

# Principles of planning public transport services

Framework: planning new network, reconsider existing network  
principles + **local knowledge + assessment and measure**

## Basic aspects:

- demographic characteristics
- personal income/price of flats (square meter)
- number, density of population
- life style, travel habits (e.g. shopping)
- number of workplace, working habits (e.g. home office)
- terrain
- current transport network, fleet
- function of territory (medical, industrial, living, commercial, educational, cultural, touristic, official/government, business)
- size of territory, generated traffic
- built-up-density (low-density, high-density)

1. indicators      **principle: providing same service level in similar territories**
2. transportation mode and vehicle type
3. distance between stops and egress walking distance

**1. indicators:** according to spatial, temporal, quality aspects

indicators:

- maximum headway
- capacity utilization (e.g. non-peak hours: 50%, peak hours and night: 75%)
- maximum rate of sitting passenger (e.g. 40% only in case of long travel)

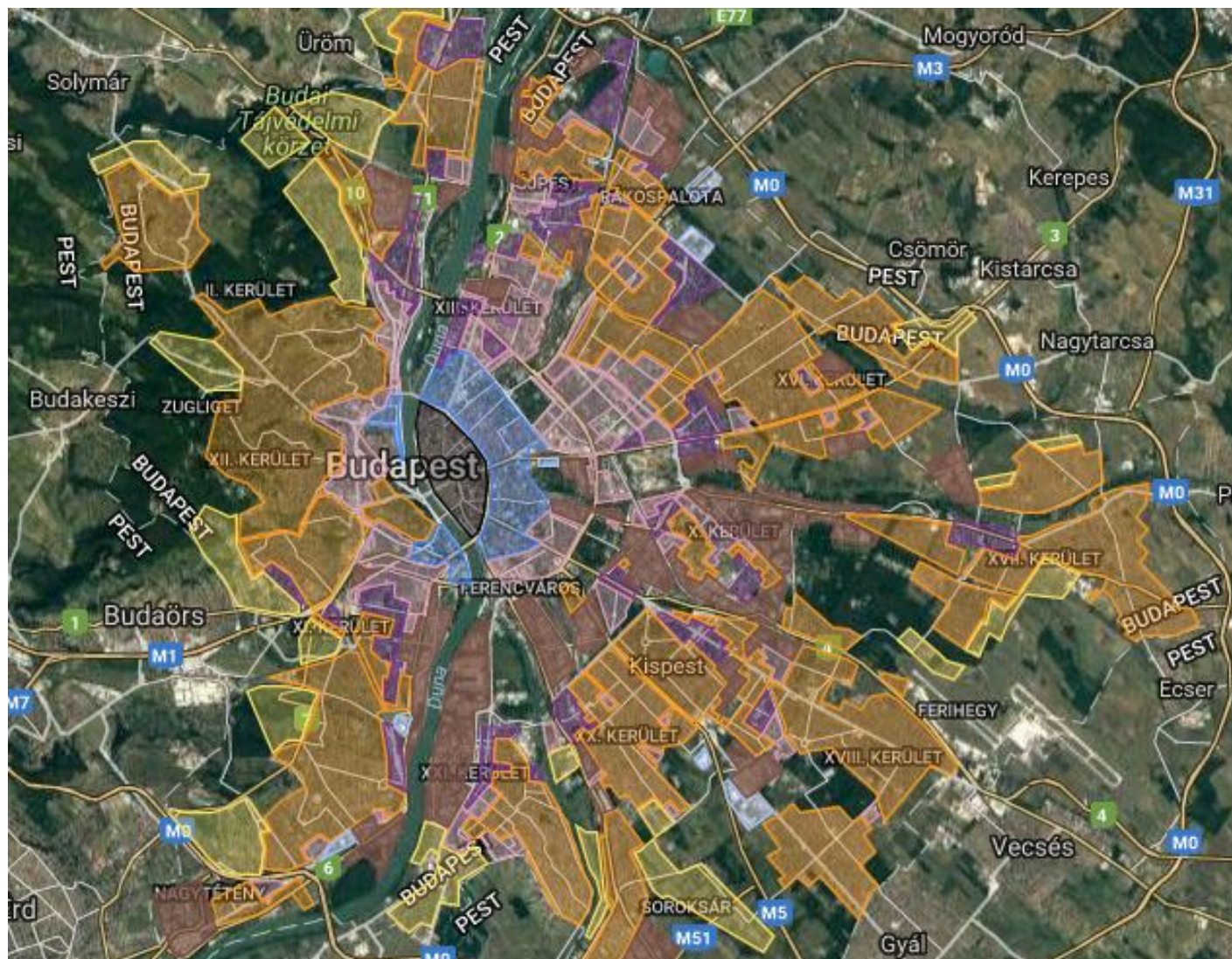
considered aspects (Case Study in Budapest):

