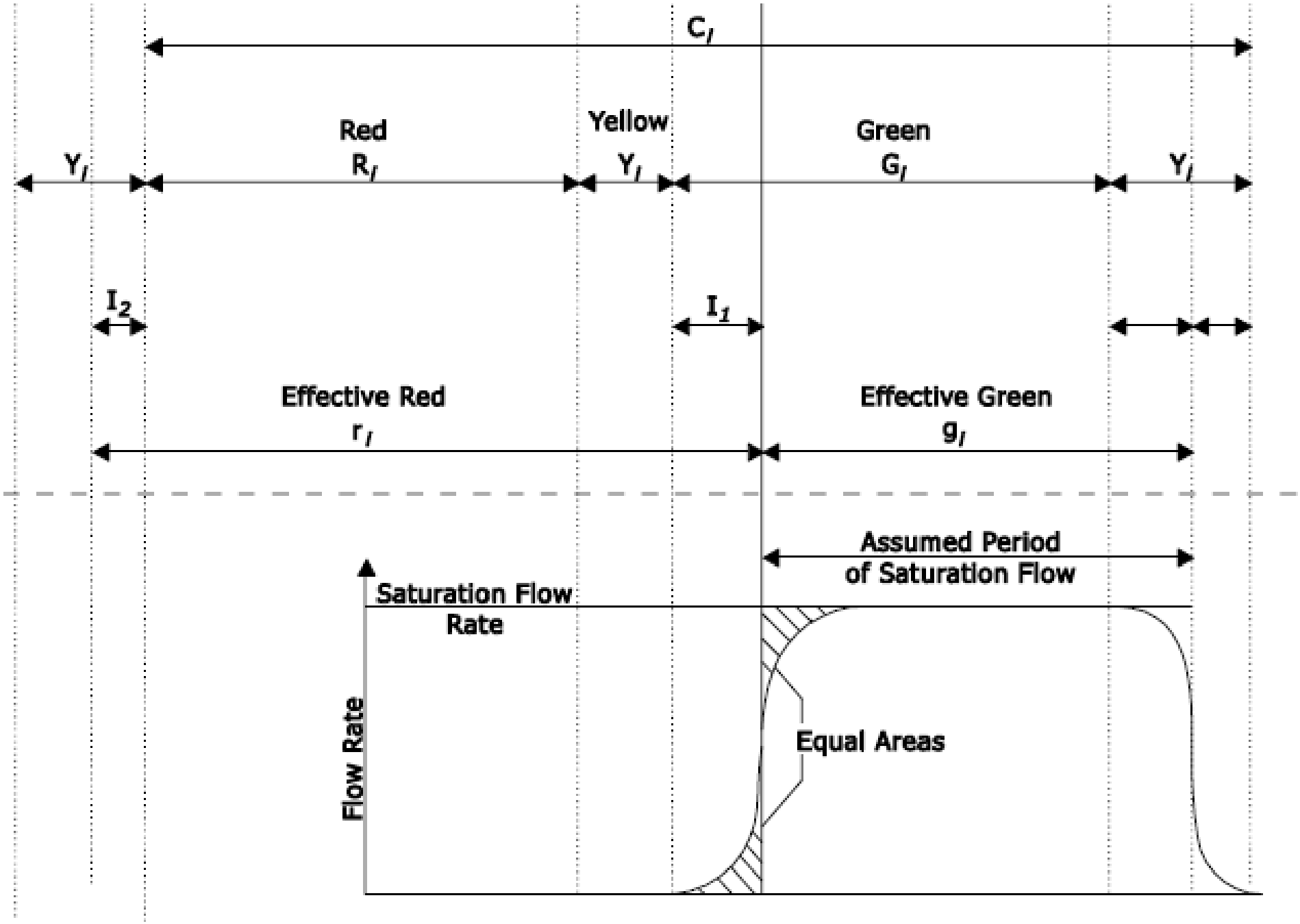
