



A decision waited for long time has been taken: Metro construction can start

Nearly two years have passed since the decision of the Municipality's General Assembly: they shall contest the Government's dismissal notice and in parallel to this they shall resume the preparation of Metro 4. The legal actions always resulted in the Capital City's victory, however, the time is fatefully running out. That's why the experts involved prepared such alternative suggestions, which might enable to commence Metro construction as soon as prior to the final settlement of legal actions.

For experts it was obvious that failing to start metro construction within a short deadline there is a risk to increase the time loss of 2 or two and half years to as much as 4 or 6 years, which would jeopardise the usefulness of all expenditures carried out hitherto. The purpose is quite clear: to construct Metro 4 as soon as possible. At the same time, the reality persists, namely that the Municipality alone cannot face the construction of such a metro line without the contribution by the State with its previously in contract assumed financial share and credit guarantee. Thus, such an alternative solution was required which can promote the soonest possible metro construction by rescheduling individual tasks and, in parallel, enable certain projects to carry out belonging to surface traffic and public transport, which had been postponed exactly because of metro construction.

Besides transport and urban development considerations, also economic arguments support the soonest possible metro construction. This is because the interests of the provisions of insulated liabilities for metro constructions always exceeded the inflation rate of the project all along this period. Finally, the trend seems to change, and a soonest possible utilisation of sources is recommended. In addition, the priorities thus given to surface developments may have indirect benefits, too. Road maintenance costs will be lower, and environment protection will be more effective.

The authors of this suggestion considered three main viewpoints in preparing feasibility versions. Their first and most important objective was the soonest possible metro construction. But also the availability of financial sources and a realistic technical scheduling were decisive.

Realistic alternatives

The experts carried out calculations, whether the Capital City would be able to construct by him alone a short section – comprising 5 or 7 stations – of the Metro line 4. Investigations revealed that it would be possible in the most necessary situation, at least between Keleti pu. and Kálvin tér, as a temporary metro station. Of course, such a project should be organised in such a manner that in case of an eventual change of position of the Government, metro construction can be continued according to initial projections – including all 10 stations.

At the same time, this version would leave an extremely narrow range of motion for other financing commitments of the Municipality. That's why the experts had developed some alternative proposals based on another projection, which were presented – together with the previous ones – to the Municipality's general assembly on August 31, 2000. Among them, alternative 'C' was suggested to be accepted, the essential features of which can be summarised in four points:

- Implementing certain surface works of pressing necessity until the full construction phase of metro.
- Constructing some structural elements of the future stations, which could not be prepared later but with considerable surface demolishing.
- Buying the vehicle shed in Kelenföld by the Municipality and commencing area preparation.
- Continuing metro project, preparation of plans and licensing, as well as the preparation of a tender plan.

In the frame of this program, the metro stations in Móricz Zsigmond körtér, Szent Gellért tér and Keleti pu. (= railway station), cut-off wall and floor construction for the pull out tunnel in Thököly út, as well as change connection with Metro 2 in Baross tér will be completed. Among surface development works, a complex renewal of the Bartók Béla út section between Szent Gellért tér and Hamzsabégi út, rebuilding of Móricz Zsigmond körtér and Szent Gellért tér will be completed, including some associated subway systems. Besides, the area of the vehicle shed in Kelenföld will be purchased and surface development commenced.

Benefits of Version 'C': Comfort, Rationality and Fastness

Due to such advanced surface developments, the areas concerned will have the possibility dynamically to develop, thus, their life will become more safe and comfortable. In addition, the sources can be used by the Municipality in a more reasonable manner, since the area will be arranged nearly to such an extent as the final status, and the surface should not be open again at construction start. Also the reception of completed metro line can be advanced thereby, since construction works can be commenced before any final decision at the Court.

(Just as an intermediary remark: in our opinion, the Court will decide for the Capital's favour, as hitherto, even in pending cases. The claim of Budapest is clear and justified; we are deeply persuaded that the Court's decisions are passed exclusively on legal bases.)

