MORE Final Event
An introduction to the MORE tools for road space reallocation

Virtual meeting, 22nd February 2022

Budapest

Andor HÁZNAGY, BKK

BUDAPESTI KÖZLEKEDÉSI KÖZPONT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769276.

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Budapest – City overview

1.750.000 inhabitants, 525 km^2

Economic (40% Hungarian GDP), **touristic** (hotels), **social** (baths), **educational** (universities), **transport hub** (railways, airport, logistic centres) of the country

Divided to Buda and Pest by the River Danube

Metropolitan region (FUA, 80 towns/villages)

- Further 800 000 inhabitants

Complex, two-tier municipal system

- Municipality of Budapest (Mayor of Budapest)
- 23 districts - 23 municipalities and mayor

BKK – Responsible mobility manager of the city

BKK is responsible for all travelers regardless the purpose, the aim, and the mode of transport. No absolute priority among transport modes.

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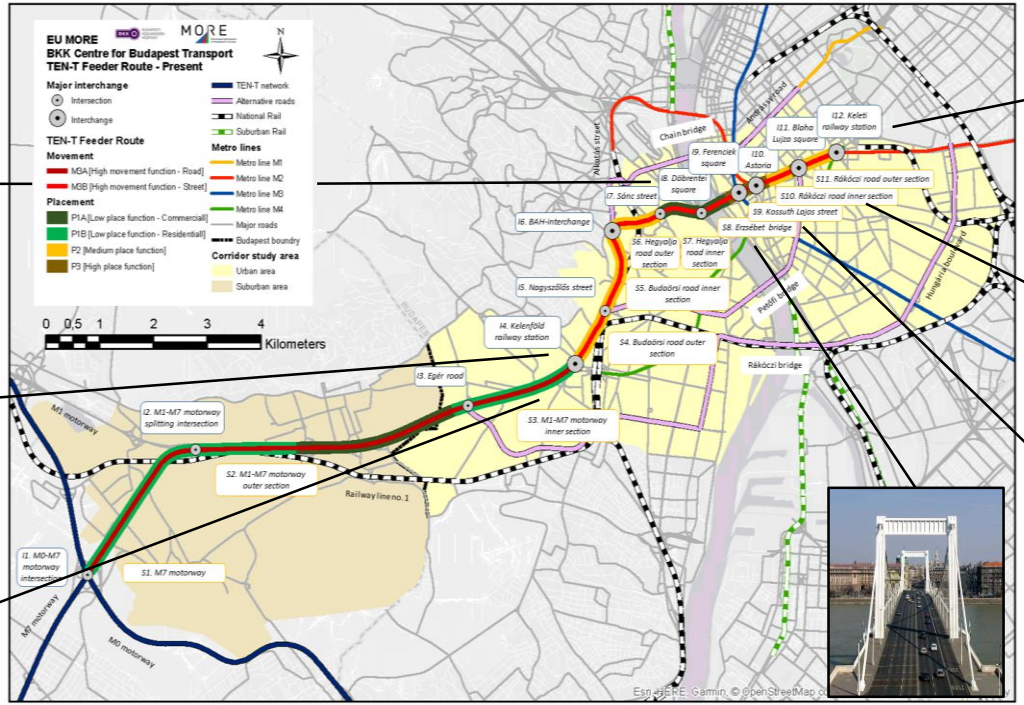
Car oriented road design

MORE Urban Feeder Route– typical example

- Outer part: cars reach easily the city centre
- Inner part: street for cars, not for local people



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Shift from car oriented city to city of places
History of Rákóczi road (Ferenciek square)

- Kossuth Lajos street, Erzsébet bridge built at the 1900's, **representative avenue**
  - Old city centre of Pest demolished
- Rákóczi road became an important **public transport axis** of Budapest
- **Tram network closed** when metro network opened in the 70's, grade sparated interchanges built for car traffic
- **Road space reallocation** at Ferenciek square in 2014, bus lines, pedestrian crossing, traffic calming
- **Sustainable street condition** in the future, developing public & active transport, banning cars

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Identifying the basic data on the road-space reallocation process in Budapest

- Collecting national design standards for public space development
  - Pedestrians, cycling, car traffic, buses, people with reduce mobility
- Identifying the design process
  - Current vision about road-space allocation
  - Political and technical narrative (start of the projects)
  - Main actors of road-space allocation in Budapest and their roles
  - Steps of Planning process
  - Identifying the main barriers