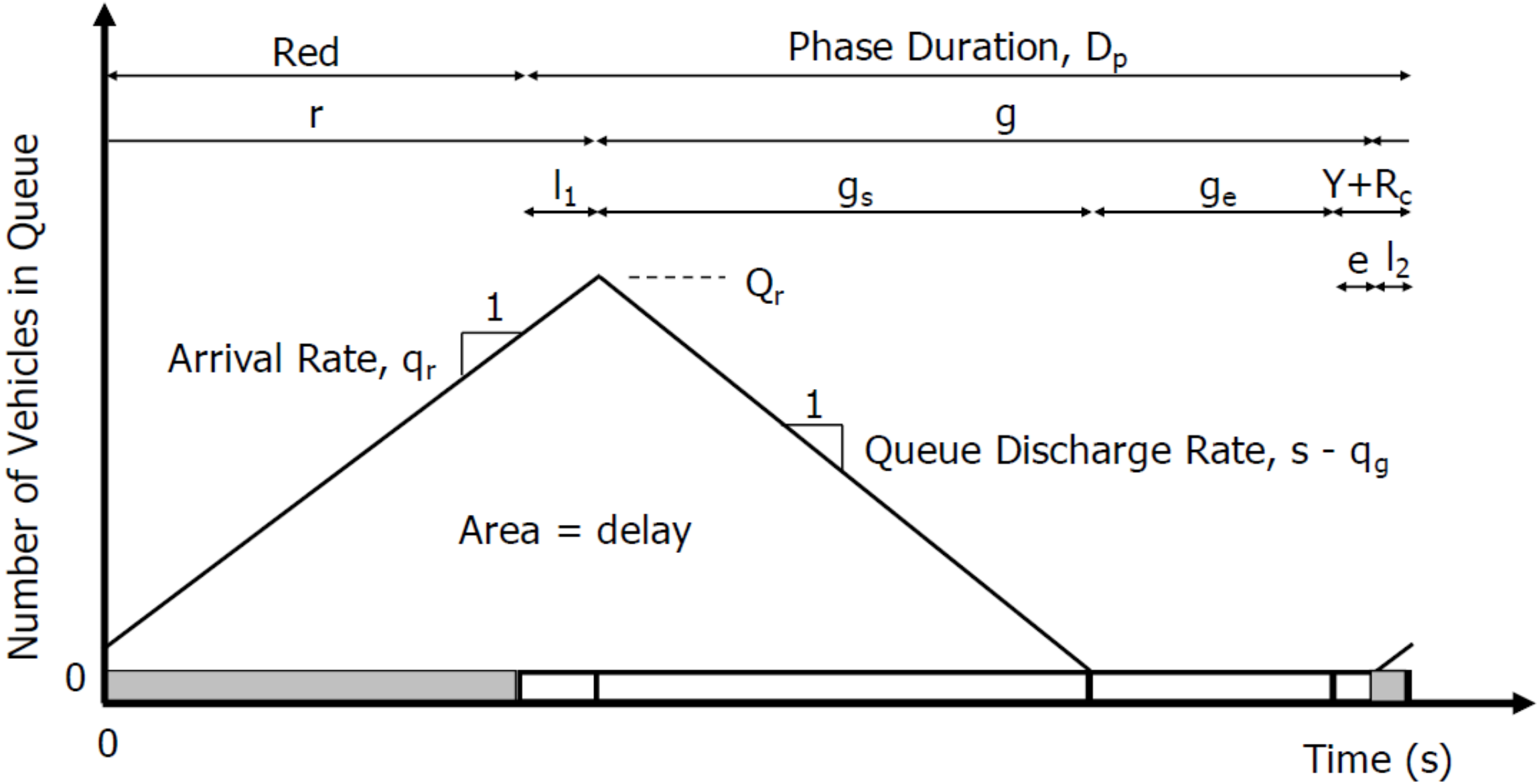
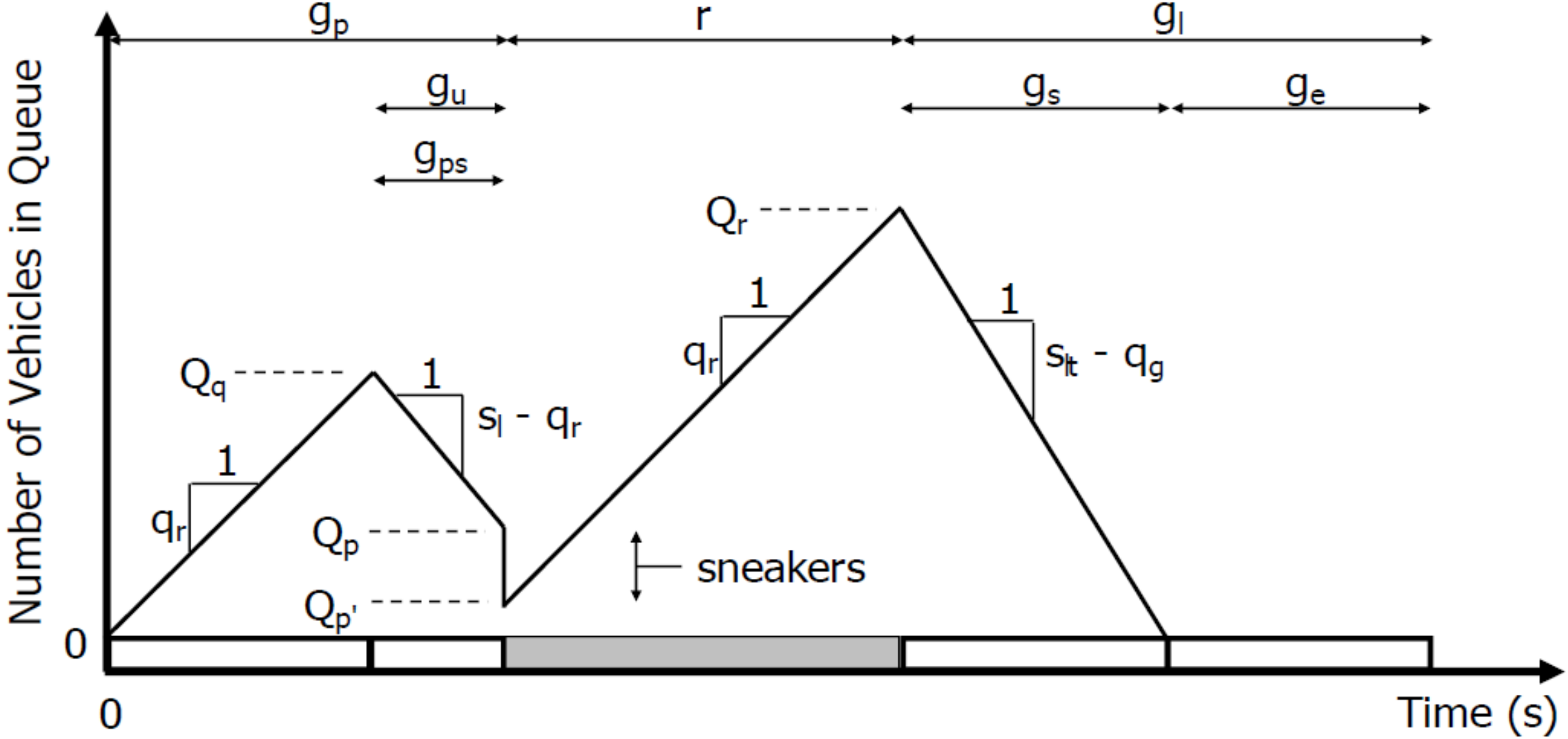
CE 572 – Spring 2015
Class 28

