

# METRÓ 4

Hírlevél

BKV Rt. DBR Metró Projekt Igazgatóság  
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DBR



METRO

## Metro 4 is needed!

May I welcome you on the occasion of the appearance of our first issue. Purpose of our publication is to provide information on the reasons and construction details of the new metro line, and that independently of politics, on professional bases. In our periodical we would like to present the content of this project, as well as the plan of surface rearrangement and transport changes related to metro construction. We also would like to mention some tenders being under way and construction progress. In other words, everything related to the new metro line of Budapest.

It is perhaps surprising that we would like also to tell some details of construction despite of uncertainties. But we do believe that the new metro will have been completed. Since we have no other possibility. Otherwise we can hang out a sign within a few years at the city entrance: "Full house". And it is in nobody's interest.

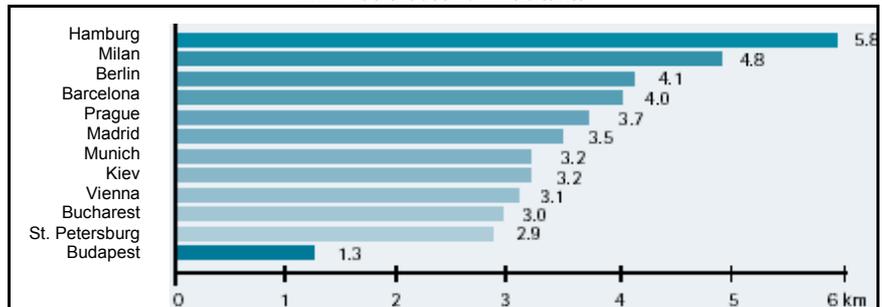
When raising the issue of metro implementation one should not forget about one thing. Metro construction is not just a target, it is a tool. It is a tool to find a solution for the traffic situation already critical in South Buda and, in this context, in the whole Budapest. And a solution for the long term. Not only for five or fifteen years, but for decades ahead. There are some opinions even today that the situation could be resolved at a lower cost by surface developments. We wish it was true! Unfortunately, it is not. Development of the surface transport itself can only provide a short term solution. Even its costs seem to be lower only for a short period. In the long term, metro is more price efficient.

But what is actually the undoubted advantage of metro with respect to other public transport means? This is the only up-to-date means that can transport passengers in a fast and safe manner and with high capacity. It does not disturb, moreover, even reduces surface congestion, it is not harmful to the environment, it does not affect city image. Its operation is independent of weather conditions and of surface traffic difficulties. It can represent a comfortable and real alternative for those travelling by car in the surroundings. Investigating any other surface possibilities, one of these aspects are not met. Taking the case of a separated tram track, its alignment may form an uncrossable obstacle on the surface. The construction of a high track railway is technically impossible in this area and, in addition, it is not advantageous for city image.

More than this, it would cost about as much as the metro. By increasing the existing frequency of vehicles, traffic jams would become permanent. One cannot construct any additional streets or roads in this area, because no more place is available. Even if approaching the issue from any other direction, the answer is definite: metro has no alternative whatsoever.

According to the contract concluded, the costs are covered by the Government and the Municipality of the Capital City in a 60 to 40 percent ratio. Accordingly, the Government will spend 38, the Municipality 25 billion on the investment. For the rest of expenditures long term credits of favourable interest rate will be taken up. Of course, this is still a lot. And in some form or other the metro will be constructed using the tax payers' money. But it will be an investment with returns within 20 years under international calculation methods. And this is not a long period for such an infrastructure project. Taking e.g. the metros in London, Porto or Barcelona, their financial rate of return is half as good as for Metro 4.

Metro network in some European cities of size similar to Budapest  
km / 100 thousand inhabitants



There is one more aspect that was barely discussed so far. This is its economy boosting and area developing effect. Since metro is more than merely a new transport mean. Domestic and international experience can prove that new investments are attracted and the price of the estates in the area is increased by it. This cannot be expected from any other surface transport means.

But what is the price of metro construction? In 1966 it was estimated to be ECU 514 million. At current price level it amounts to about HUF 133 billion.

We have many times listed our arguments supporting the metro. It seems that we need to repeat again and again our professional reasons. Our opinion is that discussion can be carried on only on professional bases. Ignoring them, the discussion turns inevitably into political philosophy. But our target is just the contrary: to provide correct and professional information on Metro 4 based on facts, which would be an investment playing a crucial role in the Capital City's life. That's why we truly hope that we can give you a comprehensive overview on the preparation, development of this huge project by this periodical titled "Hírlevél".