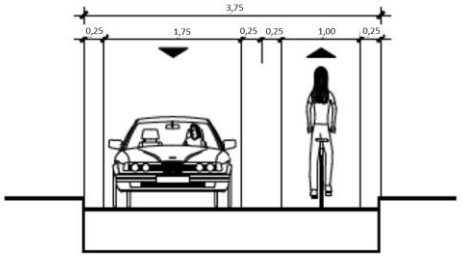
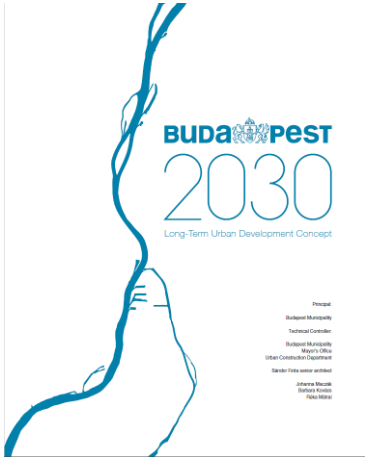


Figure 7.7. – $v_t \leq 30$ km/h, without parking, in case of private car traffic (contra-flow bike traffic in one-way street)

Inputs from strategies, documents

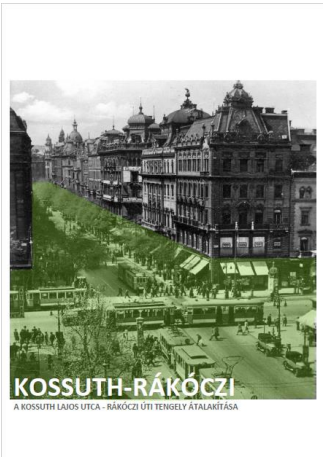
Budapest 2030 – Long-Term Urban Development Concept



Budapest Integrated Urban Development Strategy (2021-27)

Budapest Mobility Plan

Existing documents on the area



Macroscopic Transport Model of Budapest

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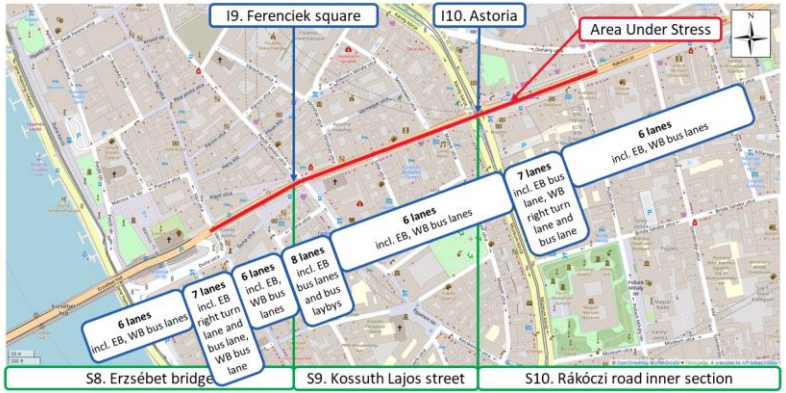
Familiarising with the stress section

- Identifying local stakeholders
- Analysing the cross-section of the street
- Traffic counts, intersection counting
  - 9 intersections; 12 vehicle types
  - Floating car measures
- Pedestrian counts, cross-section counting
  - entry points; pedestrian crossings; underpass entries
  - Public space activity survey
  - Approx. 2000 pedestrians at the area
    at the same time during the peak hours
- Public Transport lines, Public transport stops
  - Massive transport lines, ~60 buses between 8-9AM each direction
  - Approx. 20000 passengers each direction
- KPIs from TU Dresden



Vehicle types	Ferenciek square	
	Kossuth Lajos street eastbound view	Kossuth Lajos street westbound view
Private car	18737	19242
Taxi	2028	2837
Bicycle	119	425
e-Scooter	25	140
Segway	4	83
Motorcyclists	568	460
Bus (Public and Private)	1231	1010
HGV/LGV with 2 axles, < 3.5t	1727	651
HGV/LGV with 2 axles, 3.5t-7.5t	612	666
HGV/LGV with 2 axles, 7.5t <	22	867
HGV/LGV with 3 axles	0	0
HGV/LGV with 4 axles	0	0

