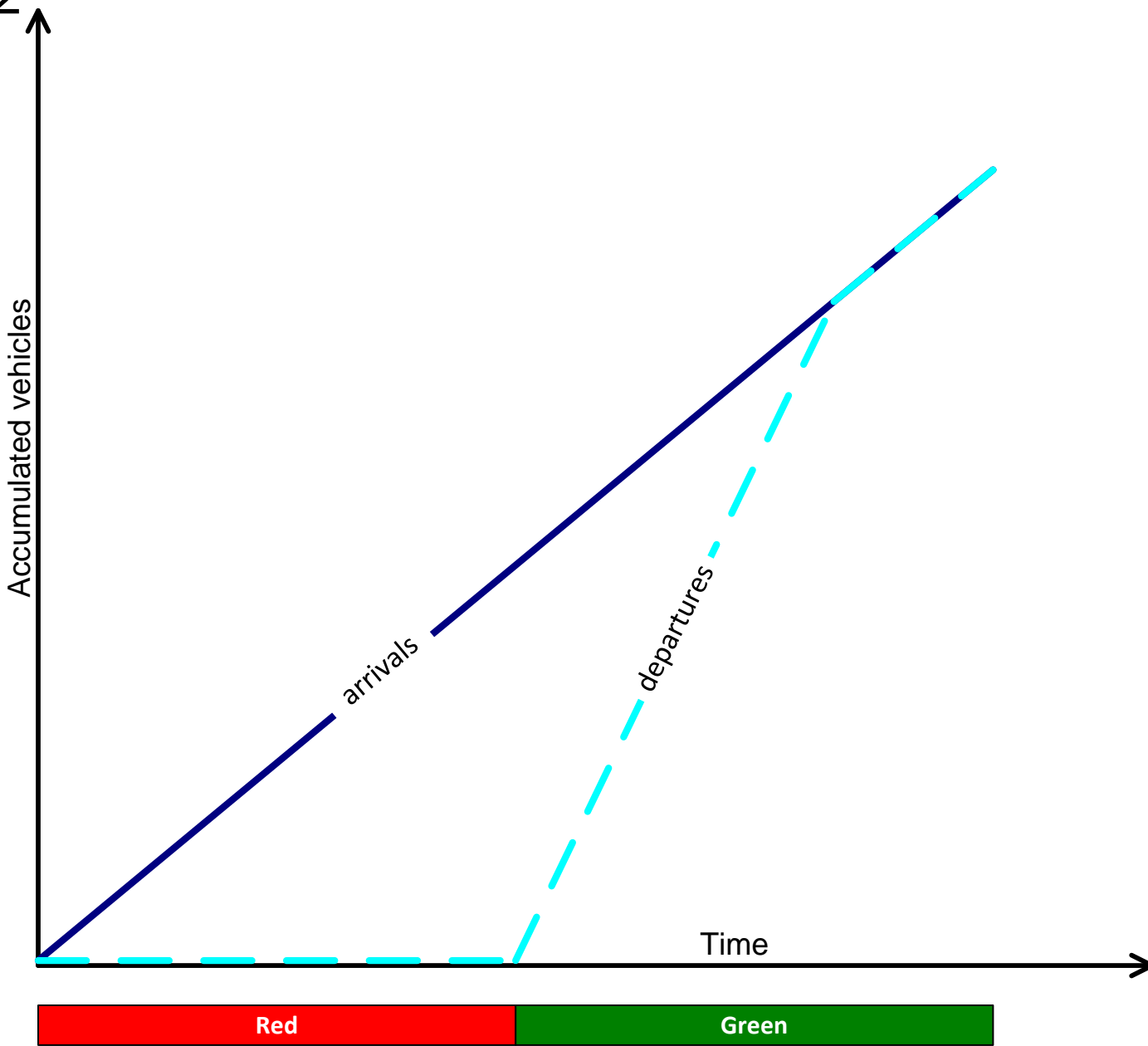
## What Do You Know About Queuing Systems?