- category of territory
- type/direction of service
- access time of connection
- directness of connection
- time intervals

## Territory category

### Legend:

-  dense metropolis
-  dense urban
-  dense
-  middle
-  loose
-  thin
-  industrial
-  commercial
- + touristic





## Direction of service

- centrum
- decentrum
- inside a territory
- thwart

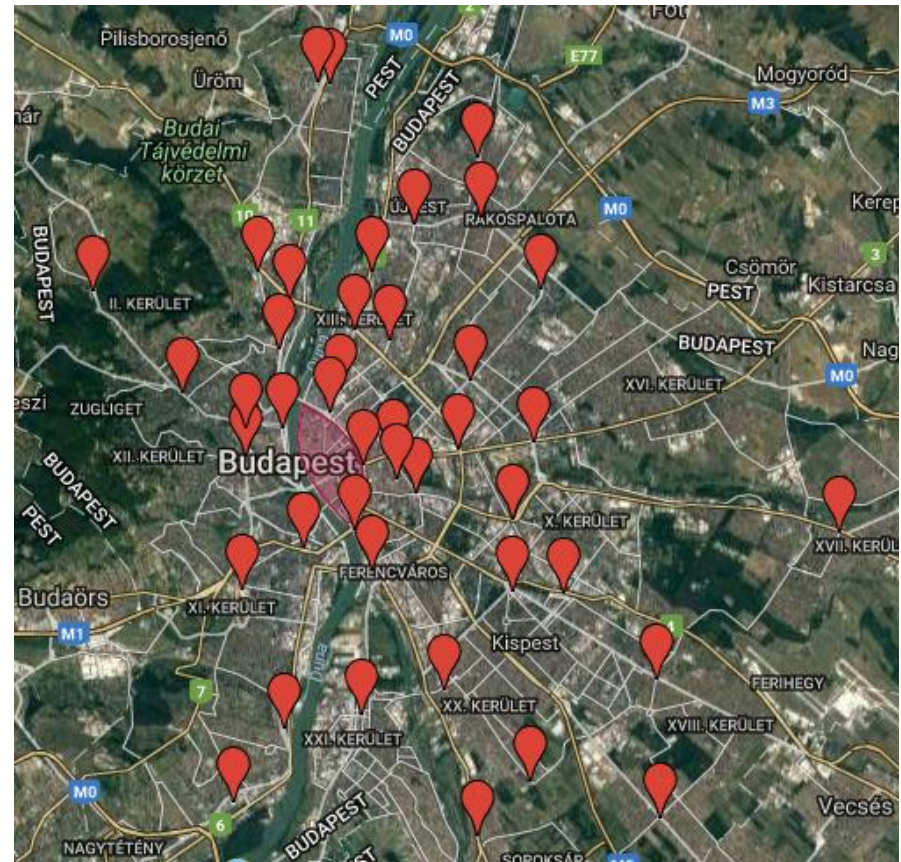
Access time of connection (max 15, 30, 60 min)

## Directness of connection

- direct (without change),
- feeder

## Time intervals

- type of day
  - TAN (workday with school)
  - SZÜN (workday without school)
  - ÉVV (workday at end of the year)
  - SZO (Saturday)
  - V+Ü (Sunday or holiday)
- time periods
  - morning and afternoon peak hours (only workdays): 6-9 h, 15-18 h
  - during the day: 9-15 h, 18-21 h
  - early morning/late evening: 4-6 h, 21-24 h
  - night: 0-4 h



decentrums in Budapest

+ extraordinary days:  
weekends before christmas,  
replaced workdays,  
long weekends

## 2. transportation mode and vehicle type

mode – capacity of vehicle

factors:

- terrain
- infrastructure
- periodic of traffic lights
- capacity of tracks and terminus  
(in case of track based modes)

type of PT	volume of passenger [passenger/h/direction]	
	from	to
metro	15000 (10000)	40000
HÉV	10000	25000
tram	4000	20000
DRT	1000	5000
trolley	depends on network	5000
bus	-	5000

## 3. distance between stops and egress walking distances

principles: minimizing egress walking distance ↔ minimizing travel time

install stops near facilities, traffic junctions considering traffic technology

factors:

- transportation mode
  - distance between stops: bus: 300-400 m, tram: 400-500 m, metro: 800-1000 m
  - egress walking: bus: 300 m, tram: 500 m, metro: 800 m
- terrain (distance between stops in hills: bus: 200-300 m, tram: 300-400 m)
- time periods (in night services 1000 m walking distance is appropriate)
- available destination by mode (the further the destination is the higher the egress walking and distance between stops are)
- number, density of population (every 400 citizens need one PT stop)

