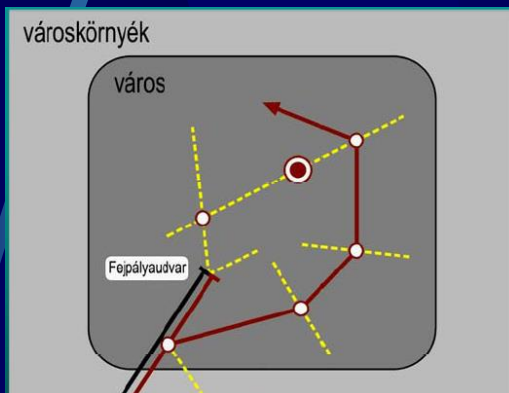


# Railway, water and air traffic in urban areas, effects on structure and land-use



**Urban Transport 15.**  
**András Gulyás PhD habil**  
**associate professor**

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# The railway in urban structure

The railway represents an important urban forming power by its lines, stations as well as roads leading to the stations.

The railway line has separated urban parts and there remained only a few connection for traffic and pedestrians (one-level or multi-level).

The road leading to the railway station has become a „second main street” as an important public transport, pedestrian and bicycle traffic axis.



# The railway in urban structure



Kiskunfélegyháza

# **The railway in urban structure**

**The big intermodal railway junctions have got an urban structural role together with suburban bus stations and other public transport modes.**

**At the vicinity of the intermodal junction new commercial and service developments take place.**

**The land-use changes provide synergic effects coordinating the demand and possibilities.**

**The railway station area therefore has become a multi-functional urban zone.**

# **Railway station examples**

## **Lisbon Oriente**

**The Lisbon Oriente station is the most important one in Portugal.**

**The station was designed by Santiago Calatrava and it opened in 1998-ban for the World Expo.**

**High speed trains (Alfa Pendular), regional and local trains and buses start from here.**

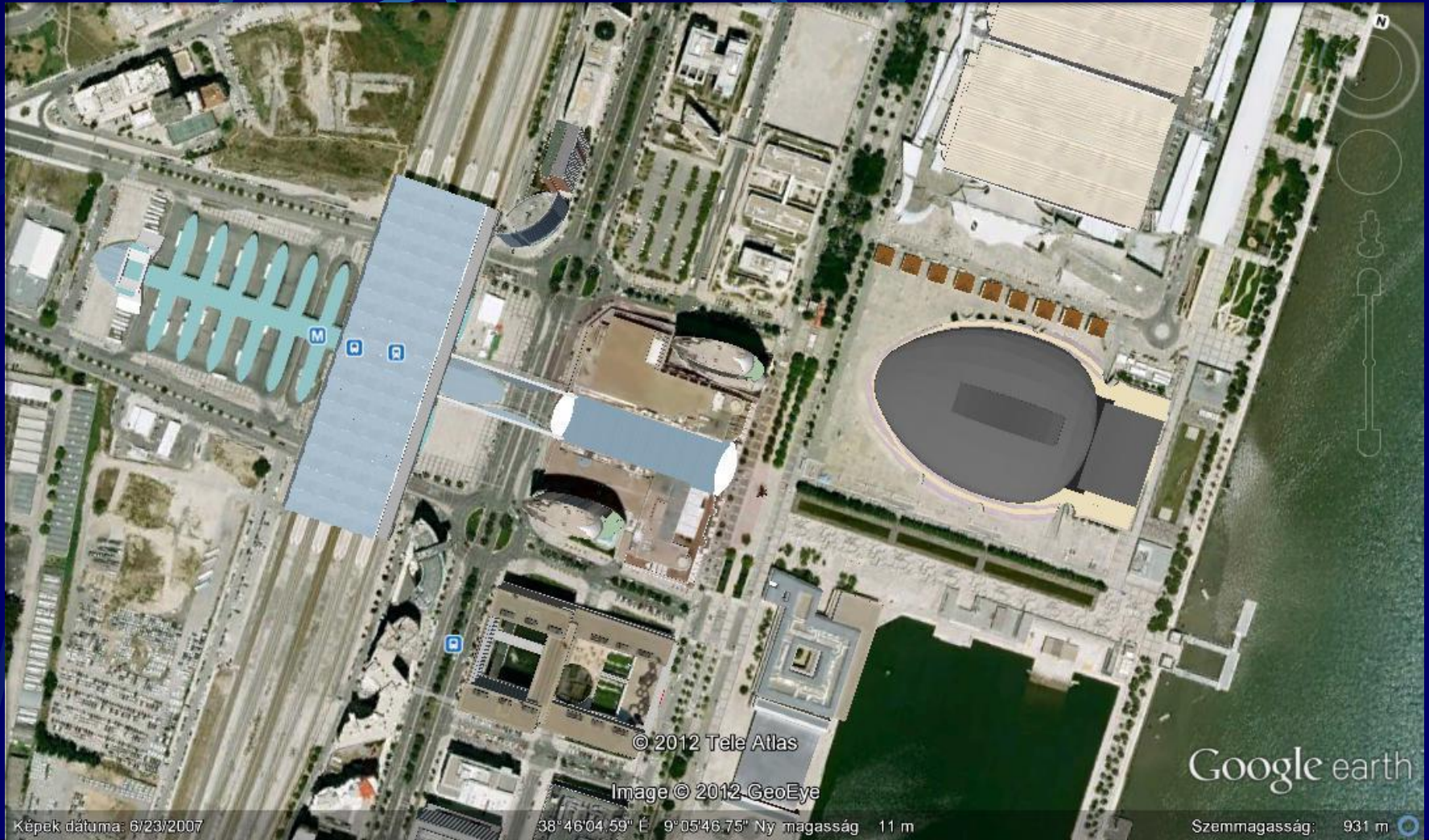
**There is a metro station and a bus station nearby as well as a shopping centre.**

**The station is highly trafficked serving 75 million passengers per year.**



# Railway station examples

## Lisbon Oriente



# **Railway station examples**

## **Lisbon Oriente**

**Calatrava won the contest for the new station.**

**There was at that time a ruined industrial area where the development provided a new intermodal traffic junction for intercity and other trains, metro and buses.**