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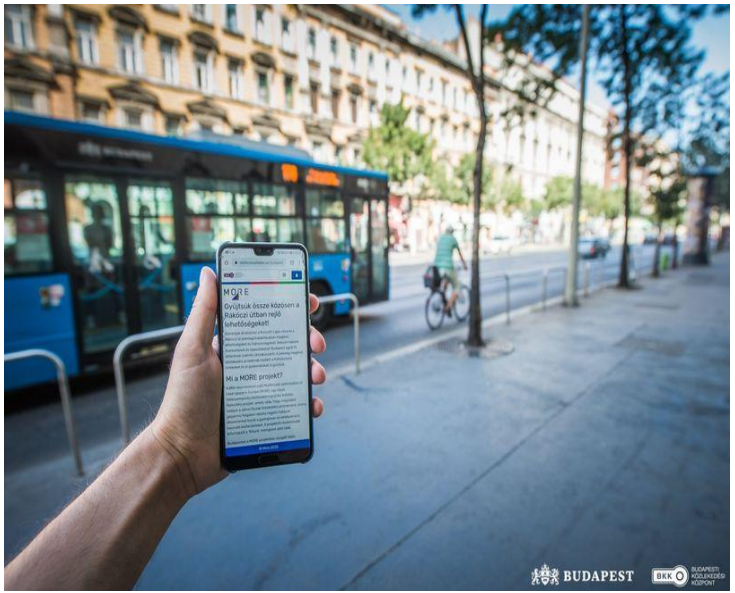
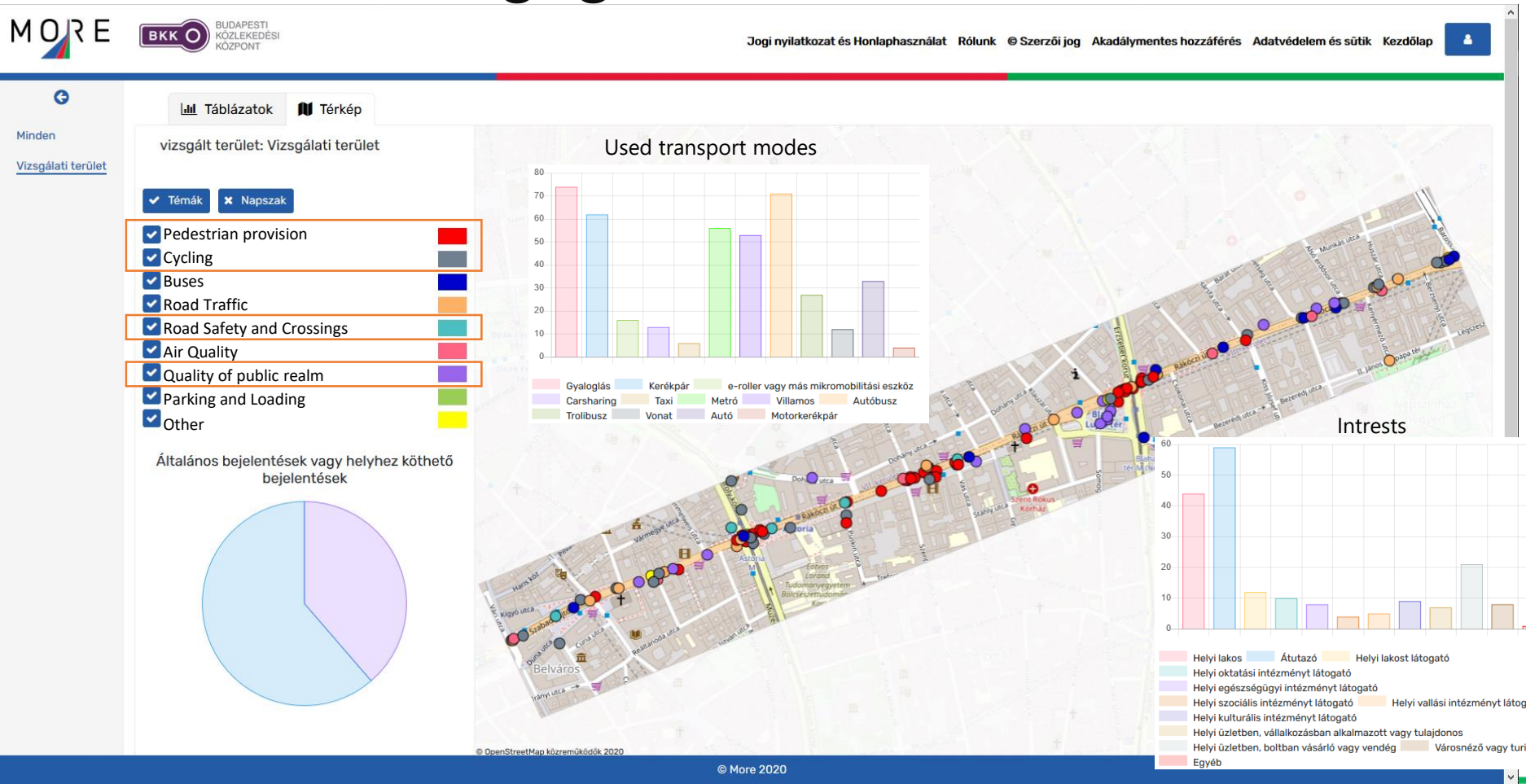
Stakeholder engagement tool-Traffweb

- Platform was available 19th Sept 2020 – 1th Nov 2020
  - 194 comments
  - 119 comments for dedicated space
  - 75 general comments
  - 73% of the reported comments are a permanent problem (24/7)

- General comments:
  - Traffic calming, reducing lanes
  - Put the bus lane to the middle of the street
  - Improving bicycle infrastructure
  - Pedestrian crossings
  - More trees, benches, tidy street



Stakeholder engagement tool-Traffweb



Whole Rákóczi axis (extended study area for the consultancy)

Stress section

1. Ferenciek square – Astoria square

- Reducing lanes
- Improving bicycle facilities
- Lack of Trees
- Lack of Benches
- Wider pedestrian crossings
- Lack of pedestrian crossings
- Tram or trolleybus instead of bus