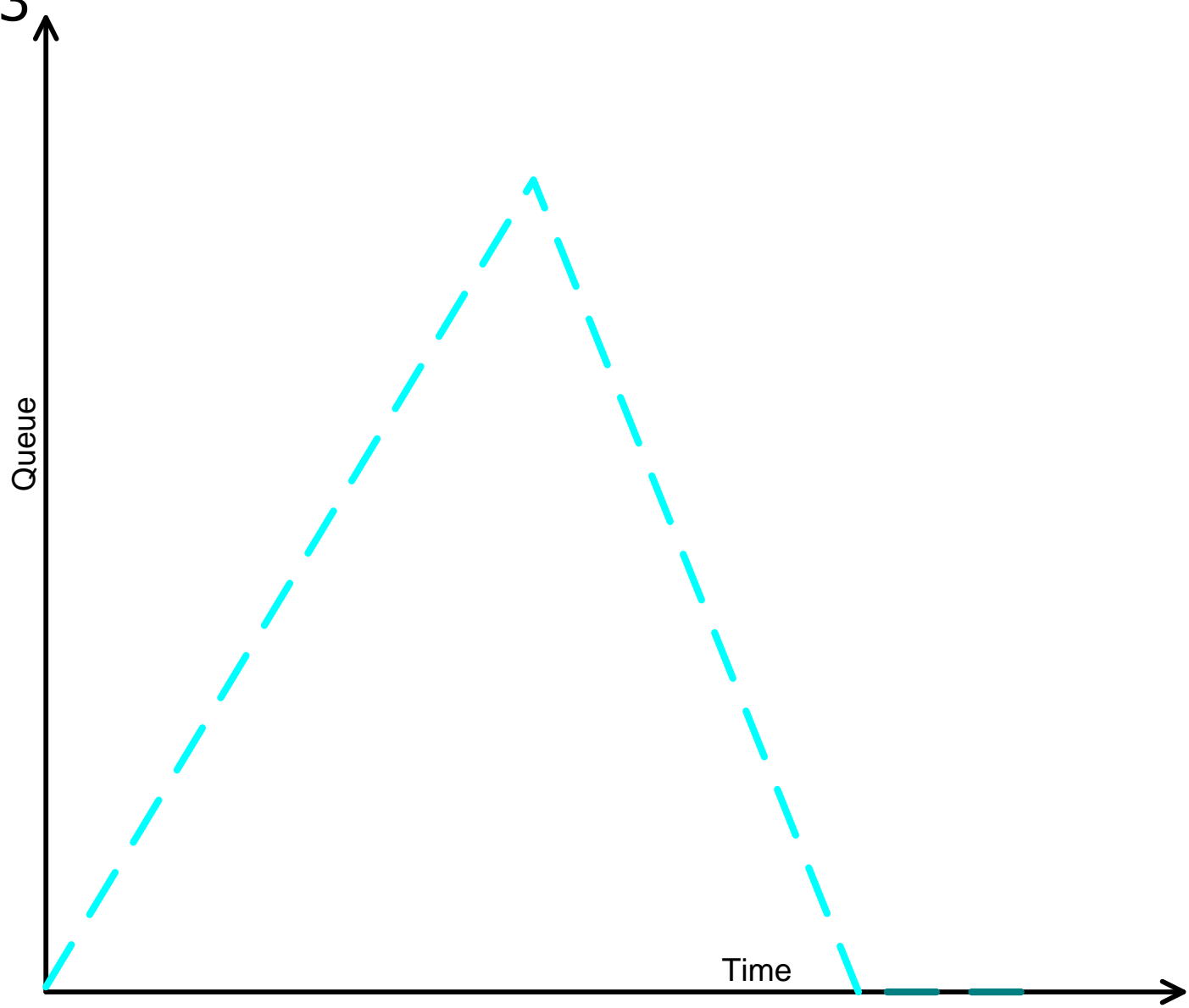
# Task 1-1



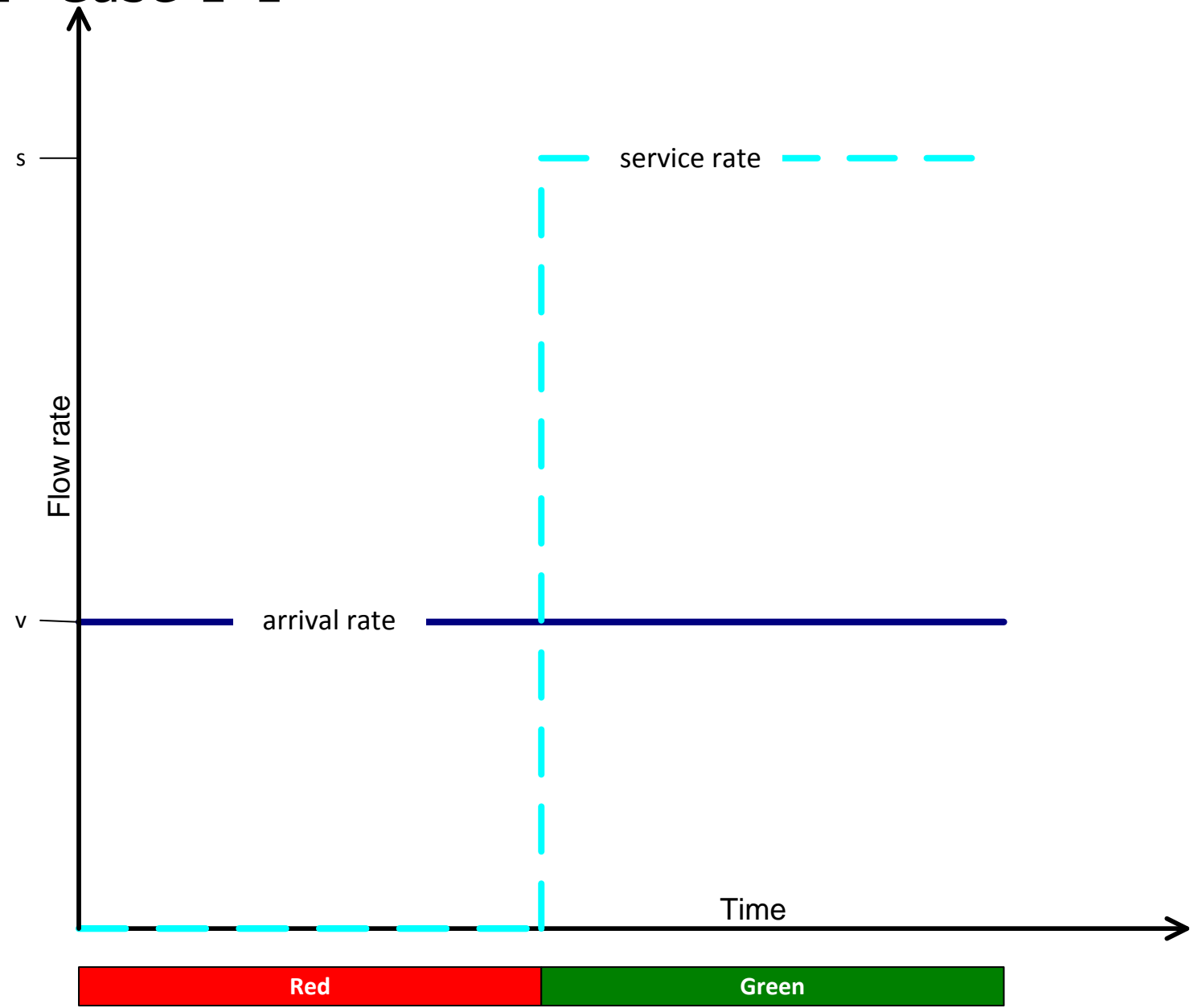
# Task 1-2



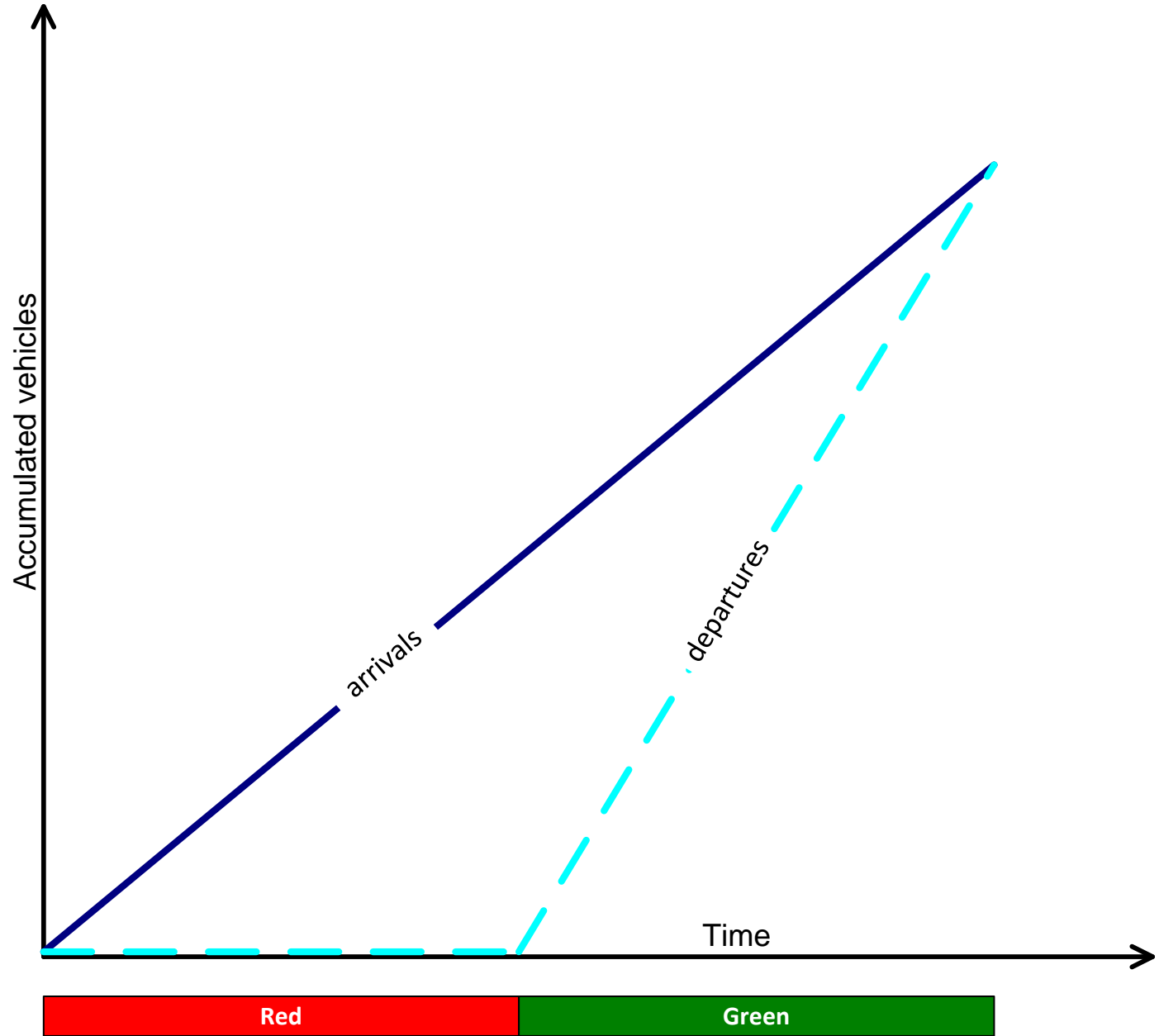
Task 1-3



# Task 2- Case 1-1

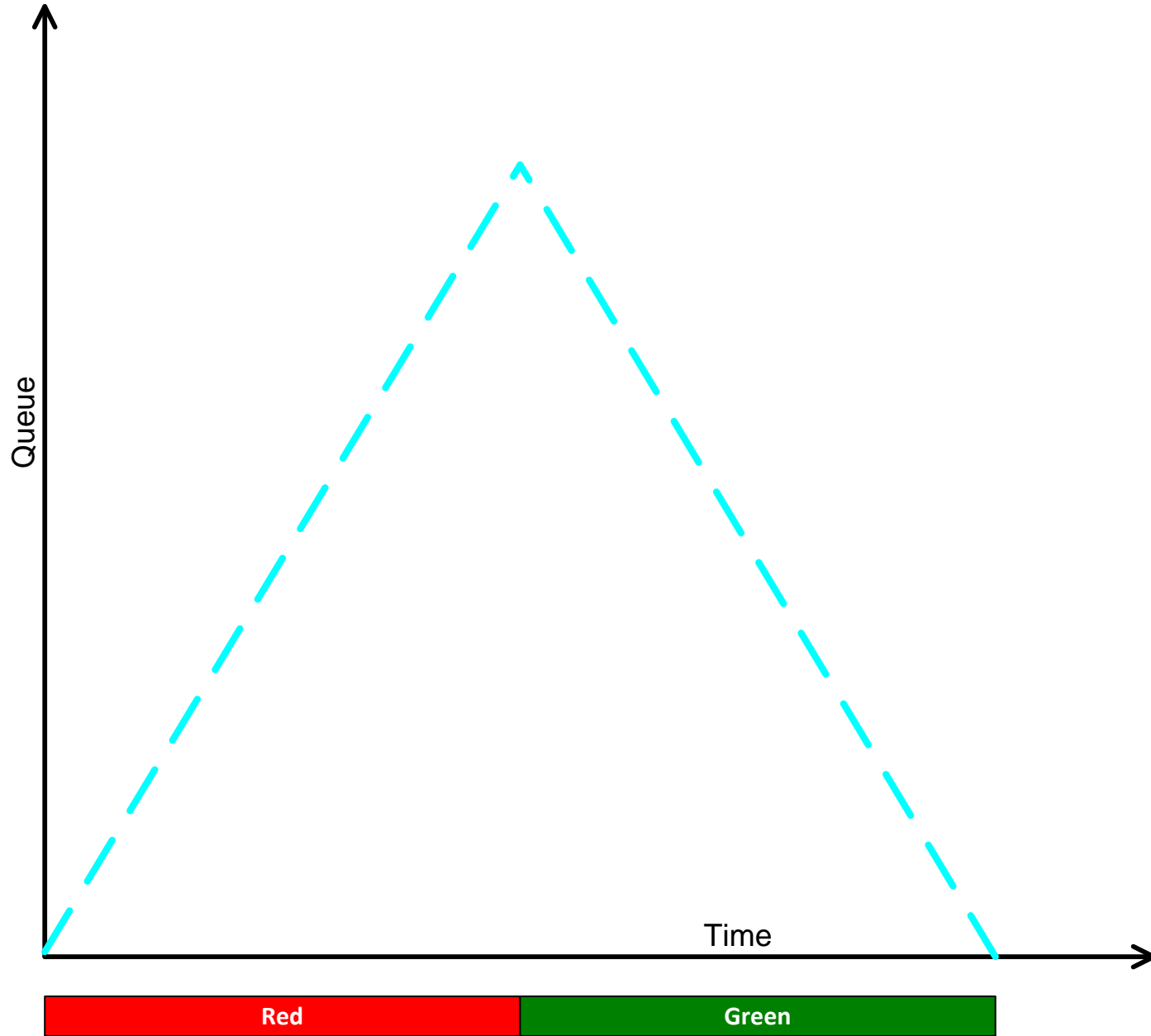


# Task 2- Case 1-2

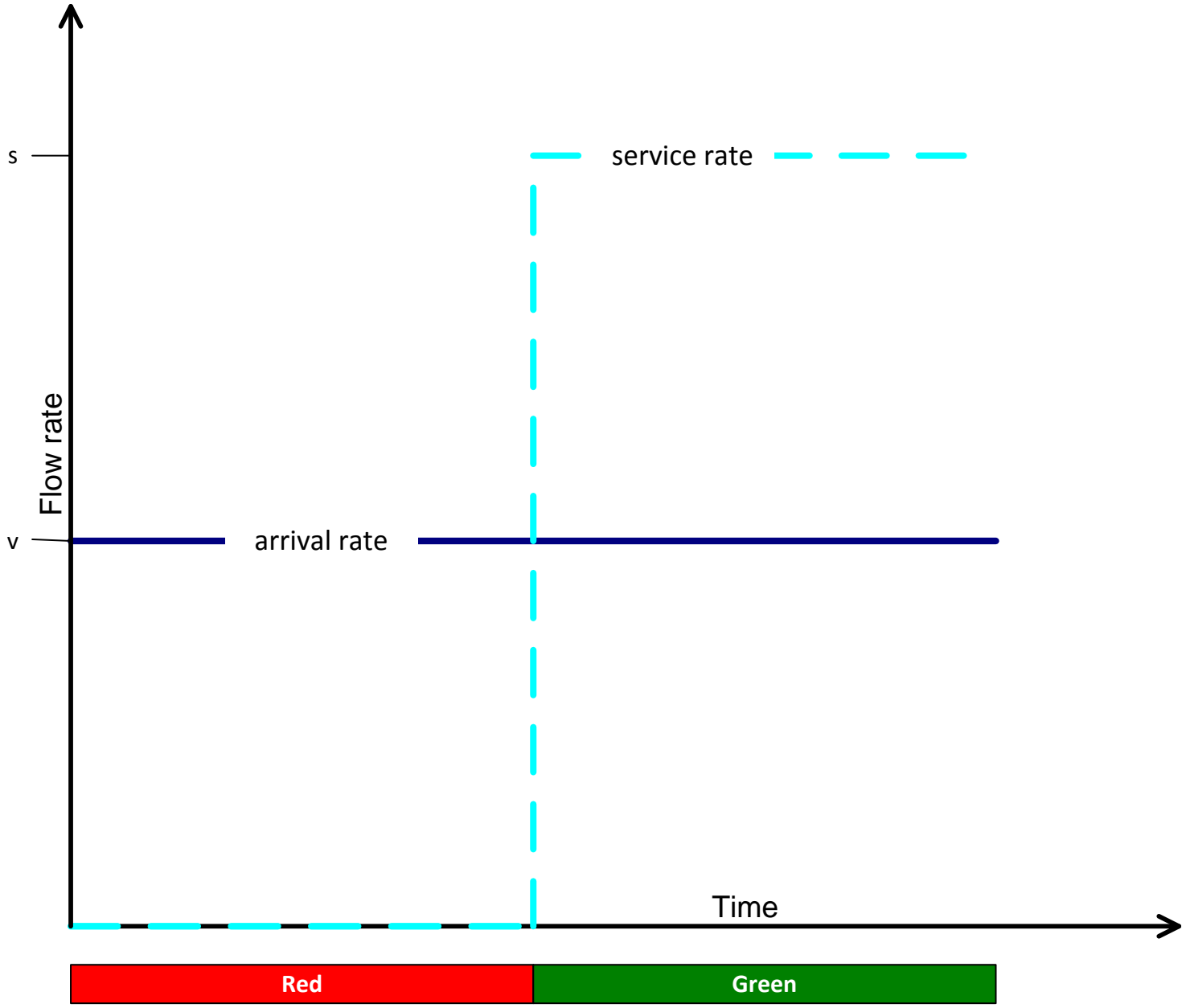




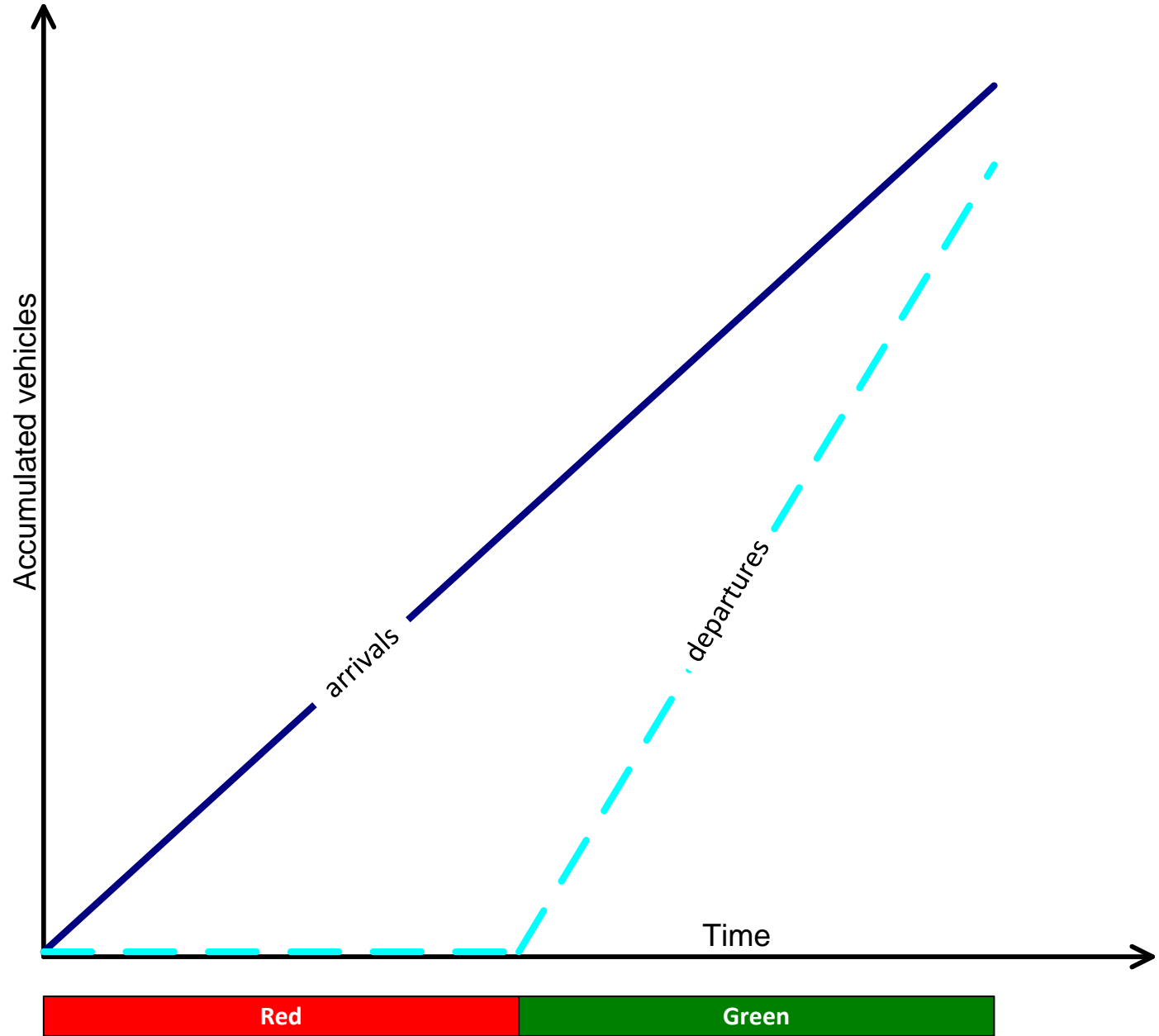
# Task 2- Case 1-3



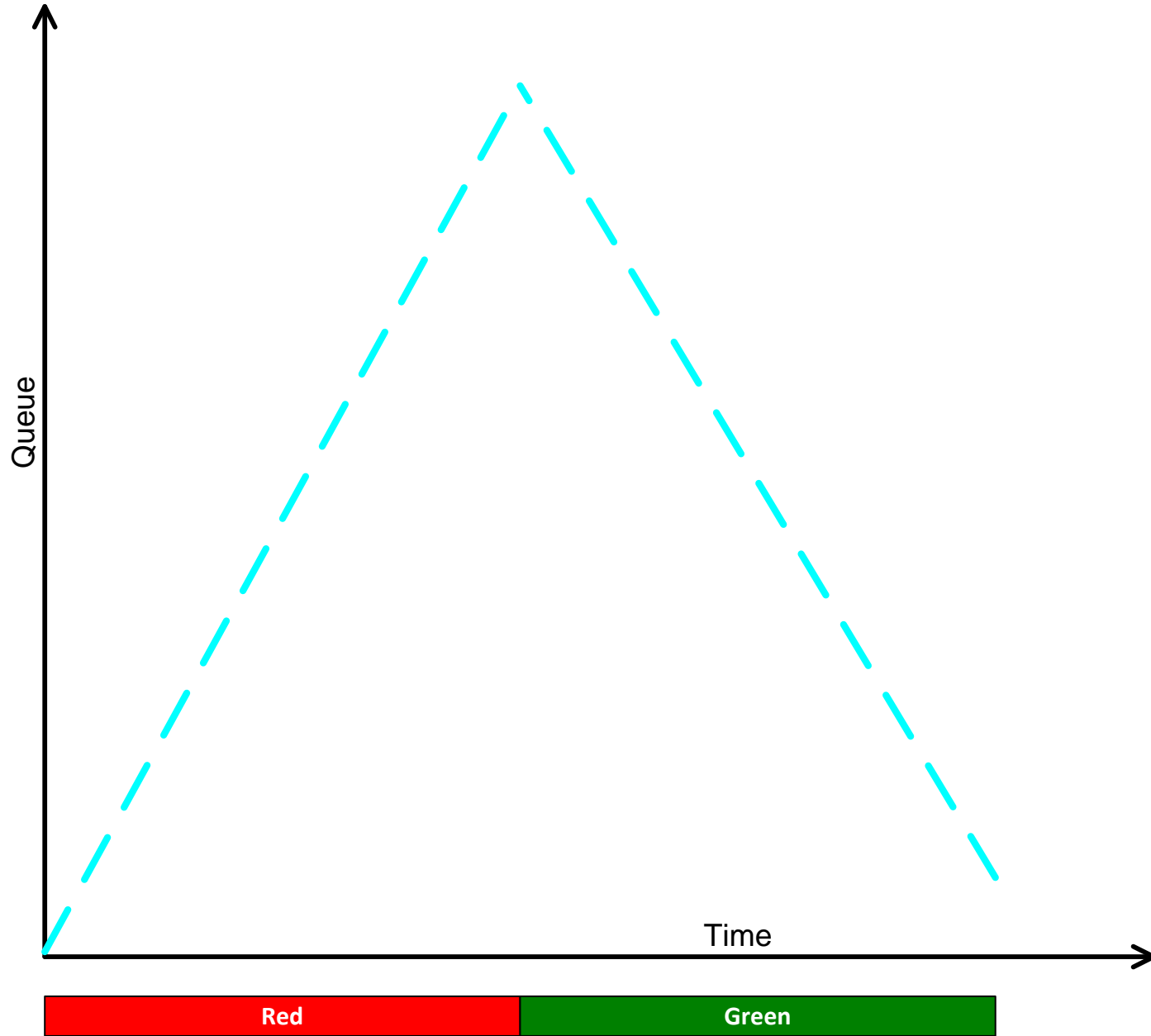
# Task 2- Case 2-1



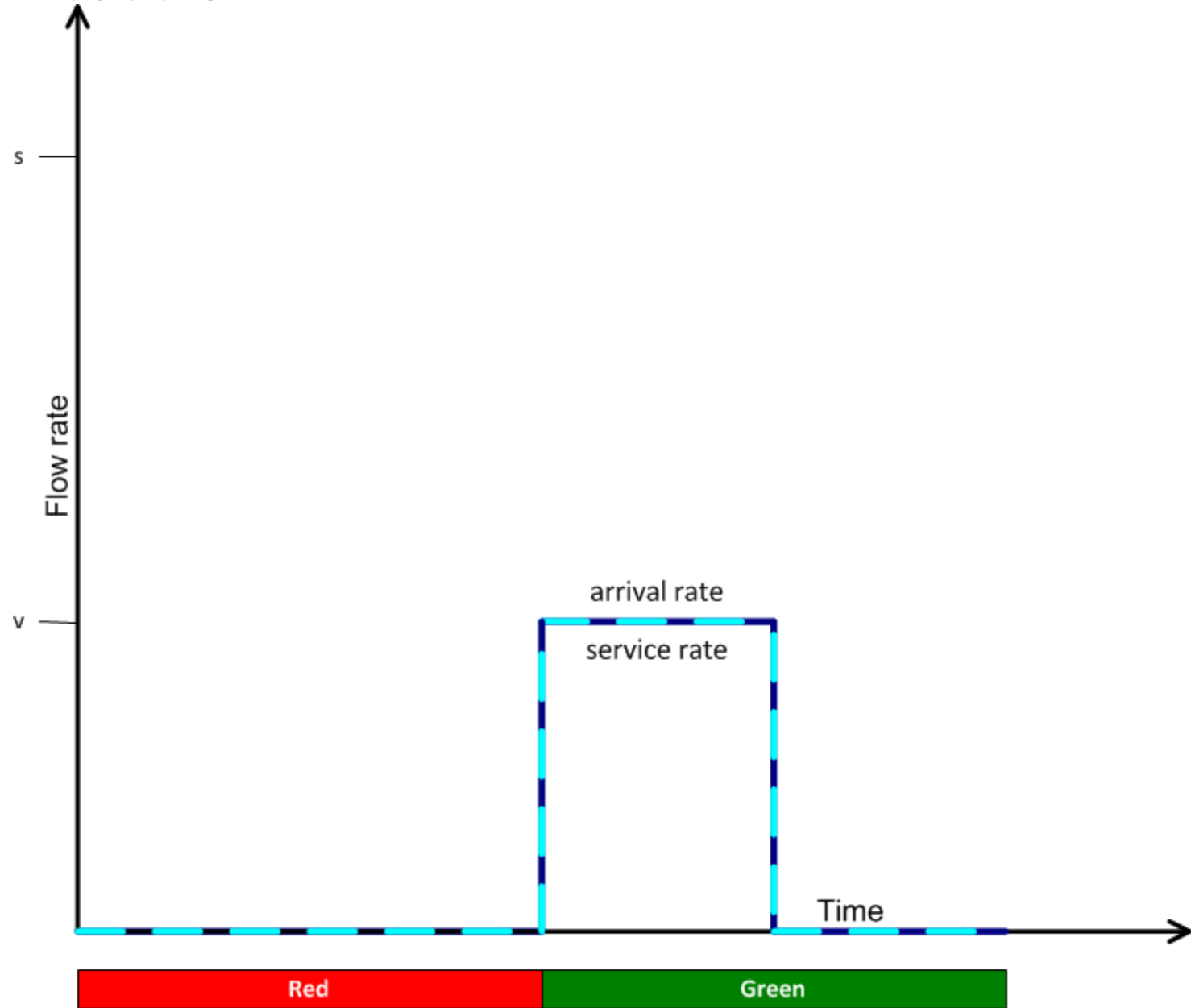
# Task 2- Case 2-2



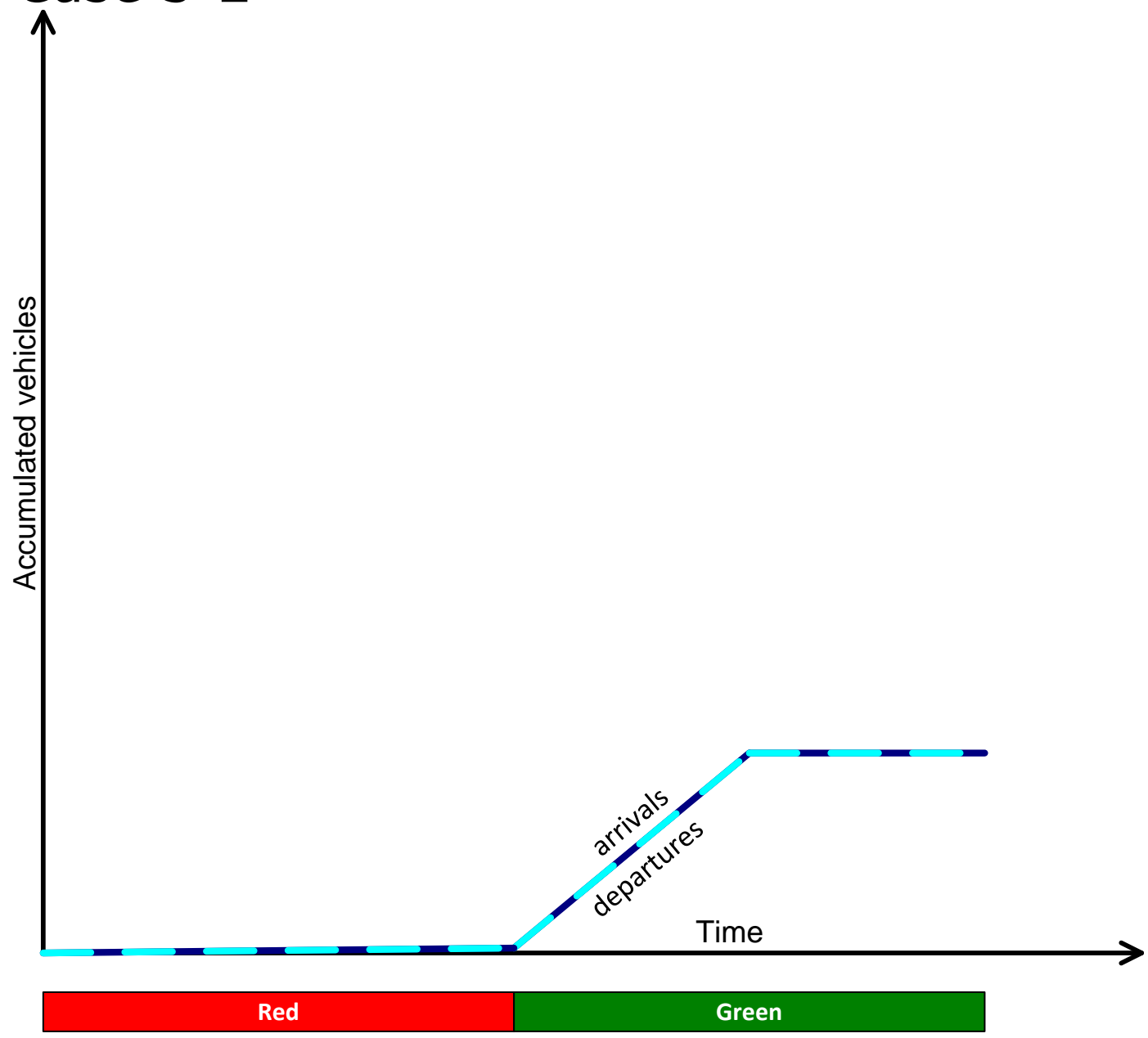
# Task 2- Case 2-3



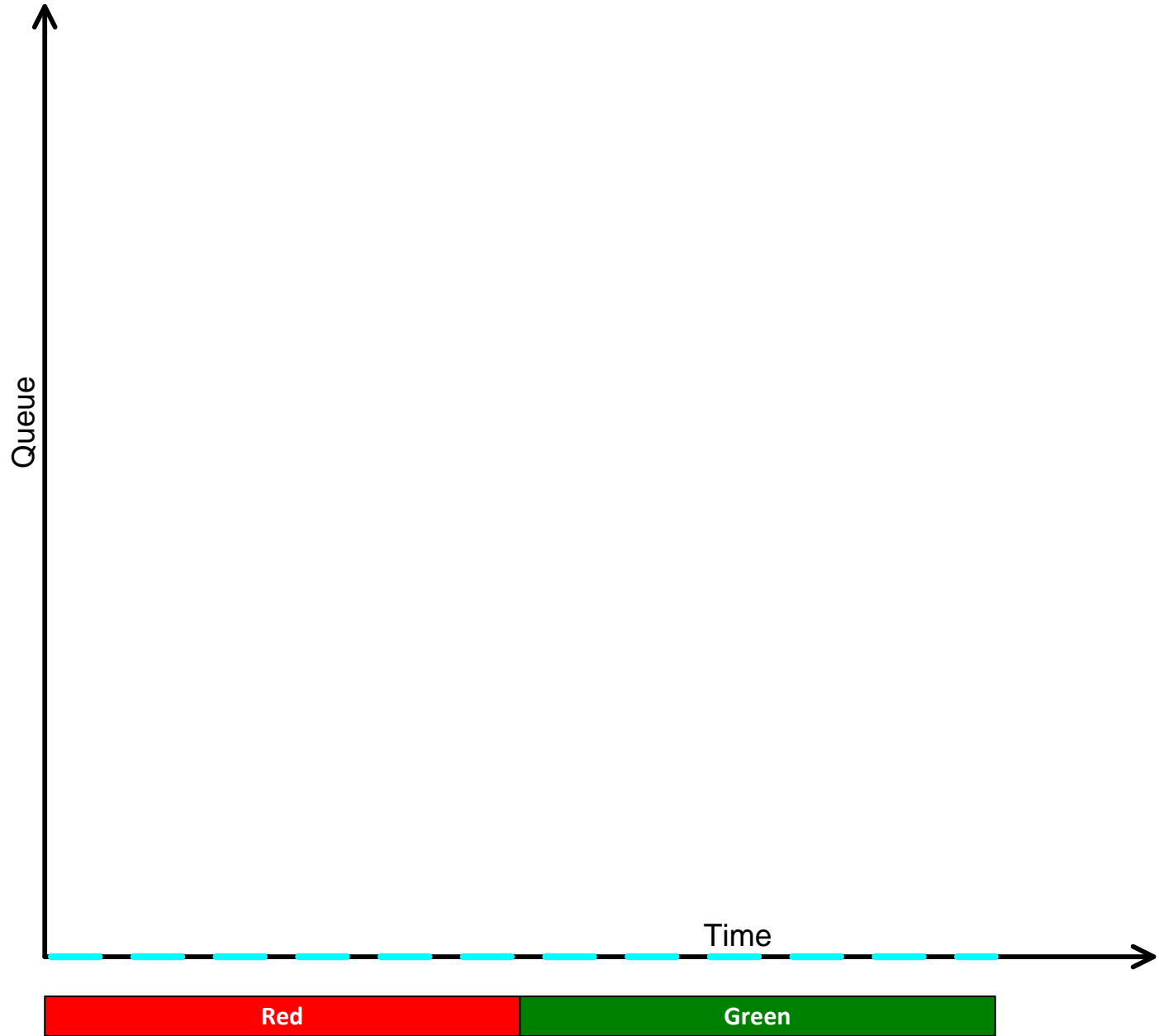
# Task 2- Case 3-1



# Task 2- Case 3-2



# Task 2- Case 3-3



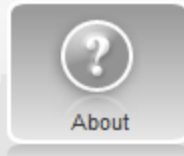
Group	Team	Name	Intersection	System
A	2	Morris Cornwell Keller	SH 8/Warbonnet	SH 8, Airport to Farm
B	3	Hartzell LeCates Landa	Palouse River Drive	US 95, SH 8 to PR Drive