László GULYÁS

Project Manager

## What is the alignment of the new metro line?

We have known for decades that the new metro line should connect South Buda with the city centre and, in a next phase, with East Pest. It is a difficult question, however, what kind of alignment should be used. In the design we considered financial, urban development and transport aspects.

Several decades ago there was a concept stating that the metro will start in Budafok. However, following the construction of Motorways M1–M7 city development was more intensive in the direction of Budaörs. Housing estates of Ómező and Gazdagrét were constructed, thus, about 60 to 70% of the traffic from South Buda towards the city centre arrived from this direction. In addition, the south-west urban agglomeration was exposed to the most dynamic development in this area, as well. Simultaneously, Budafok area lost of its significance, and its incoming traffic can hardly represent about 35%. At the same time, the surface transport situation of the Budafok area is in a better situation than in Budaörs. Several high capacity roads are leading in this direction, among others, Budafoki út, Szerémi út, Fehérvári út and Tétényi út. Whereas, there is only Budaörsi út near the approaching section of motorways M1 and M7. In recent years the traffic load has multiplied but no additional transit road can be constructed any more due to topographical characteristics of the region. The hills of Buda, especially Gellért, restricted the possibilities. A huge crowd advancing towards the city centre can actually use only Bartók Béla út. This road has reached the limits of its capacity, it cannot face anymore this increased traffic. Consequently, it has become obvious for experts that the future metro line should primarily serve the Budaörs direction with its higher number of population.

But the issue of where exactly the alignment should be and where to set out stations is much more difficult to decide. One had to consider arguments of economy, urban and transport development. However, there were several definite starting points to select. Among others, the new metro line should intersect both Metro 2 and Metro 3. It was clear that Danube crossing should occur somewhere around Erzsébet bridge and Szabadság bridge. No more southward from this point, since tram line 6 is able to satisfy existing demands across Petőfi bridge. When setting out the alignment one had to make sure that it would be possible to extend the line whenever necessary, namely towards Budaörs, on the one hand, and towards north-east, i.e. Rákospalota, on the other hand. When designing the downtown section it should be considered that the existing traffic is the most intensive in Deák tér, at Astoria and in Ferenciek tere. Consequently, the new line should be routed to approach these junctions, but not to increase their congestion.

According to such considerations the experts had prepared several versions, which were investigated in respect of expected traffic flow, costs, impacts on transport network and area development. There were versions that had to be rejected because of their technical risks at certain sites. This was the case of Blaha Lujza tér station, where most of the parameters seem to be optimal out of transport viewpoint.

However, there were severe geo-technical and, consequently, static problems in this square, which could hardly be avoided at the earlier metro construction. In other words, the construction would be complicated, risky, that is why it would also prove to be extremely expensive.

In other situations arguments of area development proved to be decisive. There was a version of the alignment that would have reached Keleti pu. by touching Astoria then crossing Terézváros and Erzsébetváros. This version would have had a similar transport impact as the accepted version, however, some urban development factors justified the version through Józsefváros. The new metro line will enable revival of this area, it will promote investments and open new resources for this area. The Józsefváros version was also supported by another argument, specifically, to provide the Kőbánya area with a better transport connection than before. Thus, the trams coming from Kőbánya will ensure a direct possibility to change for Metro in Népszínház utca. The new line will also release Örs vezér tér, since most of the District 10 inhabitants should now go to Örs vezér tér to find a metro connection. The multiplicity of the factors in selecting a final solution is proved by the fact that minor amendments were made even to the last version. Following the decision that the bus terminal would be moved from Kosztolányi Dezső tér to Etele tér, the future metro station was moved to Bocskai út and it seems to be more advantageous.

Preparation of Metro 4, selection of its alignment was a difficult and complex duty. A huge amount of viewpoints, sometimes contradictory, had to be considered and harmonised with one another. We are persuaded that the metro line of 7.34 km length and 10 stations in important transport junctions will fulfil related expectations. Indeed, it will offer the best solution for most of the passengers, it will solve the transport problems of the capital city at the lowest price and to a maximum extent.



## What has happened up to now?

Despite of the well known circumstances, the preparation works for Metro 4 have not been suspended. Several hundred experts continuously work to ensure commencing metro construction without delay after the settlement of financial issues.

Metro has been completed on paper, since a consortium headed by Főmterv Rt. prepared one of the most important design documentation of the new metro by the end of the previous year, specifically, a Railway Authorization Design. This document, filling several shelves, contains all the essential data on the new metro line: from specifications related to metro operation through the mechanical configuration of stations to the re-organisation of surface transports. This week the official authorisation of the design will take place. The design documentation will be presented in details in our next issue. However, dozens of other preparation works are required for the preparation and future implementation of the design. Just to mention the most significant of them: preliminary environment impact study, complementary geo-technical, engineering geological and hydro-geological expertise, geological expertise and geologic survey of the line section under the Danube, and the condition survey of the buildings near the alignment. Some of these works had already been prepared in relation with the feasibility study, some other ones later, directly connected to actual plans.