The costs of Alternative 'C' amount to HUF 30 billion only, including all the expenses already fulfilled, and no credit whatsoever should be taken up. It can be funded from the 7 years' development plan of the Municipality and the insulated provisions for expected liabilities. Together with the investments mentioned, the total costs of metro construction and surface developments are HUF 246 billion on current prices.

This is a huge sum, moreover, by about 70 billion more than in case of having commenced metro construction in 1999, according to the original schedule. In what a manner can the Municipality be compensated for this damage, it is the Court's duty to decide. But one thing is

undoubted: elementary interest of Budapest and of the country is the soonest possible construction of the Metro. By failing it, both the Municipality and its population may suffer the loss of a dynamic development of Budapest.

And this can be nobody's interest. That's why it is a big happiness for us that metro construction can – finally – be commenced as the result of the general assembly's decision, even if considerably later than the initial projection.

COSTS DATA OF ALTERNATIVE 'C'

Activity	HUFm (VAT not included)
Main structural elements of 3 stations, subway construction, utility substitution	12 698.8
Design, licensing, licensing by building authorities, preparing of tender documentation and organisation along the whole line (including previous expenditures)	7 606.2
Purchase and preparing of vehicle shed	3 101.1
Construction and development of a road surface of about 195,300 sq. m. (reconstruction of the utility network, road and sidewalk construction, track renewal, green area development)	6 791.1
Total	30 197.2

Up-to-date methods – less discomfort

The life may not be stopped in congested downtown streets for the period of metro construction. Today, it is inconceivable to close several streets or squares for a long period like it had been ten or twenty years ago. During the recent years such up-to-date construction technologies were developed, which will enable the constructors to disturb surface traffic much less than previously. The same techniques will be applied in Budapest, as well, and the construction of Metro 4 will cause much less discomfort than any similar previous construction.

A lot of experience have been cumulated in those countries where metro network is being continuously constructed, and environment friendly construction technologies suitable for city central zones developed. Such a construction technology is the "Milan Method", in Germany the "Deckel Bauweise", i.e. construction under top floor, or the "Top Down" construction in English. The terms may differ, but the method itself is the same. Essential of such technologies – in case of the construction of a metro station, underground garage or any other underground facility – is that the side walls of such structures are constructed the first, then the top, and the construction of underground spaces can be continued under floor, with a minimum disturbance for environment and surface life.

As mentioned, the side delimiting walls are constructed the first. This structure delimiting work pits will be constructed

by cut-off wall and palisade technique. The palisade or "rank of piles" is such an underground structure the work pit of which can be prepared with special machines and cutting off technology. Wall thickness is insignificant with respect to wall depth, thus, the pit produced is of gap character (logical basis of the Hungarian term: "Gap Wall"). The driven piles form such an underground structure implemented by boring technologies, which require large diameter holes prepared by special boring machines. The holes are usually protected by sleeve pipes against caving in. Earth is removed through these sleeve pipes with proper tools. Following the proper depth, the reinforced concrete structure assembled by welding according to hole size, the so called "armature", will be sunk, then poured with concrete under a continuous a simultaneous redrawing of the sleeve pipe.



At some locations, their grade of building in does not enable any cutting off technology due to the large span of stations. Bevelled palisade methods had been developed just to overcome such problems. Essential of this method is to sink large diameter piles from the axis of streets, intersecting with each other and directed outwards. Station structures made in this manner are narrow at the top and larger and larger downwards. Consequently, platform width can meet requirements, but the surface will be disturbed to the least possible extent.

The solutions tested in the west can also be applied in our case

Alignment of Metro 4 had been established with the consideration to place metro stations under squares or large streets. In this manner, the stations can be constructed near to the surface, which has multiple advantages. The first and most important is the comfort of passengers, since the platforms can be accessed faster. Another viewpoint is that the stations can be built from the surface, since there is no building above them. This enables a significant reduction of construction prices. Seven stations out of the ten stations of the first section will be fully built with open palisade or cut-off wall method, and another two stations partly with such a method, respectively.