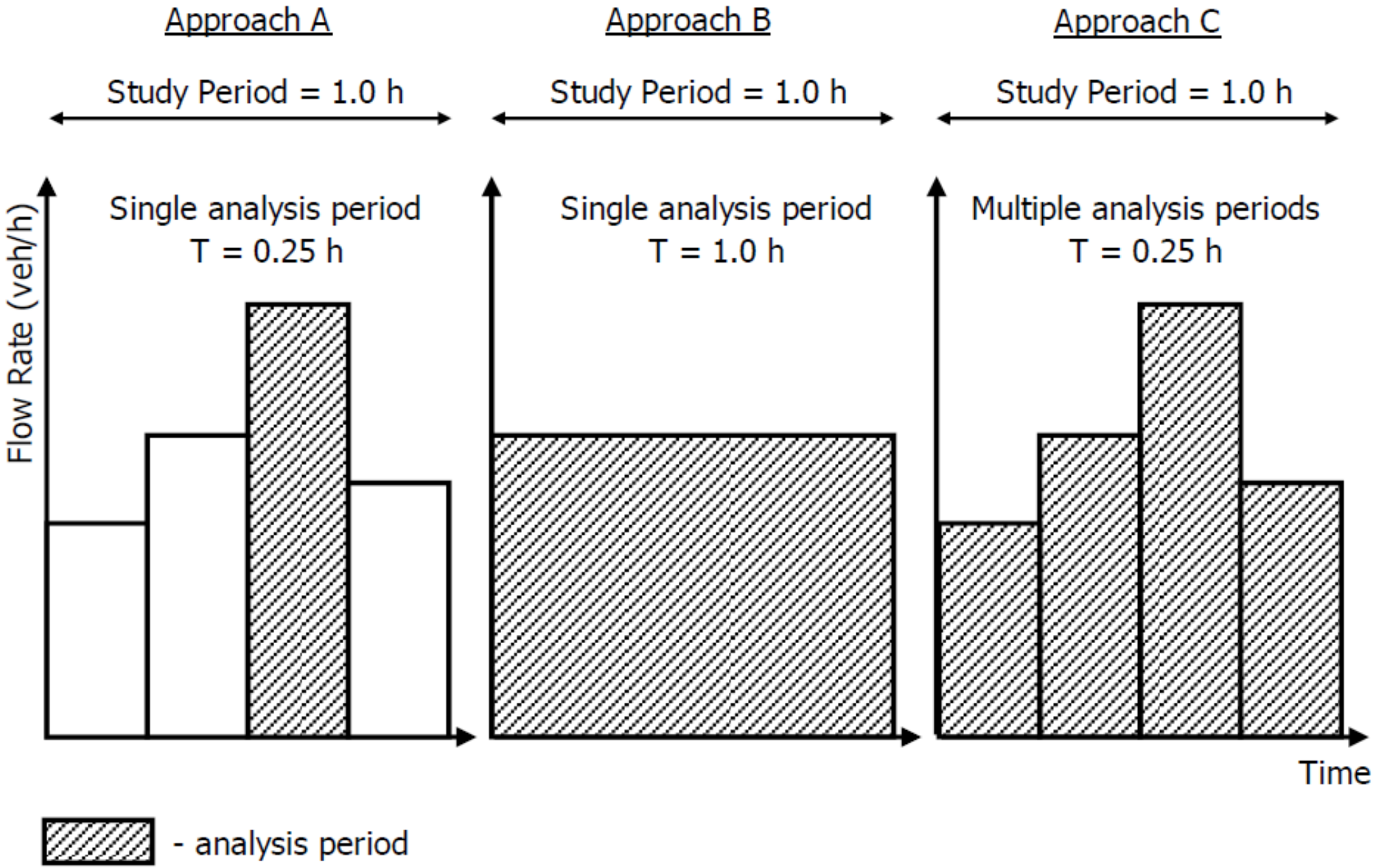
2015.04.01

- Presence of a traffic signal upstream of the subject TWSC intersection.
- A median on the major street.
- A short or flared lane on the minor street approach.
- The LT, TH, and RT movements sharing a lane on the minor street.
- Pedestrians crossing the minor street.