### Geotechnical Surveys

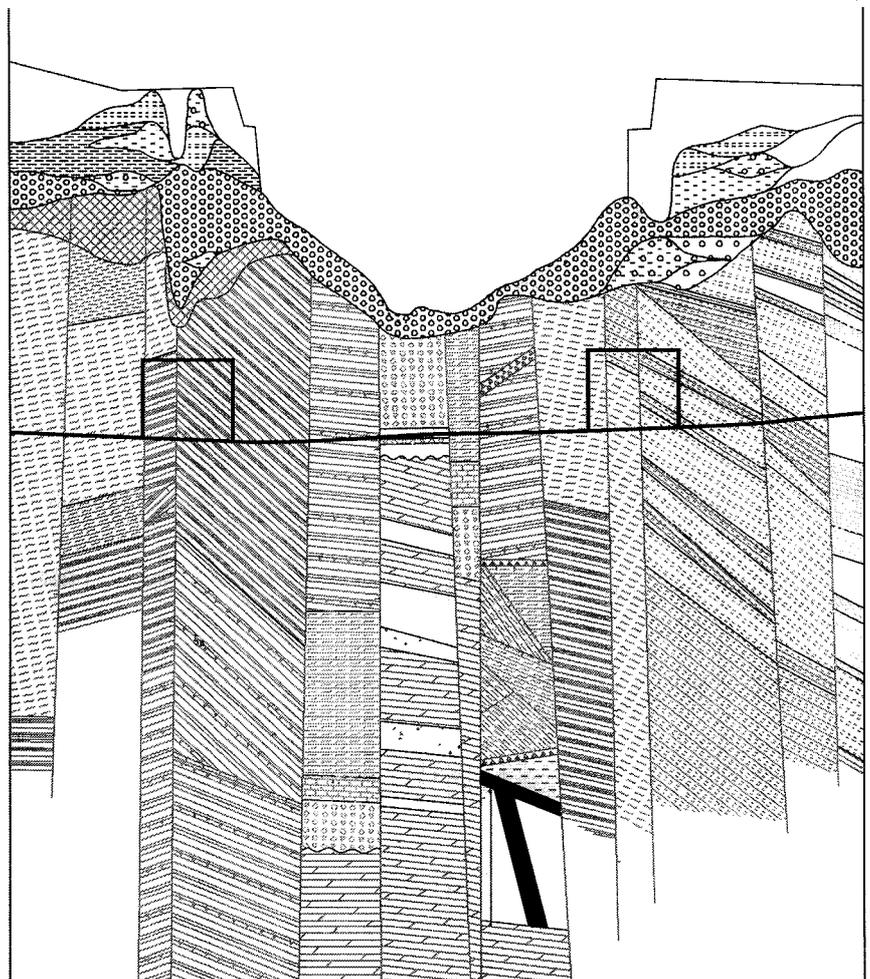
During the preparation of plans, in order to set out the alignment and to select the most proper building technology it was necessary to carry out geological surveys. The results contributed to the decision on what depth would be the safest for the tunnel alignment. Stratigraphical tests served as the basis of suggestions on construction methods. The two applicable methods are shotcrete technology and up-to-date shielding. However, a disadvantage of the latter is that it is more expensive, i.e. only foreign companies could carry out such works. Whereas shotcrete technology is cheaper, more popular and many domestic experts are familiarised with it. However, this technology can be used for tunnelling only in solid and dry soil. Loose soil structures and sites require shielding technology.

### Trial Boring in the Danube Bed

Test results in the Danube bed provided answers to many questions also discussed by the public. Among others, the issue of what would happen to the medicinal water springs of Gellért hill. Some were afraid that metro construction may endanger these thermal springs of Europe-wide reputation. However, surveys revealed that there is no reason for concern. With appropriate planning, proper construction all harmful influences can be prevented. Thus, we can avoid karst waters to get mixed up with Danube water, on the one hand, and prevent the increase of the waste leakage of medicinal waters, on the other hand. By means of up-to-date construction technologies one can significantly decrease the risk of water ingress, and possible cracks can also be eliminated immediately.

In addition, the experts carrying out such surveys identified those sites along the section concerned where special attention should be paid to the construction because of crack systems, rock stratification or the vicinity of thermal springs. The conclusion is that the mixing up of medicinal waters with Danube water is extremely slight. Another possible problem is the waste leakage of karst waters, i.e. the erupting medicinal waters are dispersed rather than gathered at one point, in the reservoir. But this problem is independent of metro construction, since surveys revealed that such a phenomenon currently exists: a large amount of unused karst water flows into the Danube through spouting springs. As for metro construction, the only thing we can do is not to increase the extent of wasted amount any further. This is guaranteed by the scrupulous survey performed by experts, a detailed geological map, comprehensive professional analysis and carefully selected construction technology.