2. Astoria square

- Lack of pedestrian crossings
- Carriageway at bad condition

3. Astoria square – Blaha Lujza square

- Widing sidewalks
- Lack of pedestrian crossings
- Improving bicycle facilities
- Bus lane at the middle of the street

4. Blaha Lujza square

- Untidy public space
- Lack of pedestrian crosings
- Lack of trees
- Lack of Parking
- Bus lane at the middle of the street

5. Blaha Lujza square – Baross square

- Reducing traffic lanes
- Bicycle lane
- Bus lane at the middle of the street
- Lack of trees
- Lack of pedestrian crossings

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Design days

- **2 workshops in personal at BKK HQ**
  - **Approx. 22 participants** at each workshop, 3h long events
  - **Specific methodology** – reflecting and seeking to current and future conditions
  - **Urban aspect (21st July 2021)**
    - BKK (Strategic planning, Mobility Development, Project Implementation Depts.)
    - Mayor Office
    - Chief Architect
    - Chief Landscape Architect
    - Budapest City Planning Ltd.
    - Budapest Public Space Maintanance Ltd.
    - Budapest Horticultural Ltd.
  - **Transport aspect (26th July 2021)**
    - BKK (Mobility Development, Mobility Management Depts.)
    - Budapest Public Road
    - Budapest Transport Ltd.
    - Budapest City Planning Ltd.

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Design days

- **Methodology of the design days**
  - **Complex approach** - Participants were familiarized with the stress section and the whole Rákóczi road, its current and future potential and vision before using the blocks and acetates. (Two main sessions)
  - Working in groups
  - **Current condition - PEST analysis** (political, economic, social and technological view)
  - **Future condition – 4 topics**
    - Transport vision (complex view with public, private and share transport)
    - The role of Rákóczi road in transport, its function as a public space (strategic function of Rákóczi road)
    - Urban identity, humanisation (character of the road in an ideal vision)
    - Application of technological and regulatory options (new and old technologies, their legal framework)
  - In-depth understanding of stress section options

Design days

- **Methodology of the design days**
  - **Using blocks and acetates** to determine current and future (cross-section) scenarios (trees+green areas)
  - Possible **future** measures and design of stress section – based on former workshop parts outputs and outcomes
    - Firstly, working in 4 groups – diff. part of the Rákóczi road
    - Secondly, commenting of the elements (blocks and acetates) freely over the whole section
  - Possible **current** measures - filtering, rethinking of future options (e.g.: solutions if the curbside remains)
    - Firstly, working in 4 groups – diff. part of the Rákóczi road
    - Secondly, commenting of the elements (blocks and acetates) freely over the whole section
  - Scenario development and inputs of D5.3, D5.4

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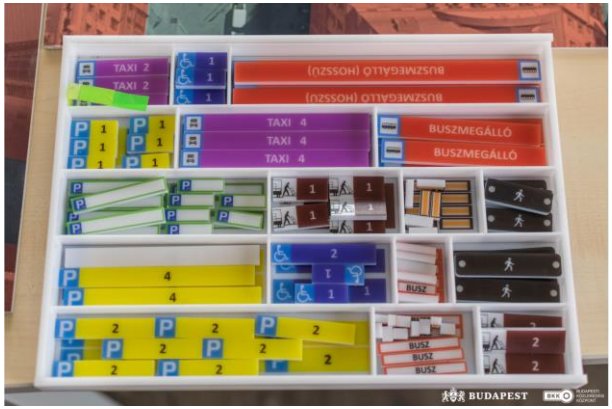
Design days - pictures

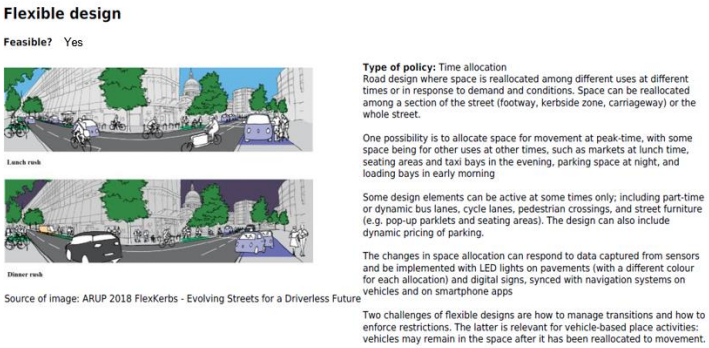


Option generation tool

Some of the feasible designs that could be used in the section are:

- Reduce number of traffic lanes
- Decrease width of traffic lanes
- Widen footway and/or declutter footway
- Flexible design
- Dynamic parking charging
- Kiss and Ride
- Inclusive design
- Part-time parking/loading space

- Policy intervention tool



Flexible design

Feasible? Yes

Lunch rush

Dinner rush

Source of image: ARUP 2018 FlexKerbs - Evolving Streets for a Driverless Future

Type of policy: Time allocation
Road design where space is reallocated among different uses at different times or in response to demand and conditions. Space can be reallocated among a section of the street (footway, kerbside zone, carriageway) or the whole street.

