

1.258J/11.541J/ESD.226J
Public Transportation Service and Operations Planning
Fall 2003

Assignment 3

Due: November 6, 2003

This assignment deals with service on the MBTA Red Line and will require four individuals per "team". A single submission should be made by each team.

Data Collection Activity

One person should be stationed at Alewife, two at Park Street (center platform) and the fourth at Broadway.

Data should be collected at Park Street either in the morning or in the evening peak i.e., for 1.5 hours from 7:30 to 9 AM or from 4:30 to 6 PM. However, data collection at Alewife should begin 30 minutes before and extend 30 minutes after this time window, while at Broadway it should begin 15 minutes before and extend 15 minutes after this time window.

You are collecting data in order to estimate models and to explain recovery time, waiting time, running time, and dwell time, hence you should collect the data which you feel is appropriate. It is likely that minimum data requirements will be:

- the lead car numbers (both ends at Alewife) for all trains passing through the station (in both directions)
- train arrival and departure times
- train ring-off times at Alewife
- approximate passenger loads

Clearly passenger loads (or even boardings and alightings) will be the most difficult to estimate (particularly at Park Street!) but an approximation may be possible. Arrival times should be based on first door opening and departure times on last door closing. You should also note any control action affecting any train -- i.e. holding, short-turning, expressing or deadheading.

If you would like to pool data with other teams, please do so. I suggest that you discuss this before collecting data, since the data you collect will, of course, need to be compatible. Please let me know at least 48 hours in advance about the time and day you have chosen to collect so as to avoid duplication and so I can notify the Red Line superintendent.

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Analysis

There are a range of issues which should be addressed using the data which you have collected.

1. Passenger Wait Time: Estimate the hypothetical mean passenger waiting times for the following sets of passengers:
 - passengers boarding at (a) Alewife, (b) Park Street, (c) Broadway heading for JFK.
 - passengers boarding at (a) Broadway, (b) Park Street, (c) Davis heading for Alewife (assume the arrival headway distribution at Alewife is the same as the departure headway distribution at Davis).

Compare and interpret the results.

2. Train Dwell Times: Compare your dwell time observations with those in the Puong memo (attached). Comment on the results. Discuss your Park Street dwell times and formulate a model for Park Street dwell times.
3. Train Running Times: Estimate one (or more) train running time functions for Alewife-Broadway in each direction. Critically assess your models.
4. Comment on the train departure time practices at Alewife, analyzing both ring-off time compliance and other factors affecting train recovery time.
5. Critically assess the effectiveness of the real time control interventions which you observed in your data set -- e.g. impacts of the intervention.
6. Compare actual Red Line performance with the 1996 Service Policy in terms of on-time performance and crowding. Comment on the results.