**In the time of the World Expo as well as since then the station has an important role in the city life.**

**The appearance of the building resembles the waves of the ocean.**



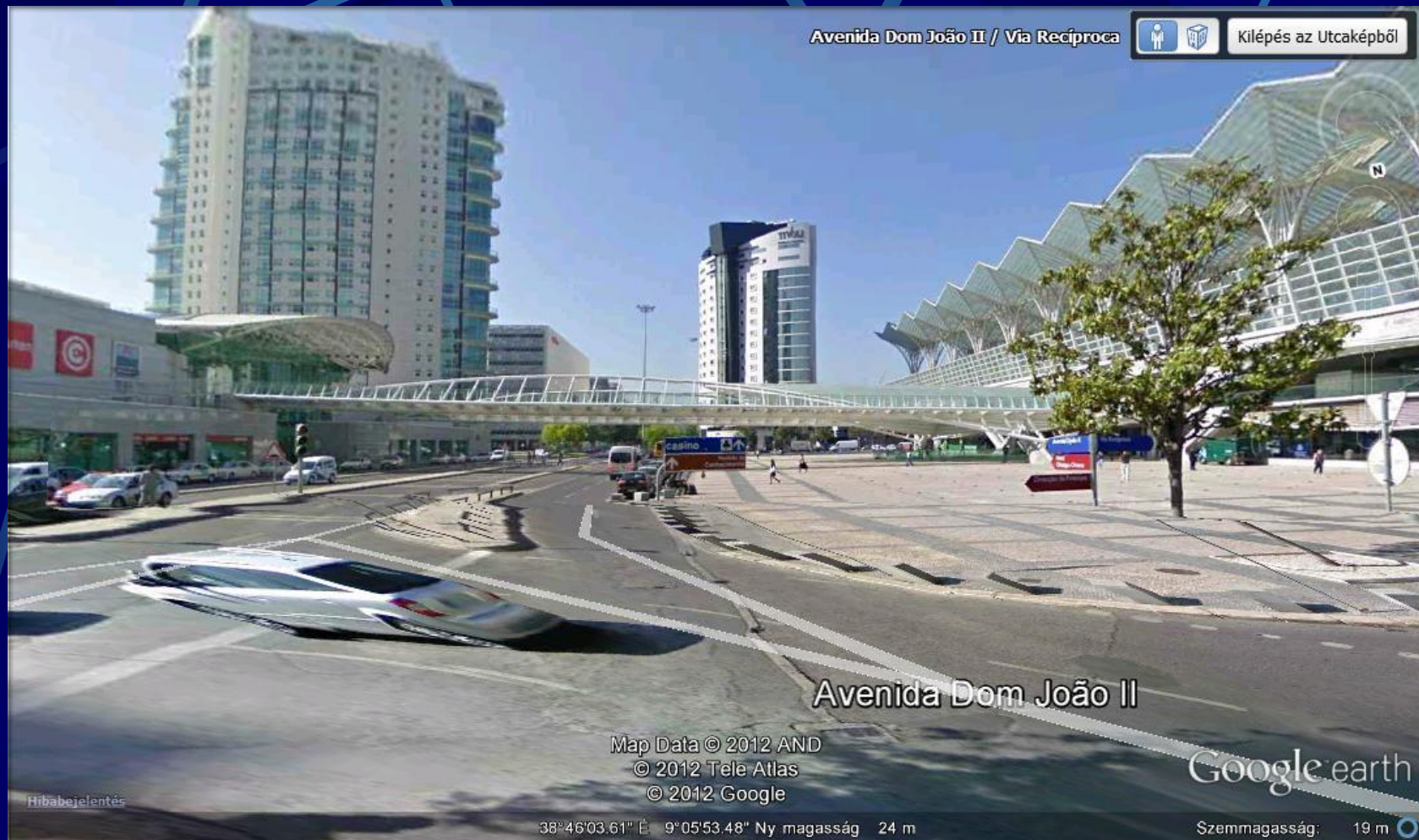
# Railway station examples

## Lisbon Oriente



# Railway station examples

## Lisbon Oriente





# Railway station examples

## Lisbon Oriente





# Railway station examples

## Lisbon Oriente



# **Railway station examples**

## **Rome Tiburtina**

**The Tiburtina station in Rome has been totally reconstructed by 2011.**

**The main goal is to provide a station for the high-speed trains in a through traffic mode instead of the previous head station Termini moreover the station has regional tasks as well.**

