

# **Needs and expectations from public transportation**

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I will be using the terms "Public transport", "Public transportation", "Public transit", "transit", and "PT" interchangeably in this course.

## What is public transportation?

**Definition (American Public Transit Association).** Transportation by bus, rail, or other conveyance, either publicly or privately owned, which provides to the public general or special service on a regular and continuing basis.

**Definition (Merriam-Webster dictionary).** A system of trains, buses, etc., that is paid for or run by the government.

**Definition (Cambridge dictionary).** A system of vehicles such as buses and trains that operate at regular times on fixed routes and are used by the public.

**Definition (Jarrett Walker).** A passenger transport service focused on travel within a region, open to all passengers, with the ability to carry multiple passengers who may have different origins, destinations, and purposes.

**Definition (Daganzo and Ouyang).** The basic goal of public transit is to enable the mass movement of passengers from their origins and destinations in an efficient manner.

## Why do we need public transport?

- ▶ Population is growing in cities. Not enough space for everyone to drive.
  - New Delhi's population  $\sim 32,941,000$  (second largest after Tokyo)
  - PT can offer mobility to passengers in much smaller space
- ▶ Automobile accidents (innocent lives are lost which are expected to be normal!) are more frequent than PT accidents.
- ▶ Many people (poor, disabled, some elderly, and young) cannot drive
  - Not everyone can hire a driver.
- ▶ PT can serve multiple passengers in fewer veh-km as compared to automobile.
  - PT is more environmental-friendly (less emissions)
- ▶ Provides employment
  - efficient use of labor

## Take a look at this picture



Source: [mikkosmostlyharmless.blogspot.com](http://mikkosmostlyharmless.blogspot.com)

## Motivating example from Newell (1994)

Consider a square-shaped Central Business District (CBD) with no residences (e.g., Southern Manhattan). Assume the following:

- ▶ All workers reside in the periphery of CBD.
- ▶ Workday starts approximately at the same time for everyone.
- ▶ They can move freely and park once they enter the CBD.
- ▶  $A$ : area of CBD ( $2 \text{ km}^2$ )
- ▶  $p$ : fraction of CBD area occupied by buildings (0.5)
- ▶  $n$ : average number of floors (10)
- ▶  $a \ll A$ : size of one-person office space including common spaces such as staircases, corridors, and lavatories ( $200 \text{ ft}^2 \sim 2 \times 10^{-5} \text{ km}^2$ )
- ▶  $s$ : spacing between adjacent streets ( $300 - 500 \text{ ft} \sim 0.16 \text{ km}$ )
- ▶ Streets are bi-directional with 2 lanes in each direction
- ▶  $q$ : maximum no. of cars that each lane can carry in one direction in 1 hour (500 veh/hr)
- ▶  $k$ : average car occupancy (2)

Evaluate the total passenger demand and CBD perimeter capacity. Further, evaluate for how long the rush will last. Compare this with the situation when 25% of population start using buses (equivalent to 2 cars)

## Expectations from public transit

- ▶ Better accessibility<sup>1</sup>
- ▶ Better mobility<sup>2</sup>
- ▶ Affordable
- ▶ Civility, safety, and comfort
- ▶ Reliable
- ▶ Equitable
- ▶ Sustainable

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<sup>1</sup>Number of opportunities one can reach from a location in a given travel time budget.

<sup>2</sup>Average distance that passenger can travel in unit time

## Jarrett Walker mentions seven demands from PT

1. It takes me wherever I want to go.
  - Are there stops near my origin and destination? Are both connected?
2. It takes me when I want to go
  - How frequent is the service?
  - What is the span of its service (determined by scheduled time of first and last trip)?
3. It is good use of my time
  - Short travel times
  - Have basic amenities such as internet, reading lights, electric outlets, etc. to help in doing activities.
4. It is good use of my money
  - What is the fare?
5. It respects me in the level of safety, comfort, and amenity it provides
6. I can trust it
  - Reliable service
7. It allows me spontaneity to change my plans.



Thank you!