

Transit Data Exercise

City of Cambridge Transit Advisory Committee | June 5, 2013

The goal of this workshop is to get feedback from the committee on what transit and demographics data and analysis would be useful to the committee to help better understand who uses transit, how it is used, its impact on other urban planning and development issues, and identify opportunities for transit expansion. We do not have the capacity to conduct analysis on all of the suggestions given by the committee. Instead, the results from this exercise will be used to help our transit planning staff develop a workplan that prioritizes the data analyses that will conduct. Using the Transit Data Exercise worksheet as a guide, committee members brainstormed data that they would be interested in.

DEMOGRAPHICS. What demographic characteristics of Cambridge residents and workers are you interested in knowing about as it relates to transit use? Think about how to understand who uses transit and who doesn't, and why.

- How many residents are close to transit
- By neighborhood, the % of people using public transit, and how varies by neighborhood
- Age of transit users to help understand what are the barriers to access to transit
- Zip codes of people coming in to Cambridge (e.g., entering from Rt. 2 and getting on Red Line at Alewife)
- Do income levels correlate to transit ridership
- Understand age distribution of Cambridge population, and how changing over time
- Auto ownership, number of parking permits issued, and where they are geographically
- How many families have children and those that are school age, and how far they live from attend school
- What is percent of male/female on public transit
- How many Cambridge residents commute to jobs outside of Cambridge
- In general, understand changing trends of demographics
- Language of riders (might be barrier to transit access)
- Occupations of Cambridge residents
- Management staff for small/medium businesses have a shrinking amount of disposable income so are moving farther out of the city, causing transit to be more crucial for access to jobs (and businesses access to talent)
- Understand how many trips are taken by SCM (non-profit door-to-door service for elderly) and the MBTA's RIDE, and understand how these trips overlay with existing fixed routes
- Disability; age; income; race; location
- For each household, in Cambridge, calculate # of persons over 18 divided by autos owned (or vice versa) and then plot by color range the results. Also show number of folks over 18 within ¼ mile of each bus line and 1/3 mile of each rail station.
- Definitive numbers on car ownership/use in Cambridge, numbers and trends.
- Demographic characterization of those who commute by car, by public transportation, by bike, and by private bus system.
- For those who use public transportation, the demographic comparison between those who own a car, and those who don't.
- Income information about riders who use bus service versus rail. The general assumption is that busses are what poor people ride. I would like to know if this is the case in Cambridge.

TRANSIT RIDER CHARACTERISTICS. Of those who use transit (subway, bus, and commuter rail), what aspects of their travel behavior are you interested in? Think about how to understand what options people have,

- How many workers get incentives, both parking passes and transit passes
- How much “cross commuting” is there, where people commute from an origin outside of Cambridge, through Cambridge, with a destination outside of Cambridge.
- How many trips are 1-seat rides, how many involve transfers
- How many Cambridge residents do reverse commutes, and what are their transit options
- What “last mile” transit services are offered for reverse commuters
- Understand how exactly do families use transportation, especially how needed a car is, versus relying on transit
- What types of multi-modal trips are taken, and who takes them
- Relationship between Hubway and transit ridership
- Are certain people car dependent because of transit schedules, with changing work hours (e.g., Saturday is not considered a transit work day)
- Programs like Cambridge In Motion are intend to help shift more riders to the fixed route transit system.
- How does car sharing impact transit ridership
- Number of times used per week, per mode; weekday versus weekend use; how behavior changes or would change in response to fare hikes, accessibility improvements
- Number of people with disabilities using the fixed-route system (versus The RIDE) over time
- A profile of users by their days per week using transit. Start with calculating each users frequency (days per week) and then dig deeper into each category (Frequent users--5+ days per week, Regular—3-4 days per week, Periodic—1-2 days per week, and Occasional—1-3 days per month).
- What are the most heavily utilized segments of the system in absolute terms (number of riders) and relative terms (% of capacity)? What are the least used segments, analyzed the same way. What are the 1,3, and 5 year forecasts for the same data?
- Actual utilization of the MBTA real time apps. I’ve seen data on downloads, but how often is data accessed via these apps?
- How people get to their first seat ride. Walk, drive, drop-off, etc. Is this decision affected by location or other characteristics (age, income, etc.
- Impact of employer payments (total or partial) on decision to use transit versus other means.
- Demographic indicators to determine whether the provision of employer paid transit benefits significantly impact mode choice
- Demographic indicators to determine whether the provision of free parking significantly impact mode choice
- Demographic indicators to determine whether having to pay for parking significantly impacts mode choice
- Demographic indicators that determine whether a person will use other transportation modes (bike, walk, car-pool)
- For residents with cars who use street parking from communities with limited street parking and Cambridge neighborhoods with limited street parking how does the possibility of not being able to find a space available at the end of the day influence decision to use transit?
- Use of transit for work trips versus personal trips during the work day and on evening and weekends. What determines this choice?

TRANSIT OPERATIONS DATA. What data and/or trends are you interested in knowing about regarding our existing subway and bus system? Think about ridership, performance, capacity, and how understand problems.