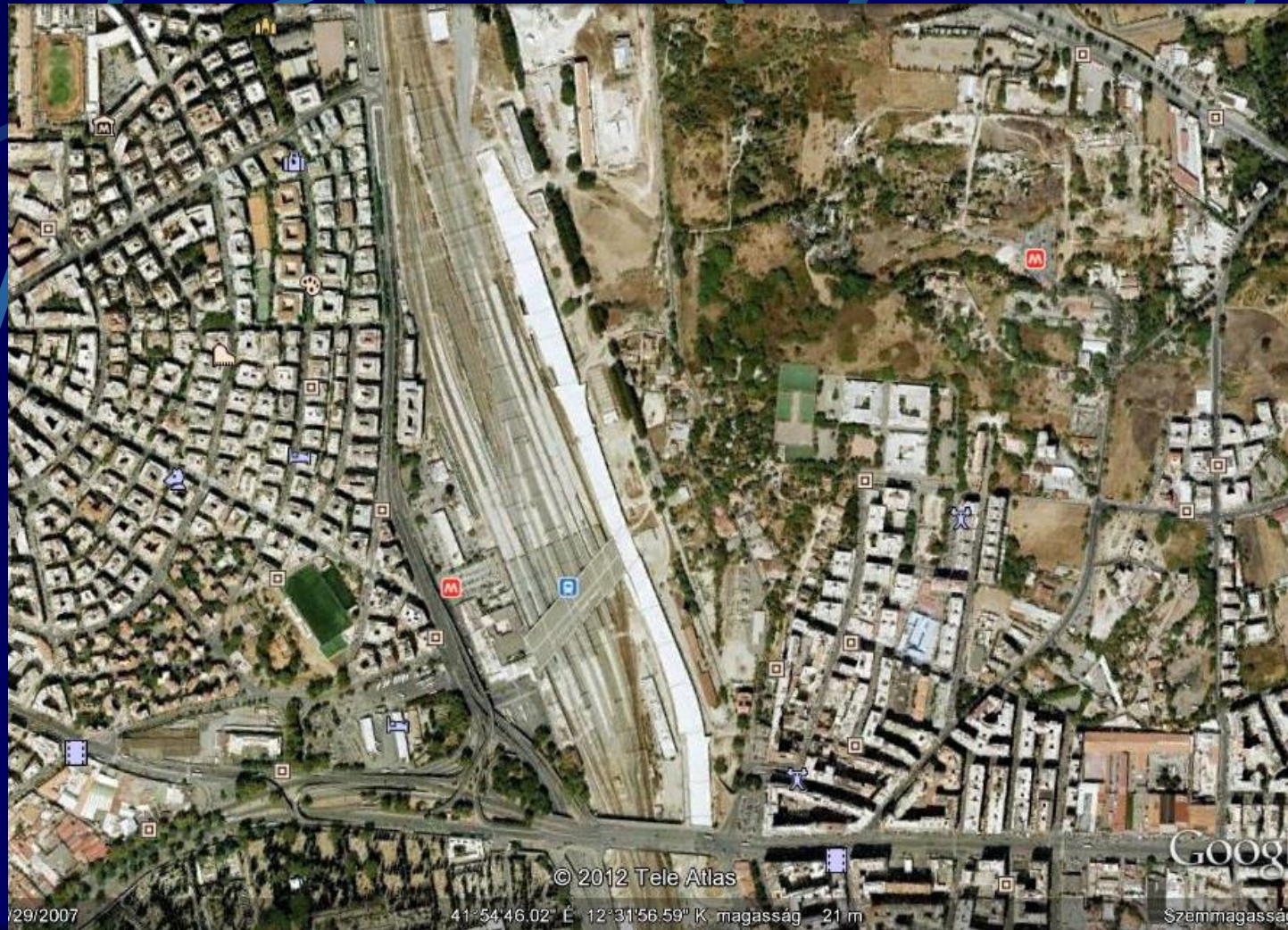
**There are daily 140 high-speed intercity trains and 290 regional trains in the timetable.**