One possibility is to allocate space for movement at peak-time, with some space being for other uses at other times, such as markets at lunch time, seating areas and taxi bays in the evening, parking space at night, and loading bays in early morning

Some design elements can be active at some times only; including part-time or dynamic bus lanes, cycle lanes, pedestrian crossings, and street furniture (e.g. pop-up parklets and seating areas). The design can also include dynamic pricing of parking.

The changes in space allocation can respond to data captured from sensors and be implemented with LED lights on pavements (with a different colour for each allocation) and digital signs, synced with navigation systems on vehicles and on smartphone apps

Two challenges of flexible designs are how to manage transitions and how to enforce restrictions. The latter is relevant for vehicle-based place activities: vehicles may remain in the space after it has been reallocated to movement.

Kiss & Ride

Feasible? No

Source of image: https://www.cm-amadora.pt

Type of policy: Space allocation
Designated areas next to public transport nodes (train, light-rail, bus stations) or other places (schools, employment centres) for passengers to be picked up/dropped off by personal vehicles. There is no charge for stopping.

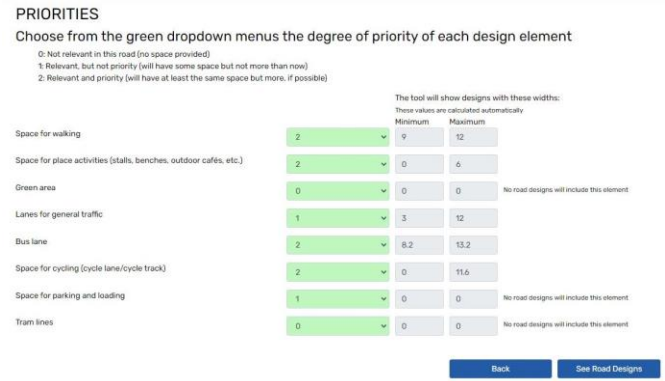
The spaces can only be used for a short time (a few minutes). Drivers must stay inside the vehicle, or nearby, while waiting. The spaces may complement park and ride spaces, but should be closer to the station, to reduce the time they are occupied.

Kiss and ride zones may operate only for a few hours (e.g. peak time, school opening/closure times), with the space assigned to other uses (e.g. longer term car parking, bicycle parking) at other times.

This measure reduces cruising for parking and reduces the need to stop in locations that are unsafe (e.g. with no pedestrian crossings, or near junctions) or disrupt other road users (e.g. double parking, or parking next to cycle lanes).

Compliance can be an issue. Drivers may occupy the space for more than allotted minutes, preventing others from using it. They may also use it as a standard parking space, for longer hours. Adequate signage and enforcement is needed.

- Road design tool



PRIORITIES

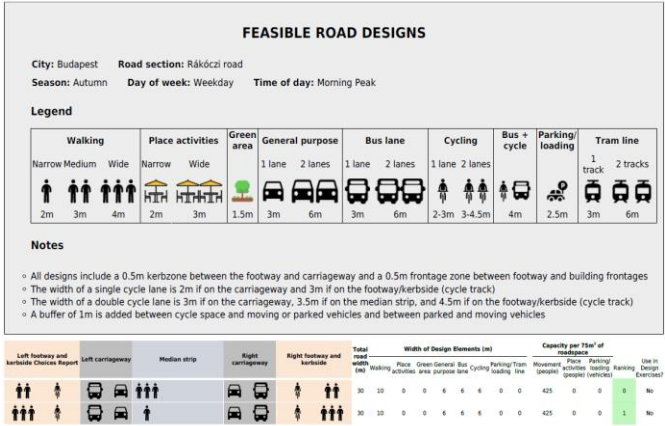
Choose from the green dropdown menus the degree of priority of each design element

0: Not relevant in this road (no space provided)
1: Relevant, but not priority (will have some space but not more than now)
2: Relevant and priority (will have at least the same space but more, if possible)

The tool will show designs with these widths:
These values are calculated automatically

		Minimum	Maximum	
Space for walking	2	9	12	
Space for place activities (stalls, benches, outdoor cafés, etc.)	2	0	6	
Green area	0	0	0	No road designs will include this element
Lanes for general traffic	1	3	12	
Bus lane	2	8.2	13.2	
Space for cycling (cycle lane/cycle track)	2	0	11.6	
Space for parking and loading	1	0	0	No road designs will include this element
Tram lines	0	0	0	No road designs will include this element

Back | See Road Designs



FEASIBLE ROAD DESIGNS

City: Budapest **Road section:** Rákóczi road
Season: Autumn **Day of week:** Weekday **Time of day:** Morning Peak