C	5	Larrea Cupps	SH 8/Line	SH 8, Farm to Jackson
	6	Saras Skinner		
D	7	Scheel Kury Geibel	US 95/Sweet	US 95, SH 8 to PR Drive
E	9	Bode Hale	SH 8/US 95	SH 8, US 95 to Mt View
	10	Dashti Maffey		
F	11	Alzufairi Almakrab	SH 8/Warbonnet	SH 8, Airport to Farm
	12	Crow Elmore		
G	13	Ryu Alrashdi	SH 8/Line	SH 8, Farm to Jackson
	14	Bernauer Taylor-Stiffarm		







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Simulation Community



HOME PAGE

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- Algorithms -- Exploring research regarding the improvement of simulation algorithms
- Research Needs -- Investigating the direction and needs of simulation research
- Data Sets -- Researching the provision of data to support simulation needs.

Registering on the web site will provide you with basic access to documents, data and research created by the NGSIM Program and Community. Becoming a "Friend" of one or more of the work groups will provide you with the ability to participate in work group discussion forums, and be recognized by the Community as a contributor to the work groups. Recognition as a contributor to the NGSIM community allows an individual further participation access to on-going research efforts as well as the possibility to directly participate in the government of the community.

[www.ngsim-community.org](http://www.ngsim-community.org)







## PURPOSE

The purpose of this activity is to give you the opportunity to see how queuing system models relate to high resolution field data.

## DELIVERABLES

- Prepare an Excel worksheet that includes the following information:

**Tab 1:** Title page with activity number and title, authors, and date completed

**Tab 2:** Original data

**Tab 3:** Time-space diagram plot with answers to questions from Task 2

**Tab 4:** Cumulative vehicle diagram plot

**Tab 5:** Uniform delay calculation

**Tab 6:** Summary and answers to Critical Thinking Questions

**TASK 1**

Using the field data, prepare a time-space plot for the eight vehicles, placing distance on the  $y$ -axis and time on the  $x$ -axis. Note that the location of the stop bar for the subject intersection is at a distance of  $y = 346$  feet. The stop bar should be shown on your plot.

**TASK 2**

Change the chart settings to show the range  $y = 200$  feet to 400 feet and  $x = 20$  seconds to 120 seconds. Answer the following questions:

1. Is there movement in the queue while the vehicles are supposedly stopped?
2. Which vehicles are directly affected by the red display?
3. Which vehicles are affected only by the behavior of their leading vehicles?
4. Which vehicles are not affected by either the red display or their leading vehicles?
5. How far upstream does the queue extend?

**TASK 3**

Review the data on the "arrival-departure tab." Using the maximum extent of the queue upstream from the stop bar as the system entry point to your queuing system, prepare a cumulative vehicle diagram showing the arrival time into the system and the departure time from the system.

**TASK 4**

Using the cumulative vehicle diagram that you prepared in Task 3, show on the diagram the time that each vehicle is in the system (delay time). Compute the average delay (average time in system) per vehicle. Remember that this delay does not consider free flow travel time.