## Other principles

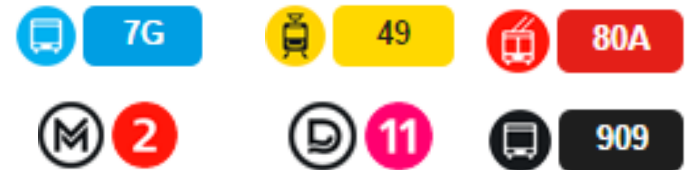
### Number of line

**line:** trips on same route between same final stops

trips in similar route (e.g. longer route, extra stop), but with different operational hours can be one line number + letter

in case of Budapest

- daily services: 1-299
  - track based lines 1-99 (tram: 1-69, trolley: 70-99)
  - exception: Metro, HÉV, ship
    - letter according to mode: M = metro, H = HÉV, D = (Danube ship) + number
    - numbers of metro and HÉV are different
- suburban services (bus – 600-899, train – e.g. S25)
- night services: 900-999
  - referring the similar daily lines
- letters:
  - A: extra trips (in general on shortened route) – *not provide ,more' than the basic line for the passengers*
  - B: secondary extra trips or route with some modification (e.g. lengthened) with same operational hours than basic line – *provide more than the basic line for the passengers*
  - E: express (rapid) line: less stop than the basic line or emphasizing the rapidity
  - G: trips to depo



## **Name of stop/station**

general:

- short, informative name
- pairs of stops principle
- junction principle
  - sub-junction (e.g. Széll Kálmán tér M (Várfook utca))
- name of stop + sign of metro or HÉV (e.g. Örs vezér tere M+H)
- name of stops of bus, tram, trolley is similar than name of station of metro, HÉV
- name of quarter of city in the name of stop is avoidable
- avoiding duplication

priorities:

1. railway station, created junction name (e.g. Astoria, Kőbánya-Kispest)
2. name of two-dimensional public spaces (e.g. square, park)
3. name of one-dimensional public spaces (e.g. street)
4. name of institute

name of arrival station in displays (junction name, in case of round route: direction)

# Planning public transport services

## Steps:

1. Description of the demand (spatiality, temporality, types of passengers, etc.), number of passengers in peak hour
2. Network planning
3. Capacity planning (track, vehicle) – vehicle selection, number of departures/frequency
4. Turnaround times calculation
5. Number of needed vehicles
6. Timetable planning – specific times and dates
7. Schedule and disposition of vehicles (one vehicle running on several routes)
8. Staff management plan
9. Accounting the performance (vehicle, staff, energy consumption, etc.)

## timetable

plan for **management of the public passenger transportation**

(more strict rules in the intercity transportation than in the inner-city)

Activities of passenger transportation companies may be derived from it



## Demand – supply timetable

rigid demand, flexible demand (possible to influence)

Compromise between the travel  
demands/expectations and the  
operational conditions



Minimalizing the necessary vehicles – increasing the turning speed

### Improvement of capacity utilization of the vehicles (track, staff)

- Utilization of time
- Utilization of capacity
- Assignment of runs into turns (e.g.: fuelling, taking into account the empty mileages, spare and standby times)
- Staff management (labour law, collective agreement; times between depot and terminals, preparation and final times, rest times, qualification, practice, experience, track/route knowledge)
- Operative staff management (holiday, illness)

## Synchronization/coordination of vehicle runs

- Round routes
- Two way round routes
- Joint routes (routes running on similar path partially - weaving)
- Normal and express runs (different services)
- Inserting extra service or additional vehicle
- „undercut”, „overcut”
- Transfer before service closing
- Hub and spoke system

## Transfer guarantee (weighting by the number of passengers)

- Replacement of lines in space-time diagrams
- Change the density of the lines in space-time diagrams (change of vehicle capacity)
- Change the slope of the lines in space-time diagrams  
(speed increasing; infrastructure refurbishment based on timetable)
- Schedule with tacts  
(same periodicity or multiples of each other; representation with „spiders”)
- Planning (planned transfers) – implementing  
(operative traffic management – waiting for each other mutually)
- Tariff system, rates (discounts)

## Adherence of/keeping the timetable (quality aspect) – operative traffic management

## **Passenger – based on the timetable:**

- Choose between the providers
- Basis of the complaints, claims and refund

**Non-public timetable** – scheduling and managing the vehicle maintenance and the reparation, rest times for the staff (strict rules)

## **Commercial/public timetable** (simple, clear structure)

- restrictions, vehicle features (train composition), other services (e.g.: the usability of the vehicles for disabled passengers or by baby car, buffet, dining car, Wi-Fi)
- [name of the service provider](#)

**Graphics timetable** – spatial and temporal „coordination system”; lines in space-time diagrams

## **Summarized timetable**

- Temporal delineation (e.g.: Summer time)
- Spatial delineation (e.g.: lake Balaton)

The role of the paper-based timetable is significantly decreasing; it is used especially for marketing function/purpose

[Liberalization of long-distance/regional bus services \(train\)](#)