Legend

Walking			Place activities		Green area	General purpose		Bus lane		Cycling		Bus + cycle	Parking/ loading	Tram line	
Narrow	Medium	Wide	Narrow	Wide		1 lane	2 lanes	1 lane	2 lanes	1 lane	2 lanes			1 track	2 tracks
2m	3m	4m	2m	3m	1.5m	3m	6m	3m	6m	2-3m	3-4.5m	4m	2.5m	3m	6m

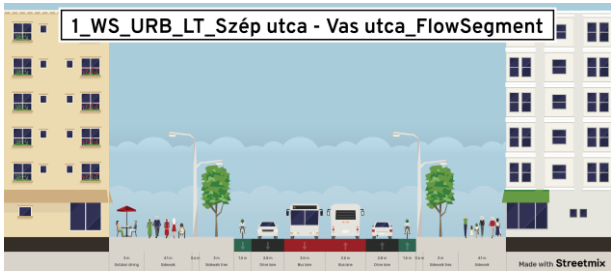
Notes

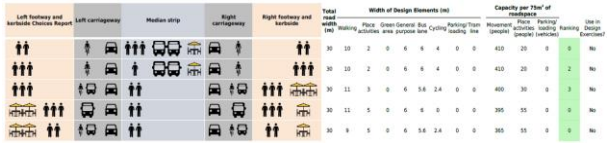
- All designs include a 0.5m kerbzone between the footway and carriageway and a 0.5m frontage zone between footway and building frontages
- The width of a single cycle lane is 2m if on the carriageway and 3m if on the footway/kerbside (cycle track)
- The width of a double cycle lane is 3m if on the carriageway, 3.5m if on the median strip, and 4.5m if on the footway/kerbside (cycle track)
- A buffer of 1m is added between cycle space and moving or parked vehicles and between parked and moving vehicles

Left footway and kerbside Choices Report	Left carriageway	Median strip	Right carriageway	Right footway and kerbside	Total road width (m)	Width of Design Elements (m)							Capacity per 75m² of roadspace				
						Walking	Place activities	Green area	General purpose	Bus lane	Cycling	Parking/ loading	Tram line	Movement (people)	Place activities (people)	Parking/ loading (vehicles)	Ranking	Use in Design Exercises?
					30	10	0	0	6	6	6	0	0	425	0	0	0	No
					30	10	0	0	6	6	6	0	0	425	0	0	1	No

Refining the results, determining scenarios

- **Using the outputs of design days**
  - **Different cross-section** at each part of the Rákóczi road Outputs of Urban planning (Livablibilty aspect) and Transport planning (Transport aspect) WS
- **Outputs of Traffweb consultation**
- **Professional consultation on the possible use of curbside at the stress section area**
  - Parking, Taxi, (micro)mobilitypoints, city log, EV chargers
  - Position of cycling lanes (i.e. surrounds of bus stops)
- **Using MORE policy intervention tool and Road design tool**
- **Generating 3 diff. scenarios for current** (1-2 years ahead) **and future** (2030) **conditions + baseline** with the todays (current) condition





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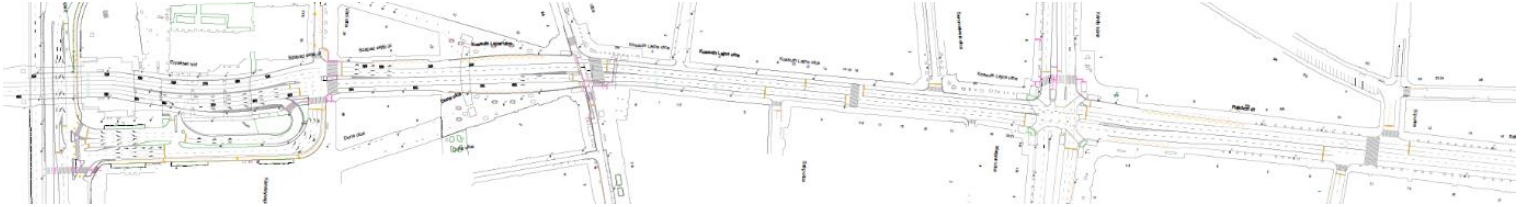
Scenarios

Conditions	Short-term outputs, (2 years ahead) Krebs remain	long-term future outputs (up to 2030) Kerbs change
Current condition	Current layout (public space, numbers and function of the traffic lanes, traffic management) Road, Ped., PT traffic from counting	Current layout (public space, numbers and function of the traffic lanes, traffic management) Traffic data from macrospoic model and counting (using hollistic approach)
Urbanistic approach	1 car lane, 1 cycle lane, 1 bus lane (next to the kerb) per diretion; 30km/h Parklets, share areas and greens at the new spaces; more pedestrian crossings (signalized) (diff. places at Urbanistic and Transport approach) Differences at the Astoria square and the bridgehead of Erzsébet bridge (near to the Váczi street) Traffic data from macroscopic model and counting (using holistic approach), using growth factor for Ped. traffic; Traffic lights optimised	1 car lane, 1 cycle lane, 1 bus lane (in the middle of the street) per diretion; 30km/h Parklets, share areas and greens at the new spaces; more pedestrian crossings (signalized) (diff. places at Urbanistic and Transport approach) moving the kerbside made it easier to plan Differences at the Astoria square and the bridgehead of Erzsébet bridge (near to the Váczi street). Buslane at diff. space at the bridge Traffic data from macroscopic model and counting (using hollistic approach), using growth factor for Ped. traffic; Traffic lights optimised
Transport approach		
Mixed version	Minor modification to the current condition Current laxout with some newtraffic signal controlled pedestrian crossings	