C_l
Red
R_l
Yellow
Y_l
Green
G_l
Y_l
Y_l
I_2
I_1
Effective Red
r_l
Effective Green
g_l
Assumed Period
of Saturation Flow
Saturation Flow
Rate
Flow Rate
Equal Areas


Red
Phase Duration, D_p
r
g
l_1
g_s
g_e
$Y+R_c$
e l_2
Q_r
1
Arrival Rate, q_r
1
Queue Discharge Rate, s - q_g
Area = delay
Number of Vehicles in Queue
0
0
Time (s)


g_p
r
g_l
g_u
g_s
g_e
g_{ps}
Q_r
1
1
q_r
s_{lt} - q_g
Q_q
1
s_l - q_r
1
q_r
Q_p
$Q_{p'}$
sneakers
Number of Vehicles in Queue
0
0
Time (s)


Approach A
Study Period = 1.0 h
Single analysis period
T = 0.25 h
Approach B
Study Period = 1.0 h
Single analysis period
T = 1.0 h
Approach C
Study Period = 1.0 h
Multiple analysis periods
T = 0.25 h
Flow Rate (veh/h)
Time
- analysis period

Lane Groups and Movement Groups

The automobile methodology is designed to evaluate the performance of designated lanes, groups of lanes, an intersection approach, and the entire intersection. A lane or group of lanes designated for separate analysis is referred to as a *lane group*. In general, a separate lane group is established for (*a*) each lane (or combination of adjacent lanes) that exclusively serves one movement and (*b*) each lane shared by two or more movements. Guidelines for establishing lane groups are described in the subsection titled Computational Steps.

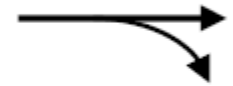
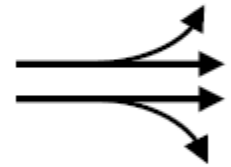
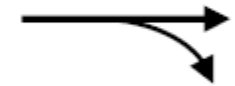
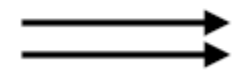
The concept of *movement groups* is established to facilitate data entry. A separate movement group is established for (*a*) each turn movement with one or more exclusive turn lanes and (*b*) the through movement (inclusive of any turn movements that share a lane).

The following rules are used to determine lane groups for an intersection approach:

- An exclusive left-turn lane or lanes should be designated as a separate lane group. The same is true of an exclusive right-turn lane.
- Any shared lane should be designated as a separate lane group.
- Any lanes that are not exclusive turn lanes or shared lanes should be combined into one lane group.

The following rules are used to determine movement groups for an intersection approach:

- A turn movement that is served by one or more exclusive lanes and no shared lanes should be designated as a movement group.
- Any lanes not assigned to a group by the previous rule should be combined into one movement group.

Number of Lanes	Movements by Lanes	Movement Groups (MG)	Lane Groups (LG)
1	Left, thru., & right: 	MG 1: 	LG 1: 
2	Exclusive left:  Thru. & right: 	MG 1:  MG 2: 	LG 1:  LG 2: 
2	Left & thru.:  Thru. & right: 	MG 1: 	LG 1:  LG 2: 
3	Exclusive left:  Exclusive left:  Through:  Through:  Thru. & right: 	MG 1:  MG 2: 	LG 1:  LG 2:  LG 3: 

$$s = s_o \, f_w \, f_{HV} \, f_g \, f_p \, f_{bb} \, f_a \, f_{LU} \, f_{LT} \, f_{RT} \, f_{Lpb} \, f_{Rpb} \, f_{wz} \, f_{ms} \, f_{sp}$$