**The surprising bridge-like architectural solution is advantageous for passengers and operation.**



# Railway station examples

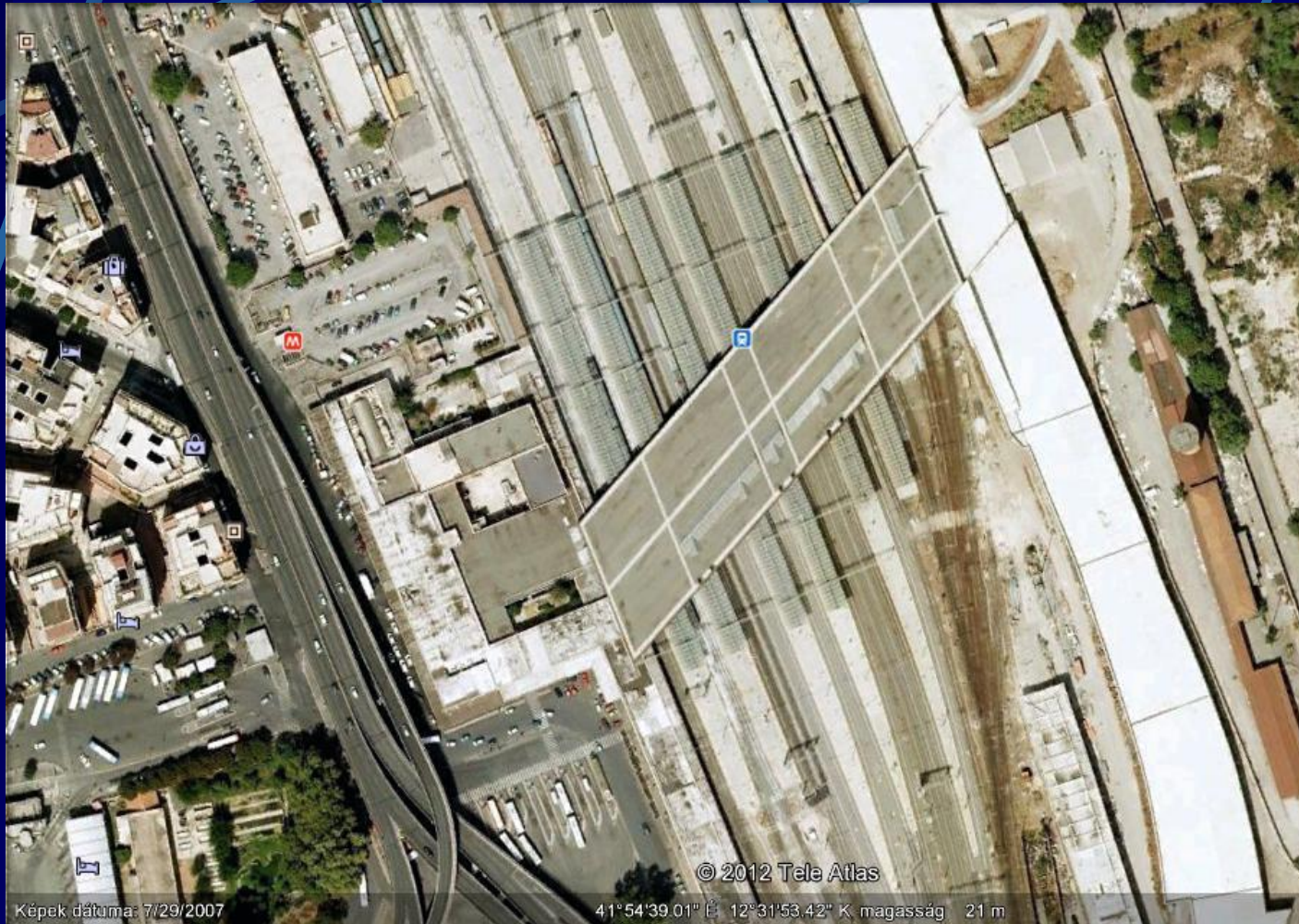
## Rome Tiburtina





# Railway station examples

## Rome Tiburtina



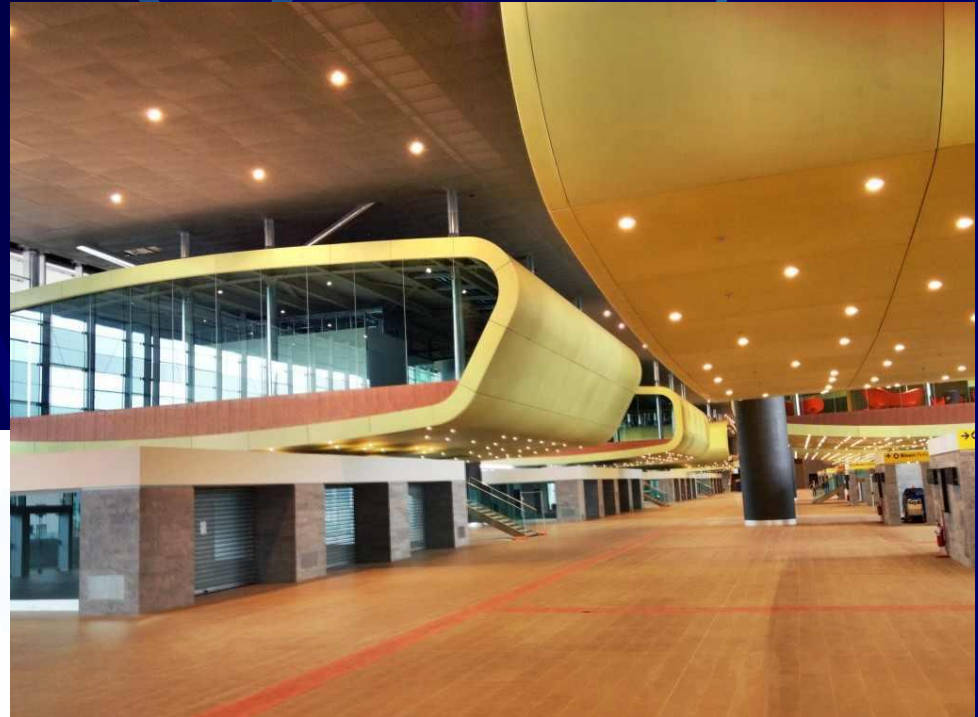
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Képek dátuma: 7/29/2007

41°54'39.01" É 12°31'53.42" K magasság 21 m

# Railway station examples

## Rome Tiburtina



# **Rail traffic as an urban transport mode**

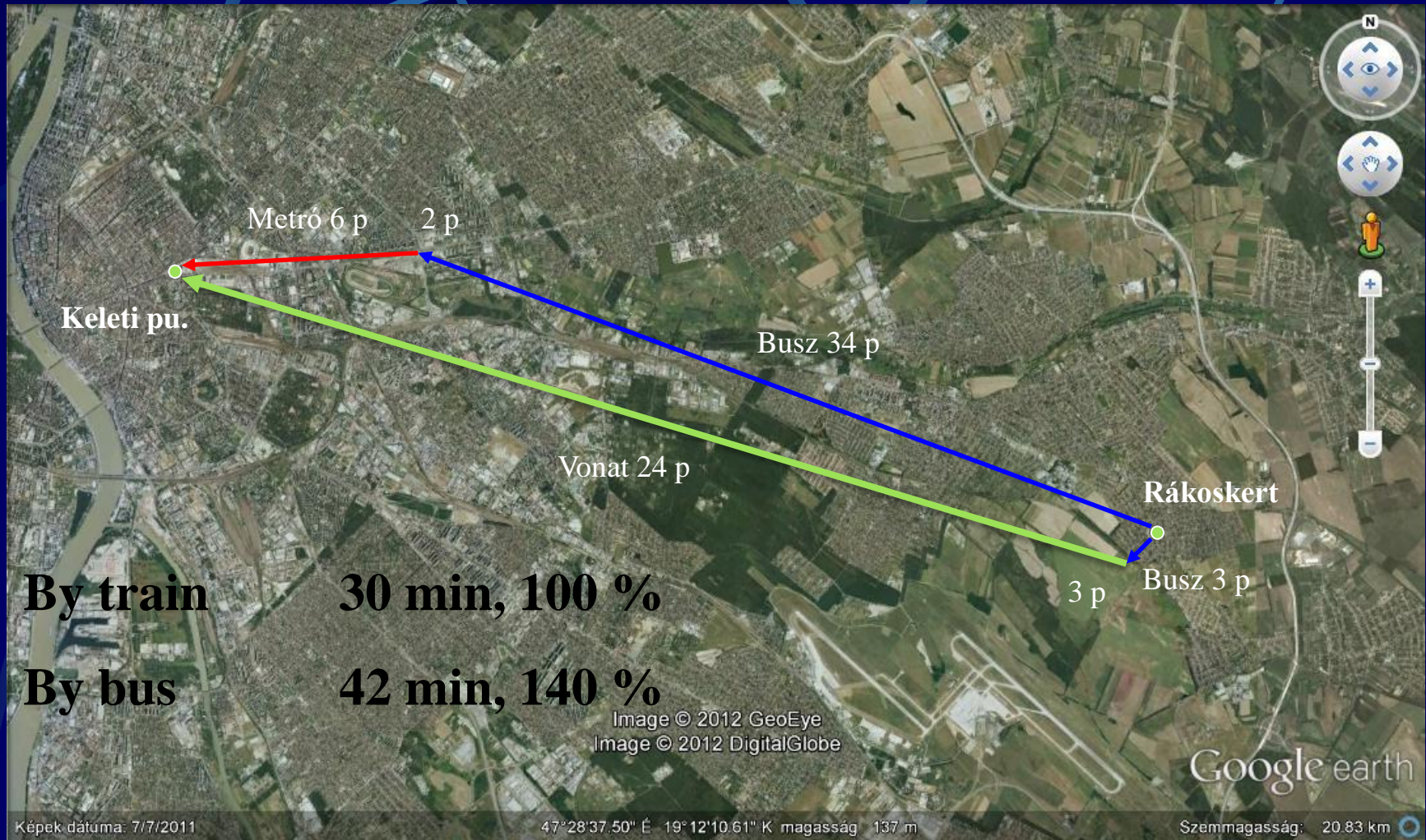
**Railway lines, stations and stops service urban transport demand as well.**