Short-term outputs, (2 years ahead)

Bus lanes next to the kerb

Current condition (null version)



Mixed version (C version)

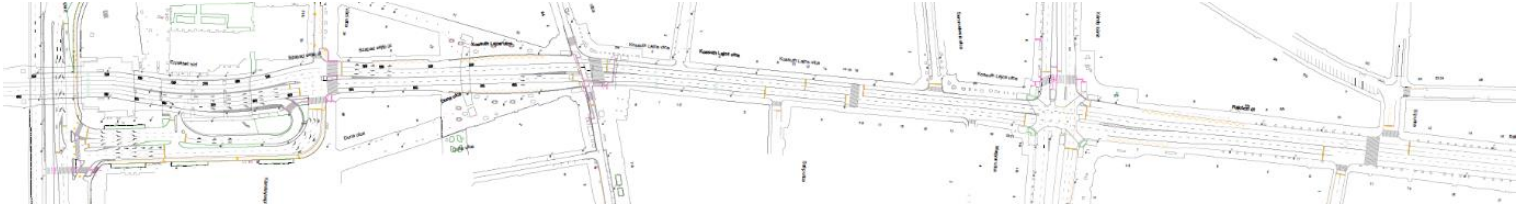
Urbanistic approach (A version)

Transport approach (B version)

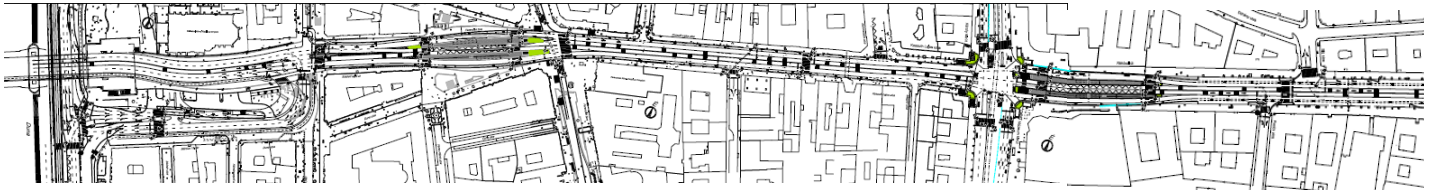
Long-term future outputs (up to 2030)

Bus lanes at the middle of the street

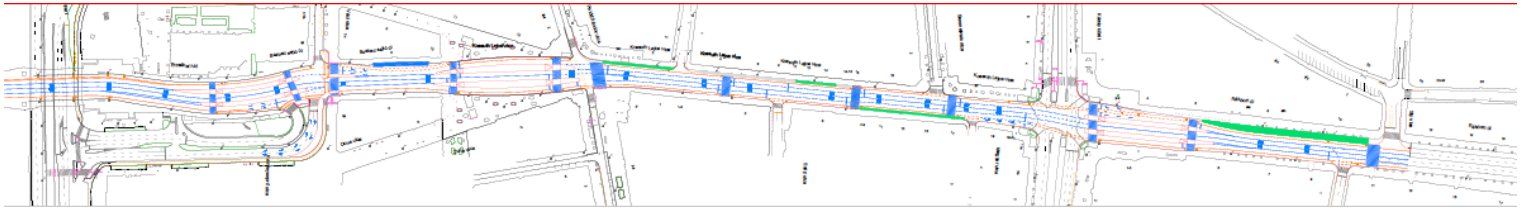
Current condition (nn version)



Mixed version (CC version)



Urbanistic approach (AA version)



Transport approach (BB version)