Stations constructed along several phases

The up-to-date "Milan Method" is quite suitable for the construction of "Box Stations" for Metro 4. The phase comprises the construction of cut-off walls or palisades delimiting stations. Although there will be certain restrictions in surface traffic during this phase, however, it will be maintained in one lane in order to enable the access of living houses, stores, the motion of ambulance, fireguard, supply and public sanitation vehicles. Utilities will also be substituted phase by phase in order to enable trouble free supply.

Following the construction of cut-off walls or palisades the top reinforced concrete floor will be constructed. This will give place to the final utilities and surface development can be finalised, too. This is the only construction period in which the population must directly tolerate any dust, noise and various other discomforts.

Thereupon, station construction works are resumed under floor. The earth is removed from under the top floor by mining methods through a special earth removing opening or a transport tunnel constructed somewhat farther. The openings can be closed for night period, consequently, the works in station areas can be continued overnight.

A disadvantage of the earth removal under floor is low work rate, on the one hand, and lighting and aeration requirements in the work pit, on the other hand. However, an extreme benefit of it is that the traffic should not be restricted for months or even years, or that the residents of the area can live under less noisy and comfortable conditions.

Several up-to-date auxiliary building structures and technologies have been developed all over the world, which can be applied in the construction of underground engineering structures and metro stations. By adopting such technologies we will be able to face all the problems seeming as impossible to solve hitherto. In the tenders to be issued for the construction of Metro 4, investors will give priority to the professional qualification of future constructors and the grade of development of their technology applied. The purpose is to employ such companies in the construction of our metro lines, which know and apply at a high level the most updated building technologies.

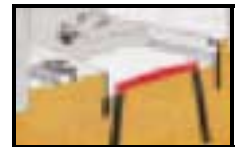
Construction of utilities



Making bevelled palisade



Construction of top floor



Station construction under floor



Surface development



Actualities

In our permanent rubric we would like to inform our kind readers on the events emerged since the appearance of our last issue. We trust that our rubric will assist you in monitoring the versatile implementation of the metro project in an "updated" manner.

Metro construction may start

In the general assembly of August 31 the Municipality's General Assembly decided to commence the construction of the first section of Metro 4, a so called "Phase A", in the frame of the advanced surface development works.

Two public purchase invitations will be issued very soon related to the preparation of licensing plans both for the Buda and Pest side surface development works.

Transport conference

Late in September, a three-day conference entitled "Quality Urban Public Transport in the New Millennium" will take place under the joint organisation of the Union for Transport Sciences and BKV Rt. (= Budapest Public Transport Company). The series of lectures will be hosted by the education and holiday centre of BKV Rt. in Balatonfenyves. The professional lectures will concentrate on the newest trends of urban and sub-urban bound track transport networks and modes.

Development plan programs

A comprehensive documentation will be compiled on the basis of the plan programs of 10 metro stations and their surroundings, comprising the totality of concepts of individual plan authors as adopted by the General Assembly. The graphical presentation developed in co-operation with the company "A.D.U. Építész Iroda Kft." treats both surface and underground planned transformations. In addition, related investments are presented, which are not a direct

part of the metro project, but they are indispensable to be completed in combination with metro works and surface development. Probably in September, the public can inspect the programs of development plans within an Exhibition taking place in the City Hall.

Geological research

Issue 2 in this year of the periodical "Földtani Kutatás" (= Geological Research) presents the results of the geological exploration carried out along metro alignment. In the first article of the paper, geological relations of the metro line and its environment are discussed. The results of seismic tests required to the metro section under the Danube are presented in a separate report. Further two articles are devoted to summarise the most important establishments of hydro-geological and engineer-geological investigations.

Ten Squares – Ten Stations

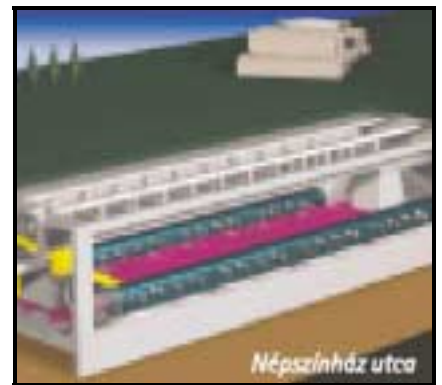
Among the overview pictures prepared on the basis of the Licensing Plan of Railway Authorities we are presenting hereunder the surface development and the configuration of the last two stations, Népszínház utca and Baross tér.