- What are all the shuttle services that operate in Cambridge
- When exactly is rush hour, is it changing
- Bus boardings and alightings (getting off)
- Peak load point, understanding bus route capacity
- Using data for evaluating system operation quality of service
- Missed bus trips (called “dropped” trips)
- How on-time are buses
- When is the peak, 8-9am? There is also a peak within a peak (15 minute high)
- Costs per trip, how varies from bus route to route, and with commuter rail, subway
- How scattered are the subway arrival times
- Ridership projection for the Green Line extension
- Average time between failures, measurement for equipment quality for buses and trains
- Using “trip alerts” data to highlight problem areas
- What locations do buses regularly get delayed
- Patterns of traffic and gridlock
- How does information feed into Google Maps, and how accurate is this data and arrival predictions
- Using AFC (automatic fare collection, the boxes and gates that accept the CharlieCard) data to understand ridership patterns
- How is it determined how many buses are needed during rush hour
- Safety record; on-time record; number of critical maintenance projects backlogged
- I would be interested in comparing service performance and maintenance between parts of the system serving higher income areas and those parts serving lower income areas, with attention to the concomitant race- and ability-related disparities.
- Total riders per route and rail station; riders per vehicle hour per route per daily time period, average peak load per bus for AM and PM peak hours. Vehicle on-time (schedule and headway) performance by route and time period.
- How much could we alleviate congestion on the Red Line if bus routes were optimized to end in Kendall Square.
- What are the current scheduled times for each type of service and how close do these services meet schedule?
- What routes operate at or near capacity and when?
- What routes run at much less than capacity and when?
- What are the issues that impede meeting schedules reliability?
- What causes things like heat, air conditioning, signage, etc. to not work and why must equipment that has non-working be put in service?
- How does the MBTA determine that a bus can be put in service when all systems are not working?
- Will electric bus service be returned to the 72 line when the construction is completed on Huron Avenue?

LAND USE, ZONING, DEVELOPMENT. What data would it be useful to have regarding Cambridge's land use characteristics and the areas with the most potential for development?

- Square feet of lab space, what percent of workers use transit
- What is the density of riders in corridors (transit and driving), to see if opportunities for better transit exists
- Housing and commercial square footage of growth historically over time, and the resulting transit ridership numbers
- What types of jobs do people have, especially how many of them are car dependent
- Trends of car parking demand changing over time, how much overbuilt parking is there in the city
- Density of workers per square foot, how these densities are trending for lab space versus office space (e.g., Cambridge max zoning is 0.9 per square foot office space, whereas Boston Properties is looking at much larger numbers in Boston)
- Density of employment by blocks. Total # of employees by parcel or block.
- How much of the spending of developers and the City is going towards automobile facilities (parking, road modifications) versus how much spending on public transportation is being similarly done.
- Assessment of how much of our physical space is allocated to cars (street, parking, gas stations, etc) versus how much is allocated to public transportation
- Are any areas under zoned given access to transit service? For instance, the areas zoned at extremely low residential density between Huron Ave and Mt. Auburn and Huron Avenue and Massachusetts Avenue. In most of this area properties are within a quarter mile walk of transit service on Huron Avenue, Massachusetts Avenue or Mt. Auburn Street.
- Is the zoning around major transit nodes appropriate for the amount of transit service and does the zoning allow for redeveloping these areas in a way that improves how transit service can be provided?

MAPS. What types of maps and visual display of information would be useful? Think about how to represent some of the demographic information above, as well as better understanding existing (and potential) transit routes.

- A map showing how close residents are to transit
- Population (over 18) and employment density at the lowest units available—turn into heat maps superimposed on the existing services.
- A map showing all the transit routes in, out and through Cambridge. The map would be actually be a timeline, with the routes growing/shrinking with ridership volume over the course of the day. Alternately, a similarly visualization with various snapshots in time - 8 AM, 12 noon, 6 PM – would be helpful.
- Transit service on the zoning map, on a map showing income, race, age and other demographic characteristics. Transit service and the amount of private and public parking.
- A map showing how congestion at various times affects schedule times for buses.
- Spacing of transit stops.
- Not sure if a map is the right way to show this, but some way to show where Cambridge students are coming from and going to school. A map should be done showing school department bus routes, special MBTA routes (like the 72 route to CRLS) and other special services provided for or by the School department.
- Service by other bus operators (EZ Ride, LMA, etc.) combined with MBTA service.

COMPARISON TO OTHER SYSTEMS. What aspects of the MBTA system would you be interested in comparing with other systems across the US (and Europe)?

- Accessibility for riders with disabilities; amount of city covered by transit; age of fleet; fare purchase/collection systems; use of mobile technology
- Bus and rail service hours per capita for the urban cores of comparable size metropolitan areas.
- How bad is the Red Line, really? I'd like to see statistics of other subway systems to see whether they, at rush hour, are under capacity or over capacity at rush hour.
- Fares -- Cost to riders
- Non-fare funding as a percent of total funding and sources – Societal costs
- How does the MBTA compare to other transit systems in assessing communities for transit service?
- Frequency of service
- Frequency of delays -- How often do buses, trains, etc. run on time
- Age of equipment – buses, subways, switching equipment, rails, etc.
- Miles of service
- Ridership – at peak and off peak
- Demographic characteristics of other transit service areas (race, incomes, education, etc.) and of the riders served by type of service
- Population density of service area
- Employment density of service area
- Building density of service area
- Cost and availability of parking in the area served
- Automobile ownership in the area served
- Cost to own an automobile in the area served
- Wages, household income, labor market, employment, etc. in the area served
- How the disaggregate zoning (each city and down defines local land use regulation) in the MBTA service area compares to how land use is regulated and land use patterns in areas served by other transit systems

MISC. Any other thoughts?

- How much the City spends to support car travel (road maintenance, parking, etc.) versus how much it spends to support public transportation. Specifically, I want to know how much of car travel is effectively subsidized by the City.
- How much money is being diverted into private transportation systems (MIT, Harvard, and other bus systems) and what plans there are for expansion of those systems for new development.
- It would be useful (I think) to understand the formula used by the State to fund transit through the Cherry Sheet. This is related to the suggestion that we compare assessments with other transit systems.