**The S-Bahn concept (originally in Berlin) is the integration of the regional and suburban railway network with urban rail transport connections.**

**The linking of urban head stations under the surface provides a good access to the city centre although its construction requires considerable cost. Even the development of a new central underground station is possible in the centrum.**



# Rail traffic as an urban transport mode



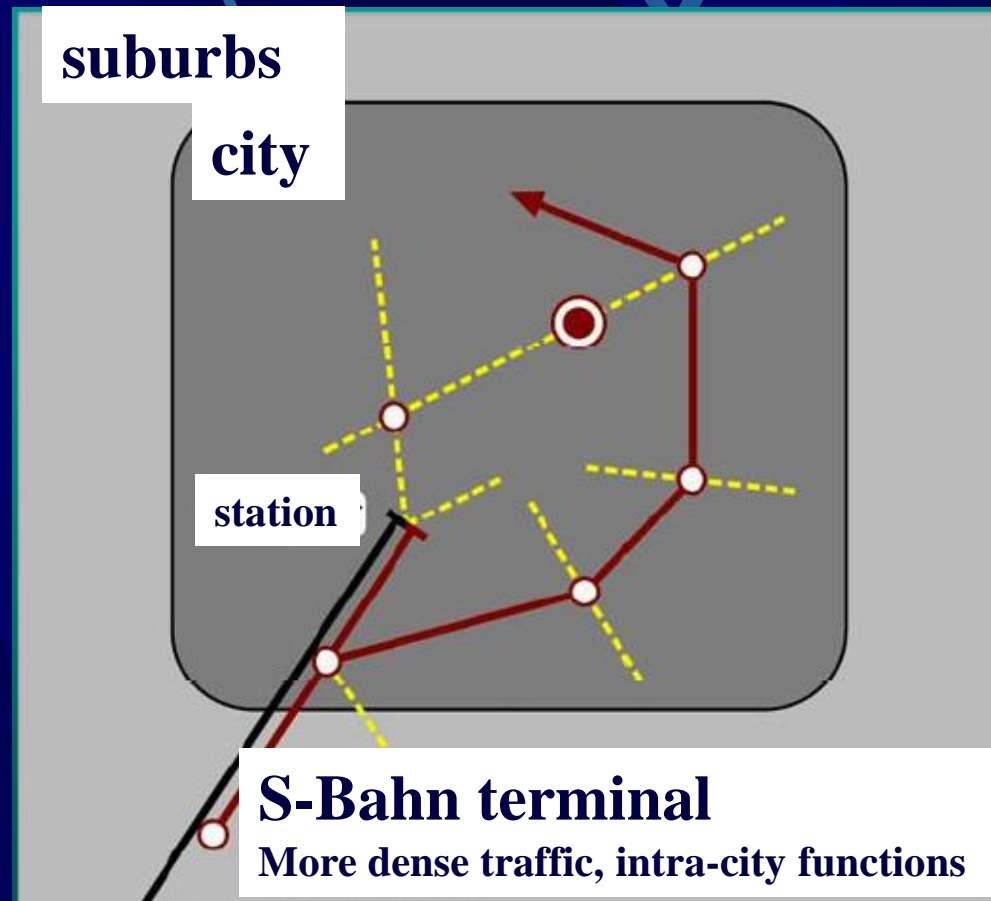
# **Rail traffic as an urban transport mode**

**The S-Bahn system is a part of a complex transport system is more than a suburban transport and more than an urban rail transport:**

- **as part of the suburban transport it serves the traffic between the suburbs, the agglomeration area and the city, connected to the local public transport,**
- **As part or supplementary of the urban public transport it serves intra-city trips because its dense connections to the local and suburban networks.**