From our next issue on we are presenting the new plans of development following the consultation with the authorities and local governments concerned.

Népszínház utca

The Designer's suggestion is to place metro exit to the corner of Köztársaság tér and Népszínház utca. The staircase will transport the passengers towards Népszínház utca. This results in a fast and comfortable changing possibility with trams. Like in Rákóczi tér, Metro

will play a significant role in the development of this area. The internal sections of Józsefváros will be given chances never existed before for integration. The value of estates and flats will increase and, in general terms, the region can join various development processes in Budapest. The tracks in



Népszínház utca will run at a depth of 16.7 meters. Three moving staircases and two elevators will transport passengers to exits.



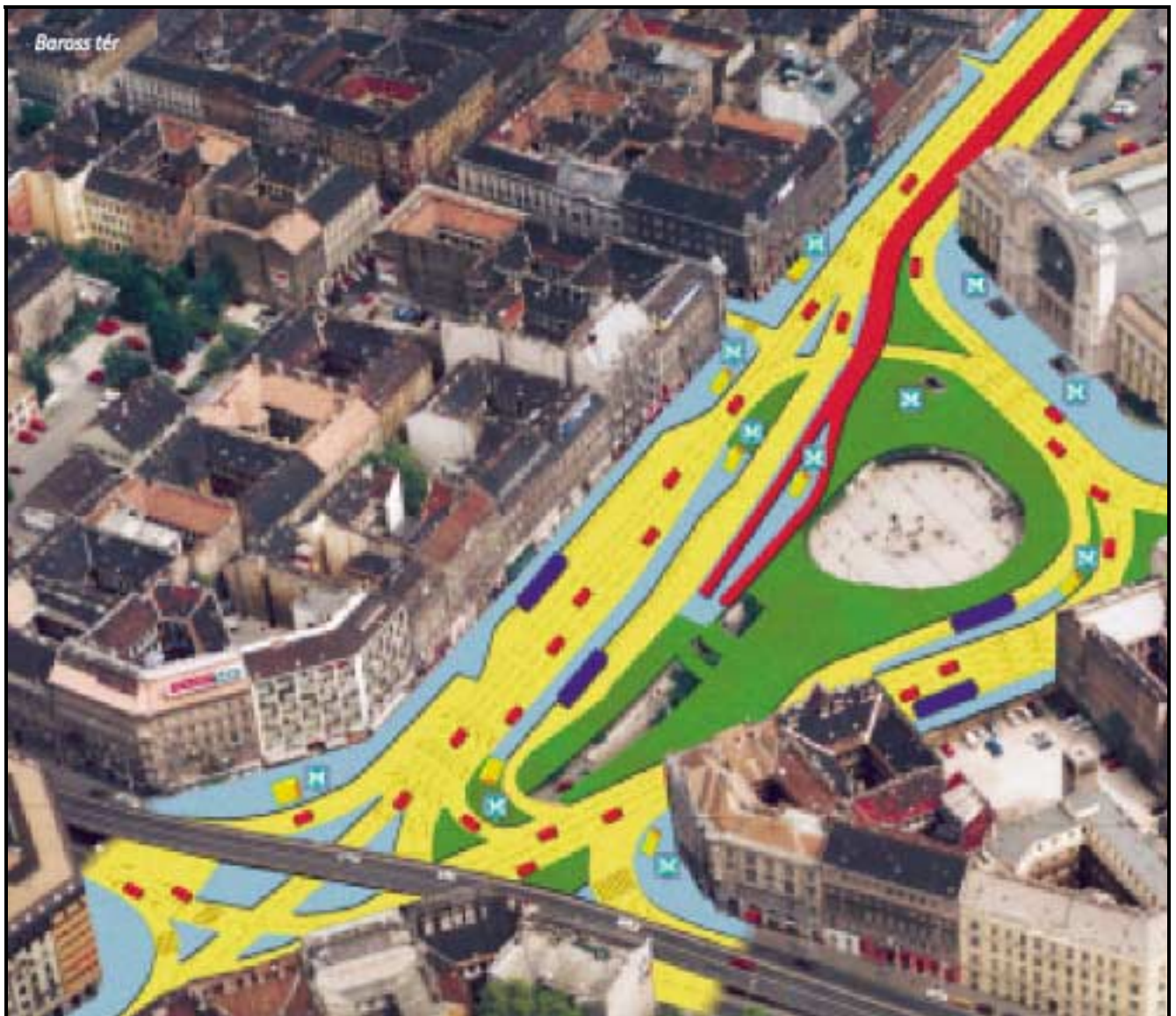
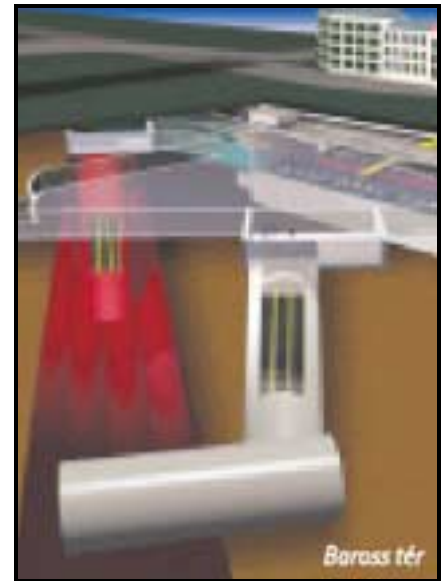
The designers expect 21 thousand passengers getting out and 22 ones getting in every day.