**TASK 5**

Using the uniform delay equation from Activity #8, compute the average delay per vehicle for this system. For the uniform delay calculation, make the following assumptions:  $C = 102$  seconds,  $g = 35$  seconds, and  $s = 1681$  vehicles per hour of green. Use your diagram to determine any other data needed for this calculation.

“field data” tab...data sorted by vehicle (time and distance)

	A	B	C	D	E	F	G	H
1								
2	VehID = 1			VehID = 2			VehID = 3	
3	Time	Distance		Time	Distance		Time	Distance
4	17.9	48		18.4	37		21.4	39
5	18.0	49		18.6	38		21.5	40
6	18.1	50		18.6	38		21.6	40
7	18.2	51		18.7	39		21.7	41
8	18.3	52		18.8	39		21.8	42
9	18.4	53		18.9	40		21.9	43
10	18.5	54		19.1	41		22.0	44
11	18.5	55		19.2	42		22.1	45
12	18.6	56		19.3	43		22.1	46
13	18.6	57		19.4	44		22.2	47
14	18.7	58		19.5	45		22.3	48
15	18.8	59		19.6	46		22.3	49
16	18.8	60		19.6	47		22.4	50
17	18.9	61		19.7	48		22.4	51
18	18.9	62		19.8	49		22.5	52
19	19.0	63		19.8	50		22.5	53

“arrival-departure data” tab...

data sorted by location for arrivals and departures

	A	B	C	D	E	F	G	H	I	J
1	<b>These data include the first arrival time at a given point and the last departure time from a given point.</b>									
2										
3	<b>Arrivals</b>				<b>Departures</b>					
4	<b>Time</b>	<b>Distance</b>	<b>VehNum</b>		<b>Time</b>	<b>Distance</b>	<b>VehNum</b>			
5	20.6	100	1		20.6	100	1			
6	21.9	100	2		21.9	100	2			
7	24.7	100	3		24.7	100	3			
8	62.1	100	4		62.1	100	4			
9	84.9	100	5		84.9	100	5			
10	88.4	100	6		88.4	100	6			
11	96.8	100	7		96.8	100	7			
12	100.6	100	8		100.6	100	8			
13	20.6	101	1		20.6	101	1			
14	21.9	101	2		21.9	101	2			
15	24.8	101	3		24.8	101	3			
16	62.2	101	4		62.2	101	4			
17	84.9	101	5		84.9	101	5			
18	88.5	101	6		88.5	101	6			
19	96.8	101	7		96.8	101	7			
20	100.6	101	8		100.6	101	8			