Geological Section Under the Danube Revealed by Trial Boring



### Environmental Impacts: Air, Noise, Vibration

Surveys have been carried out on the expected change in air pollution, environment noise and vibrations. Starting from the existing status it was investigated what would be the situation in 2010 with the metro line, on the one hand, and without any metro, on the other hand. Investigations also considered the hypothesis of a final rejection of metro construction or maintaining the possibility of construction for a long term. Investigations belonging to the preliminary impact study definitely proved the necessity of the new metro. Prior to presenting the situation following the start of operation, the by-effects of the period of construction should be mentioned. This is the time interval when despite all arrangements and careful organisation environmental damages may increase. Congestion due to traffic restrictions and diversion will certainly increase air pollution as well in this area. The surroundings of construction sites will be more noisy, and inevitably vibration will also increase. In return, all the unpleasant effects will end upon the completion of metro construction and an environment condition better than the current one will dominate. Positive environmental impact of the metro is very significant mainly in respect of noise protection. Noise levels will suddenly decrease in built-in areas, where otherwise it would be impossible to improve the situation.

Thus, a significant noise reduction can be expected in Bocskai út, Móricz Zsigmond körtér, Szt. Gellért tér and Kálvin tér. The impact can be beneficiary in vibration aspects as well. Vibration will be much lower due to the removal of trams lines 47 and 49. The new metro will not increase the vibration in the surroundings since it will run on a flexible substructure, which will only transmit minor vibrations to the surface. As for air purity, metro operation will definitely improve the current situation, especially at locations with currently intense public transport. Thus, one can expect improvements around the following stations: all stations between Bocskai út and Fővám tér. It is true that there will be no change at certain locations, moreover, a slight worsening cannot be ruled out. The traffic will be higher around those stations where the passengers arrive by car, consequently, it will also increase air pollution. This applies mainly to the terminal in Etele tér and Tétényi út. Some kind of increase can also be expected in Köztársaság tér.

### Built In Environment

The preliminary impact study investigated about thirty other aspects. The impact of metro on the soil and various underground and surface waters all along the metro alignment have been analysed. Some botanical and zoological studies have also been prepared.

Consequences on the built-in and social environment have been investigated, namely effects on health, public safety and tourism. The study dealt with the buildings, utilities, bridges and roads along the alignment. A list of the historical buildings that require "special measures" has been prepared. This issue was studied in details in the autumn of last year. A special public procurement tender procedure was issued on the survey of building condition. This survey was carried out in a band of about 150 m width along the whole section, involving more than 12 thousand flats. The aim of this condition survey was double: in the first place, identifying the buildings requiring reinforcement or other construction technology to be applied in order to prevent the setting of buildings. Secondly, this survey was also intended to clearly demonstrate any possible damages following construction. Video and photo documentation, as well as written minutes have been prepared on the flats and buildings inspected.

Geologists, structural engineers, architects, hydrological, environment protection and economic experts have worked for months with maximum efforts. Their work resulted in a study material of several thousand pages. This rather comprehensive preparatory work is the guarantee for constructing a safe, economical metro while preserving the natural and built-in environment to a maximum possible extent.

CONTRACTUAL PARTNERS OF DBR METRO PROJECT MANAGEMENT	
Activity	Contracting Partner
<b>Consulting companies employed until Project completion</b>	
Consulting services in project management	Eurometro Kft. (Joint Venture of Eurout-MÁV-OTP Ingatlan Rt.-Louis Berger)
Financial consulting services	KPMG Hungária Kft.
Legal consulting services	Gárdos, Benke, Mosonyi, Tomori Lawyer's Office
Public relations services	Sawyer Miller Group – SKBH Kft.
Translation, interpretation	Homonyik Senior and Junior Kft.
<b>Consulting companies employed for individual major activities</b>	
Licensing plan for railway authorities	Consortium of Főmterv Rt., Uvaterv Rt., Mott MacDonald Ltd.
Preliminary environment impact study	Mélyépterv Kultúrmérnöki Kft.
Condition survey of buildings and documentation	Consortium of UTIBER Kft. – ÉMI Rt.
Survey of the Danube bed; technical and other specifications for shipping contractor	Hídépítő Speciál Kft.
Geological and hydrological surveys	Geovil Kft. – MÁFI – BME
Geodetic survey	Hungeod Kft.