Modelling results

- KPIs from TU Dresden
- Results used at Appresal tool

		DELAYMEASU	Values							
		1	1	1	1	2	2	2	2
ver	time	Average of VEHS(ALL)	Average of VEHDELAY(ALL)	Average of STOPS(ALL)	Average of STOPDELAY(ALL)	Average of VEHS(ALL)	Average of VEHDELAY(ALL)	Average of STOPS(ALL)	Average of STOPDELAY(ALL)
⊖A									
A	06 09h	47,11%	216%	284%	247%	47,45%	395%	710%	375%
A	11 14h	40,34%	181%	225%	201%	35,69%	365%	537%	370%
A	16 19h	38,13%	146%	195%	148%	37,67%	621%	1140%	599%
A	19 22h	46,75%	227%	303%	240%	48,37%	595%	1120%	552%
⊖AA									
AA	06 09h	34,28%	459%	539%	600%	26,24%	949%	1951%	872%
AA	11 14h	22,86%	323%	367%	396%	17,54%	659%	995%	675%
AA	16 19h	18,90%	258%	303%	293%	24,63%	886%	1697%	851%
AA	19 22h	26,71%	384%	457%	456%	22,70%	1260%	2370%	1208%
⊖B									
B	06 09h	34,08%	564%	671%	760%	46,34%	412%	697%	405%
B	11 14h	26,22%	330%	443%	380%	34,03%	383%	544%	394%
B	16 19h	23,74%	257%	356%	272%	38,89%	641%	1136%	627%
B	19 22h	26,15%	499%	716%	550%	45,87%	652%	1168%	621%
⊖BB									
BB	06 09h	33,09%	511%	681%	653%	38,80%	444%	825%	404%
BB	11 14h	20,45%	374%	516%	429%	29,65%	338%	478%	338%
BB	16 19h	17,63%	308%	457%	323%	37,67%	500%	917%	464%
BB	19 22h	20,83%	550%	752%	625%	39,01%	604%	1088%	559%
⊖C									
C	06 09h	96,53%	238%	311%	293%	94,59%	157%	207%	162%
C	11 14h	76,28%	215%	258%	252%	97,87%	202%	258%	209%
C	16 19h	67,41%	185%	242%	202%	100,14%	166%	217%	173%
C	19 22h	81,64%	297%	394%	336%	100,08%	128%	144%	139%
⊖CC									
CC	06 09h	28,29%	454%	489%	604%	42,85%	558%	1049%	513%
CC	11 14h	22,69%	237%	246%	288%	29,20%	514%	738%	517%
CC	16 19h	24,83%	155%	174%	171%	36,11%	763%	1433%	710%
CC	19 22h	26,71%	266%	266%	320%	37,62%	934%	1725%	863%
⊖null									
null	06 09h	100,00%	100%	100%	100%	100,00%	100%	100%	100%
null	11 14h	100,00%	100%	100%	100%	100,00%	100%	100%	100%
null	16 19h	100,00%	100%	100%	100%	100,00%	100%	100%	100%
null	19 22h	100,00%	100%	100%	100%	100,00%	100%	100%	100%
⊖nn									
nn	06 09h	111,62%	107,38%	111,06%	108,31%	110,33%	111,16%	117,28%	108,51%
nn	11 14h	101,56%	120,70%	113,91%	126,67%	113,04%	160,20%	186,80%	151,00%
nn	16 19h	95,37%	113,28%	118,36%	113,00%	111,32%	128,29%	146,44%	122,48%
nn	19 22h	110,10%	114,05%	110,18%	116,84%	112,10%	103,81%	101,28%	104,77%

Short-term
Density heatmap

Long-term
Density heatmap

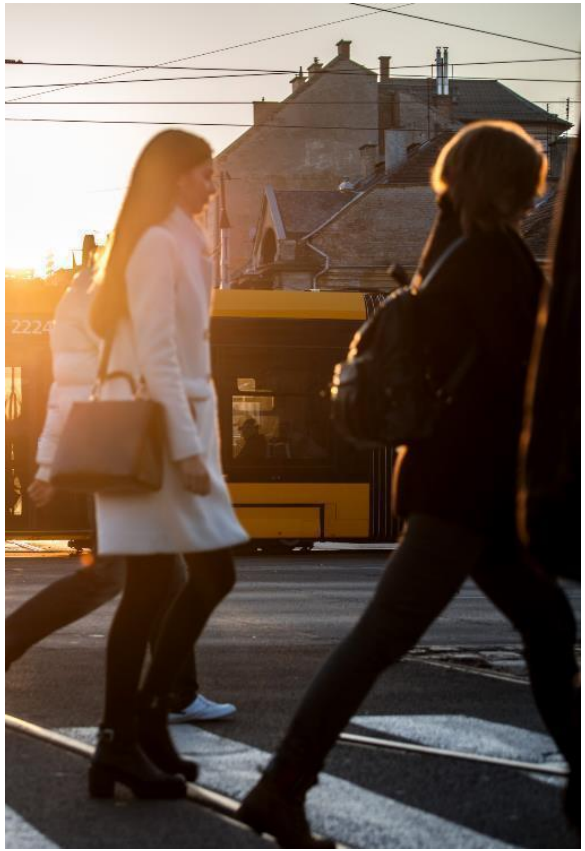







Benefits of the MORE tools

- Easy to use
- Co-creation
- Problem exploration and scenario building with active participation
- Professional dialogue
- Opportunity for virtual consultation
- Preparation, consultation, evaluation, change training, analysis, processing of results requires a lot of time and thorough preparation



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769276.

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