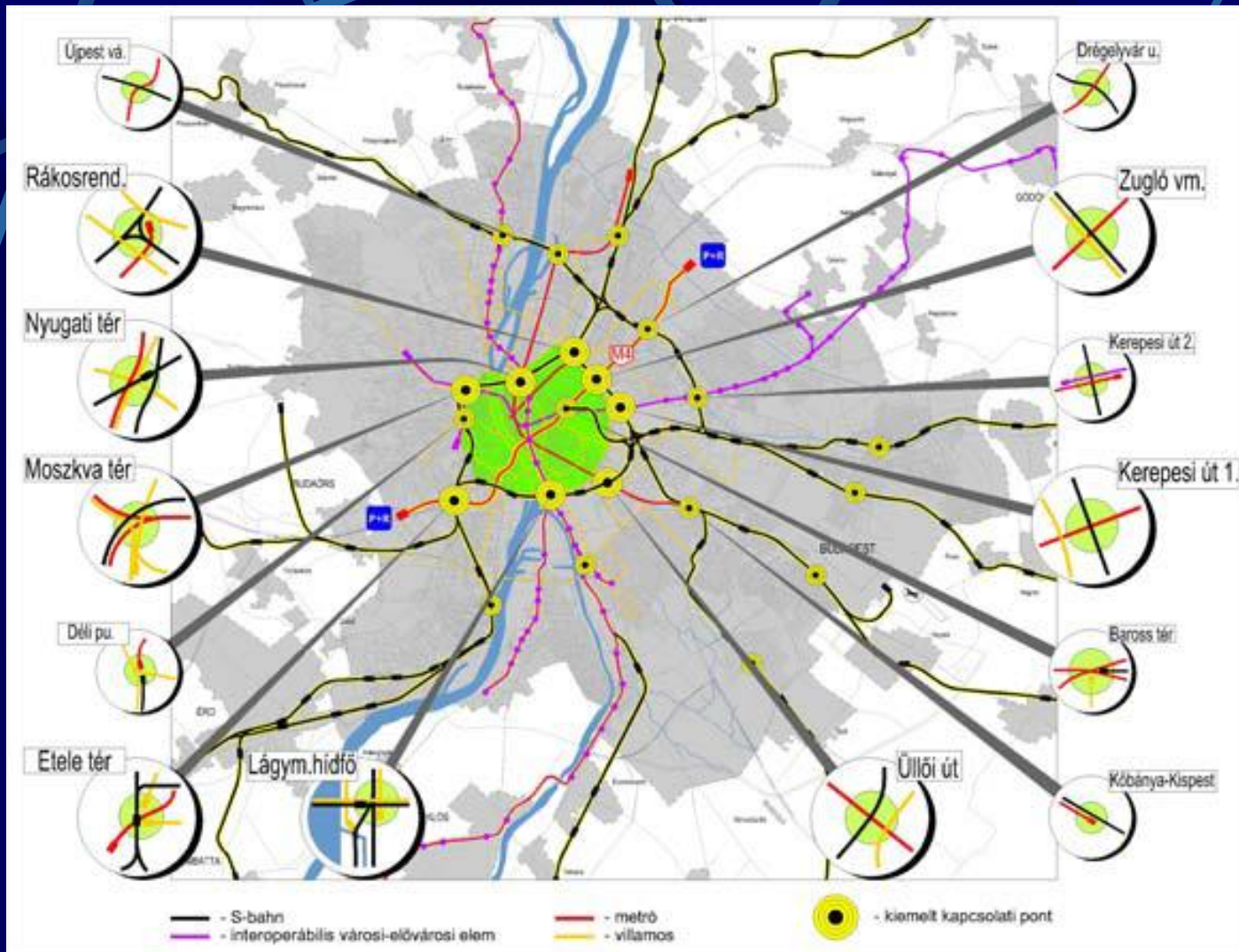
**In Budapest there is a ring railway for freight that could be used for the S-Bahn type development.**

# Rail traffic as an urban transport mode





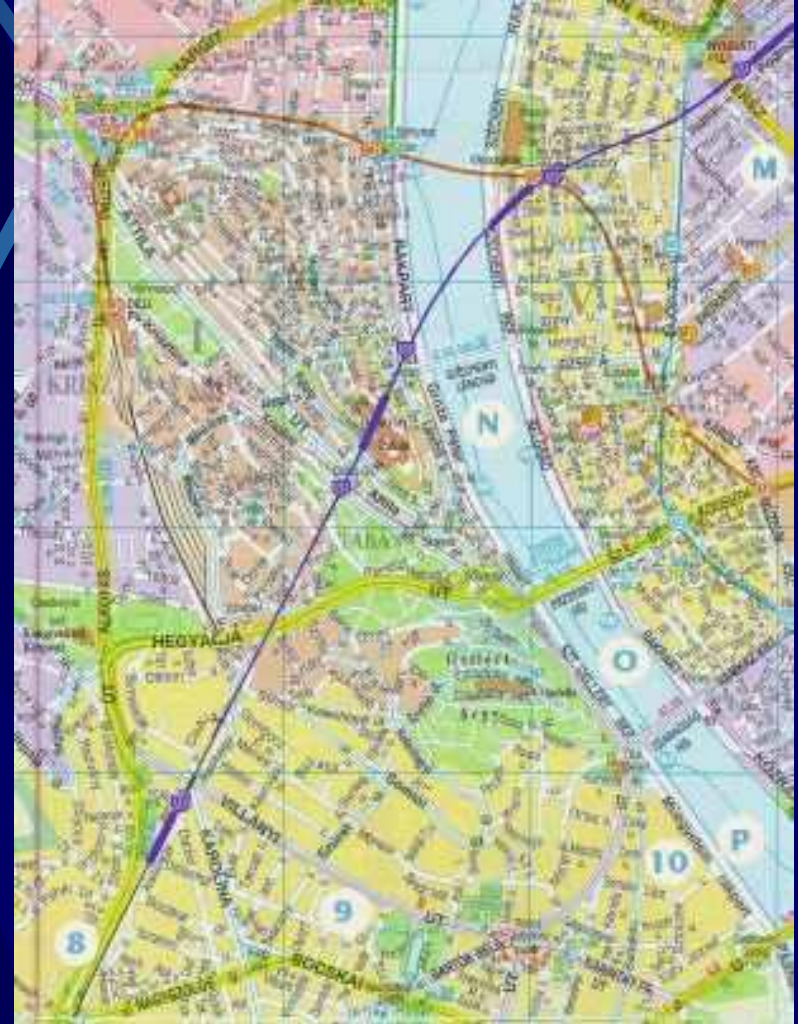
# Rail traffic as an urban transport mode



# Rail traffic as an urban transport mode

The planned underground rail connection of two Budapest head stations (Nyugati and Kelenföld) should provide better access to central areas moreover it may reduce the number of changing passengers at the current head stations.

The diagonal line may even be used for urban trips.





# Rail traffic as an urban transport mode



Brussels – underground rail connection with new central station 23/40



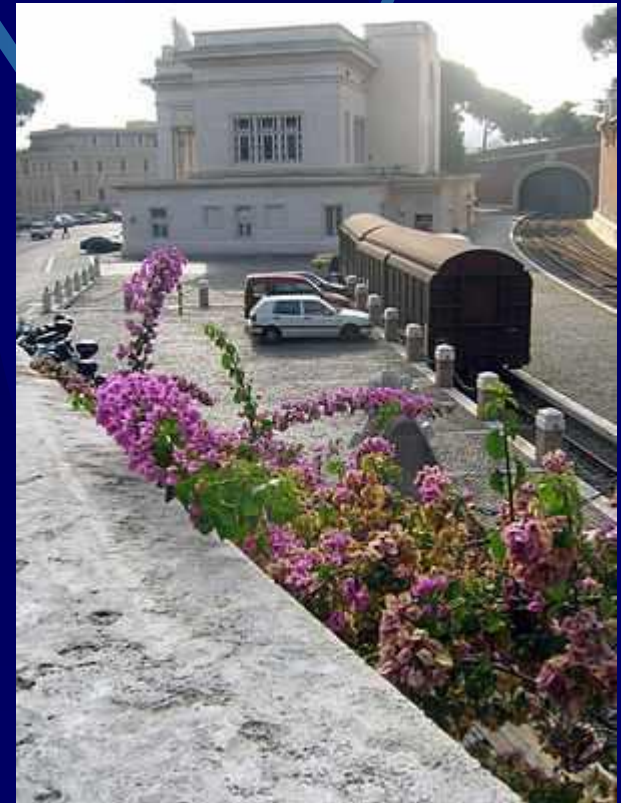
# Rail traffic as an urban transport mode

