

Traffic Engineering (CIVIL-349)
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Exercise 7
Public Transport

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Problem: Bus route planning

Service is to be provided along a circular bus route of length $D = 20$ km that visits $n = 24$ stops. Buses travel at speed $v = 20\text{km/hr}$ and waste a fixed amount of time $\tau = 1$ min at each stop. Demand is steady with the same rate $q = 0.25$ pax/hr between every origin-destination pair. The contract with the transit agency stipulates that it must serve this route with an average service time across all passengers equal to $T = 0.80$ hrs. This time is the sum of the average waiting time at an origin and the average riding time.

- a. How many buses does the agency need if it decides to operate a single clockwise route? *Hint: you should use the largest possible headway that will fulfill the contract.*
- b. How many buses would the company need in order to run both clockwise and counter-clockwise routes? Is this better or worse than case (a)? Assume that passengers use the direction with the least riding time.
- c. What is the smallest bus capacity (in passengers) for case (a)?