where

s = adjusted saturation flow rate (veh/h/ln),

s_o = base saturation flow rate (pc/h/ln),

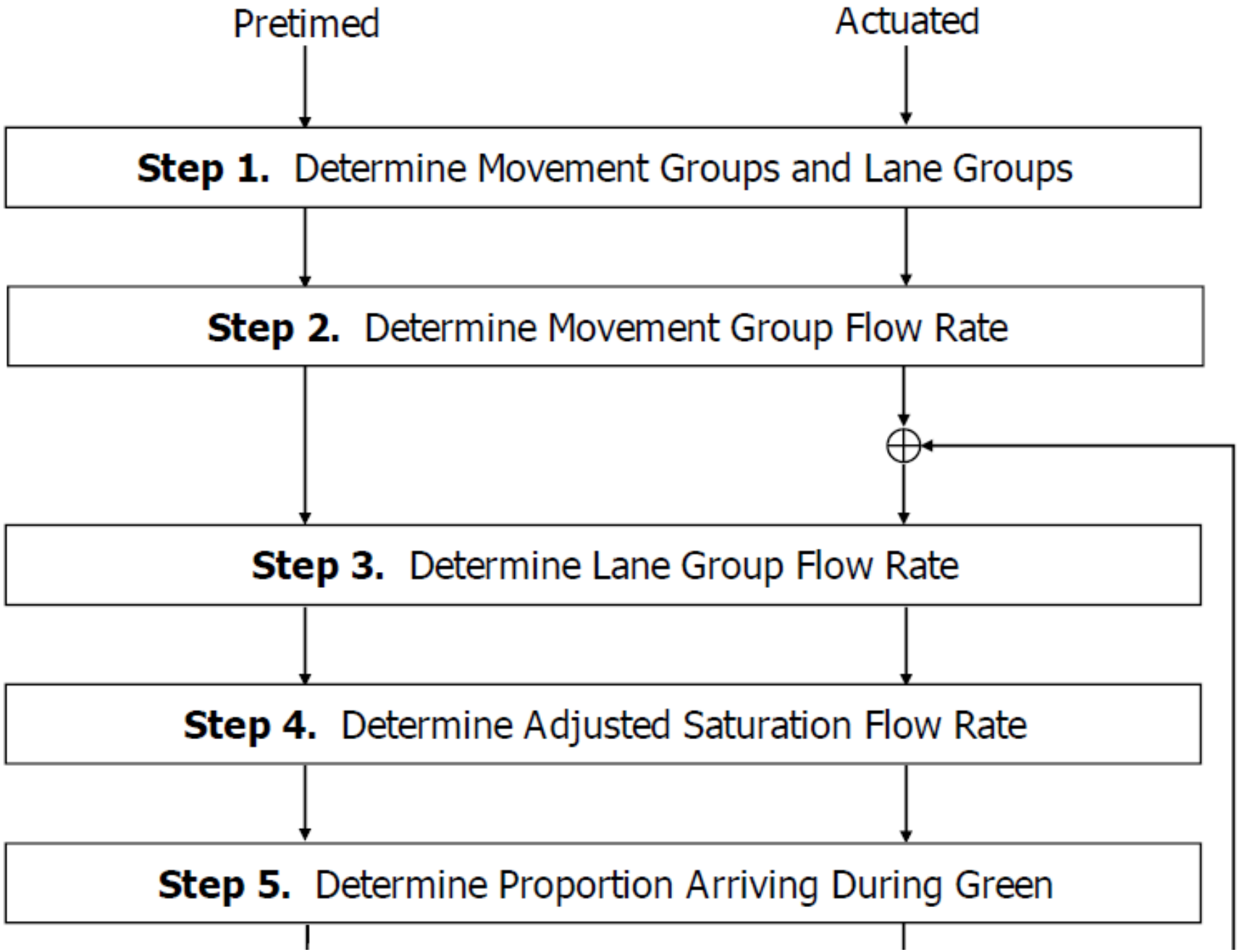
f_w = adjustment factor for lane width,

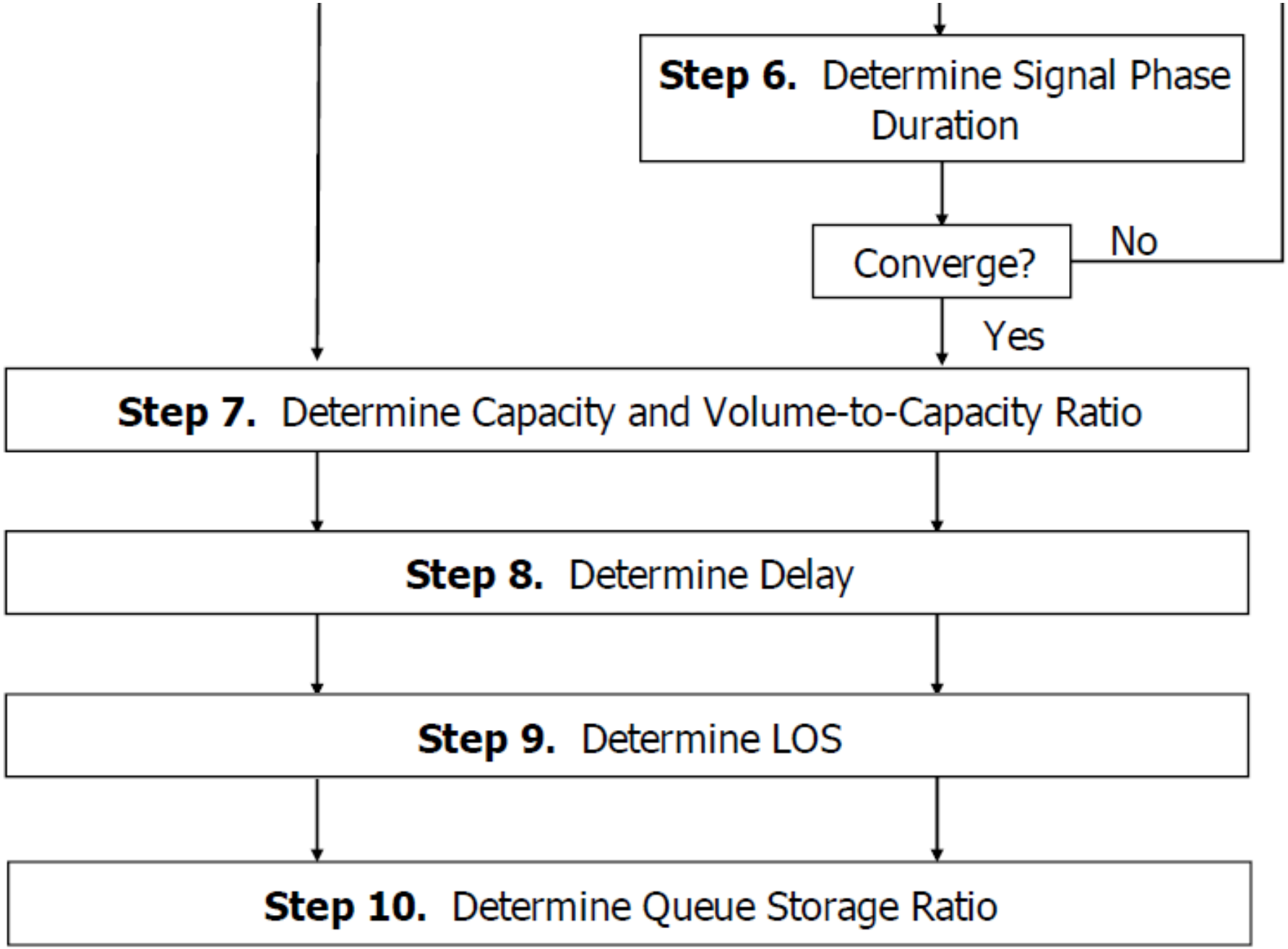
f_{HV} = adjustment factor for heavy vehicles in traffic stream,

f_g = adjustment factor for approach grade,

f_p = adjustment factor for existence of a parking lane and parking activity adjacent to lane group,

f_{bb} = adjustment factor for blocking effect of local buses that stop within intersection area,


Pretimed
Actuated
Step 1. Determine Movement Groups and Lane Groups
Step 2. Determine Movement Group Flow Rate
Step 3. Determine Lane Group Flow Rate
Step 4. Determine Adjusted Saturation Flow Rate
Step 5. Determine Proportion Arriving During Green


Step 6. Determine Signal Phase Duration
Converge?
No
Yes
Step 7. Determine Capacity and Volume-to-Capacity Ratio
Step 8. Determine Delay
Step 9. Determine LOS
Step 10. Determine Queue Storage Ratio