**The Vatican railway is the shortest line of the world.**

**It was built in 1929.**

**Today it is used for freight transport.**

**Passengers use this railway only in special ceremonial occasions.**



Rome

# Water traffic in urban structure

**There are cities with special conditions built partly or totally „on the water” (Amsterdam, Stockholm, Venice).**

**The water transport may have regular frequent lines providing public transport services (Venice) or it may have a supplementary role (Budapest).**

**In very special cases an urban ferry connection may become an element of the public transport system (New York Staten Island).**



# Water traffic in urban structure



Amsterdam





# Water traffic in urban structure

In Budapest on the Danube there is a regular ship line used mainly by tourists but sometimes it serves as an urban public transport line.

During the reconstruction of the metro line under the Danube there was an official substituting ship service between Pest and Buda.



Budapest

# Water traffic in urban structure

**In New York the Staten Island has 470 thousand inhabitants. The existing bridges provide only an indirect traffic connection to Manhattan. The direct connection is the ferry line in service since 1817.**

**The ferry line is 8,4 km long where 8 ships carry daily 75 thousand passengers. The travel time is 25 minutes. The ships has capacity for 3500 - 6000 persons.**

**On the island there is a P+R parking and a local railway station at the ferry station.**



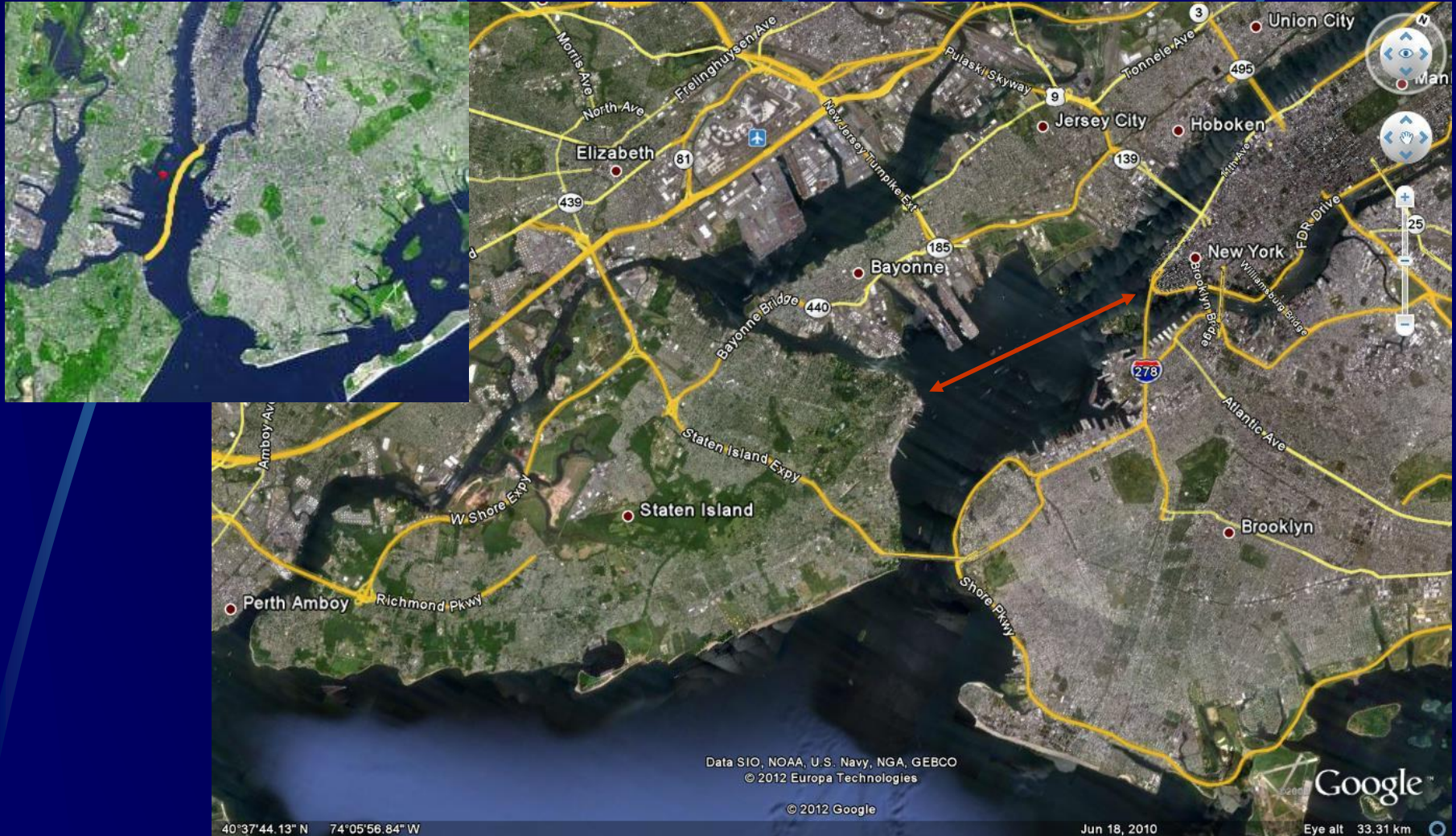
# Water traffic in urban structure

**The ferry travel is free of charge since 1997 although it was earlier a considerable income for the city. The aim of the free use is to reduce car travel to Manhattan.**

