

Université d'Ottawa  
Faculté de génie

Département de  
Génie civil



uOttawa

L'Université canadienne  
Canada's university

University of Ottawa  
Faculty of Engineering

Department of  
Civil Engineering

# **CVG4150**

## **HIGHWAY AND TRANSPORTATION ENGINEERING**

### **ASSIGNMENT # 3**

**Professor: Alaa Abdulridha**  
**TA: Zafria Khan (zkhan041@uOttawa.ca)**

**Due on Nov. 27 (by 17:00)**

Family Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

- **Include this page as a cover page for the Assignment #3.**
- **Marks will be taken out for missing units and labels.**

Question	Max Marks	Marks Awarded
1	6	
2	6	
3	8	
<b>Total</b>	<b>20</b>	

## Capacity and Level of Service

**Q1.** The following 12 consecutive 5-min vehicle counts were taken on a highway:

60    55    40    60    90    85    110    120    130    95    55    30

- Plot the histogram of these counts and the histogram of the flow rates computed on the basis of the preceding counts
- Calculate the hourly volume and the PHF.
- Show that for  $t = 15$  min the PHF can theoretically range from 0.25 to 1.00 using the data given.

**Q2.** Determine the LOS on a regular weekday on a 0.65-km section of a six-lane freeway (three-lane each) with a grade of 2 percent, using the following data:

Hourly volume:  $V = 3000$  veh/hr

PHF = 0.85

Traffic Composition:

Trucks = 10 percent

RVs = 2 percent

Lane width = 3.5 m

Terrain = Level

Base free-flow speed = 110 km/hr

Shoulder width = 2 m

Interchange spacing = 1 km

Driver population adjustment factor  $f_p = 0.95$

**Q3.** A Class I two-lane highway has a base free-flow speed of 110 km/h. Lane width is 3.35 m and shoulder width is 0.6 m. There are 5 access points per km. The roadway is located in rolling terrain with 40% no-passing zones. The two-way traffic volume is 600 veh/hr with PHF = 0.86. The directional split is 60/40. Traffic includes 8% trucks and 2% recreational vehicles. Determine the level of service (LOS).