

CE 474

Traffic System Design (Fall 2004)

Assignment # 1: Due date: Friday September 17, 2004 by 5:00 PM

1)-Using the following data to construct a headway distribution curve. If the minimum gap accepted is 4.0 seconds, determine the probability that a vehicle approaching on a side street will have to wait more than 3 gaps before merging into traffic.

| Gap size | Observed frequency |
|----------|--------------------|
| < 2 | 22 |
| 2 – 3 | 49 |
| 3 – 4 | 63 |
| 4 – 5 | 111 |
| 5 – 6 | 86 |
| 6 – 7 | 64 |
| 7 – 8 | 43 |
| > 8 | 66 |

2)-Left Turn Vehicles randomly arrive at a signalized intersection that has a separate left turn phase. The number of left turn vehicles arriving during hour is 200 vehicles. The length of the cycle is 90 seconds. Determine the minimum length of left turn storage bay so that during only one cycle in the design hour will the left turning vehicles block the through traffic. (Assume that the stored left-turn vehicles occupy 30 feet.) If the left turn volume has doubled, in what percentage of cycles the through vehicles will be blocked.

3)-A small drive-it-through-yourself car wash, in which the next car cannot go through the washing procedure unless the car in front is completely finished, has the capacity to hold on its grounds a maximum of four cars (including the one in the wash). The company found the arrivals to be Poisson with mean rate of 12/hour, and its service time to be exponential with a mean of 4 minutes. What is the average number of cars lost to the car wash firm as a result of its capacity limitation? The car wash works is open 10 hours/day.