**There is no car transport on ferries since 2001 because of security reason.**

**The ferry has got a role in the literature, on films and TV series. Its popularity is so big that even a cocktail has got its name.**

# Water traffic in urban structure



New York Staten Island ferry



# Water traffic in urban structure



New York Staten Island  
ferry



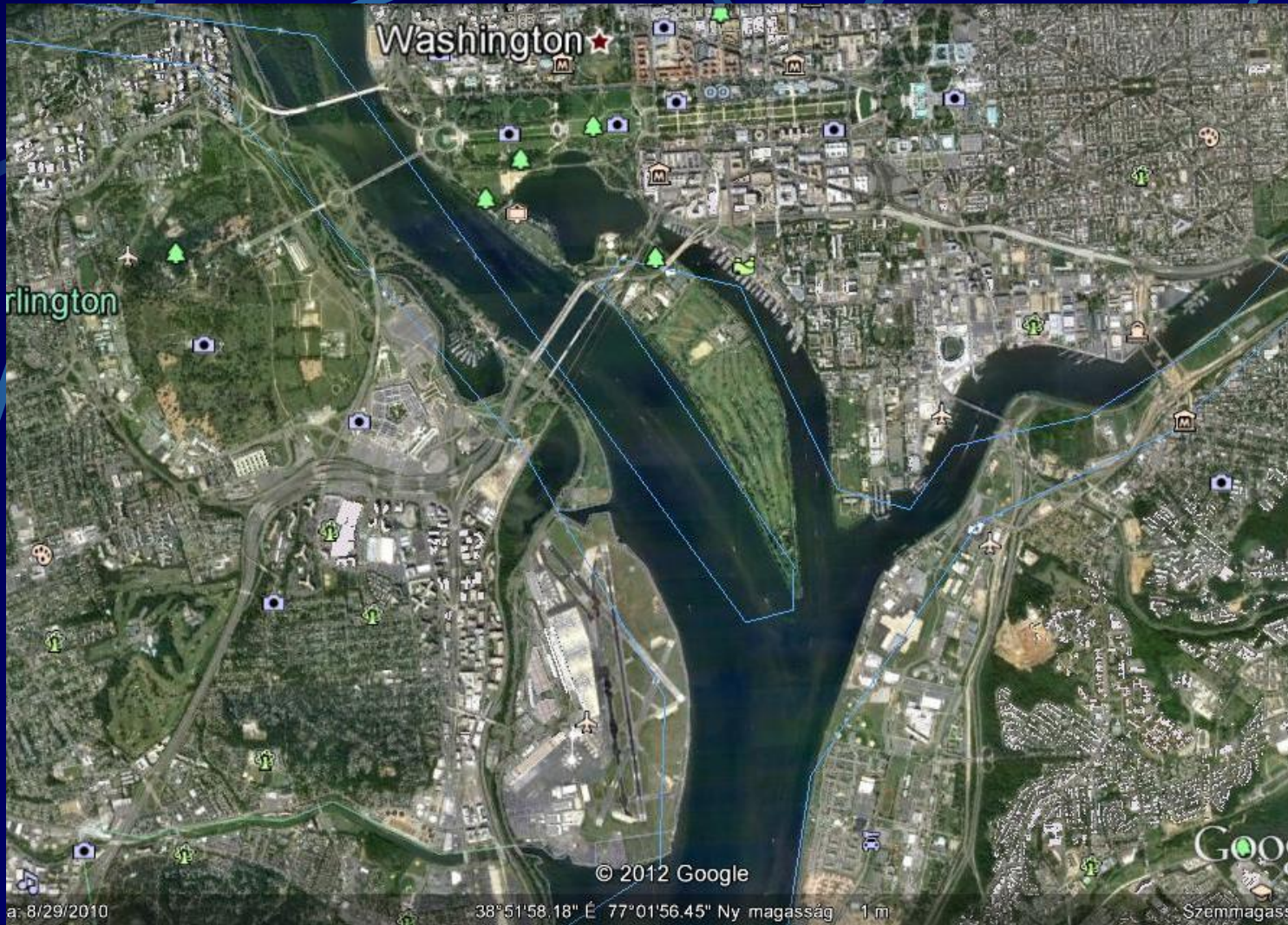
# Air traffic in urban structure

The air traffic is usually kept out of the city areas because its noise pollution. The airport at a large distance requires good transport connections to the city centre both on roads and by public transport, the latter recommended to be a rail system.

In special cases the direct and quick access may compensate the environmental effects (i.e. in Washington D.C. where the domestic airport is only 5 km from the centre).



# Air traffic in urban structure



Washington D.C. – domestic airport in the city

# Air traffic in urban structure

**The airports of the large cities with big passenger traffic can be connected directly into the high-speed railway system or at least to the urban or suburban metro or railway network.**

**The rail connection provides a quick and convenient access to the city centre.**

**A temporary solution is to establish a stop on an existing railway in case of smaller passenger traffic.**



# Air traffic in urban structure



Képek dátuma: 8/1/2009

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75° E 4°25'54.98" K magasság 49 m

Google earth

Szemmagasság: 9.73 km

Brussels – railway access to the airport



# Air traffic in urban structure

**At the Budapest Airport there is a railway stop on an existing line near to Terminal 1 with a pedestrian overpass where even intercity trains stop.**

**Unfortunately Terminal 1 has been closed a few years ago. Terminal 2 can be reached only by bus from the railway stop.**

**There are recent plans to construct a direct rail connection to Terminal 2.**

# Air traffic in urban structure

Budapest – railway  
stop at Terminal 1





# Summary

**The railway represents an important urban forming power by its lines and stations.**

**The big intermodal railway junctions have got an urban structural role together with suburban bus stations and other public transport modes providing synergic effects co-ordinating the demand and possibilities.**

**The water transport may have regular frequent lines providing public transport services or it may have a supplementary role.**

**The airport at a large distance requires good transport connections to the city centre both on roads and by public transport, the latter recommended to be a rail system.**

Thank you for your attention!

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