Baross tér

According to plans, there will be no significant change in the square. The station of Metro 4 will be located under Thököly út, and it will have a direct connection with the existing subway system. The station will be developed in a manner to enable later extension towards district Rákospalota. Among the modifications of surface transports planned in parallel to Metro, the reinstallation of tram 44 is especially important. The bus stations will be moved to another place. There is an intention to increase the green surface area on the square.

Baross tér is already a very important traffic centre. This situation will only be enhanced by a new metro line. Following the construction of this station, the square will include two metro lines, a railway station with important domestic and international railway lines and several surface public transport lines. Appearance of Metro 4 can provide new swing to the economic development of the region, as well.

The tracks in the station will run 14 deep under surface. The passengers will be transported by 6+6 moving staircases and 2 elevators to two exits. According to preliminary calculations, the metro station at Keleti pu. will be used by 63 getting in and so many getting out passengers every day.



Stockholm: tunnels driven in rocks

The City of Stockholm is located on several islands, which gave a special challenge to the developments of the transport network. Soil structure also was another problem for metro constructors: most of the tunnels had to be driven in granite rocks. However, the Swedish engineers could fulfil an excellent performance during the last half a century, since they have built a metro network totalling more than 100 km.

Although metro construction in Stockholm was decided as early as in 1930, the first section of 7.5 km of this "green" line was opened in 1950 only. The network was gradually extended over the coming decades. In 1964 the "red", then in 1975 the "blue" line were inaugurated. Eleven terminals belong to these three lines, since some of them have branched ends. Today, the metro network in Stockholm is 108 km long, thereof 62 km run under ground. Stockholm's population is only one third of that of Budapest: hardly 700 thousand people. At the same time, more than 15 km metro lines fall to 100,000 inhabitants, which is nearly twelve times as much as the similar ratio in Budapest.



The metro in Stockholm ("Stockholms Tunnelbana") is operated by the Transport Company in Stockholm ("Storstockholms Lokaltrafik, SL"). This company is a propriety of the Swedish State Railways and the Municipality of Stockholm. Since 1991, the departments within the transport company, electric plant, bus transport, suburban railways and the metro itself with 2800 employees are functioning as autonomous economic entities and profit oriented.

Every travel by metro costs nearly HUF 500 for passengers, but the tariff can even reach up to HUF 1200 for the travels to the farthest section limits. At the same time, monthly travelcard is quite cheap under Swedish conditions, i.e. not more than HUF 13,500.

The trains in Stockholm follow each other every 2 to 5 minutes in peak hours, in other periods every 2.5 to 10 minutes. The metro is operated from five o'clock in the morning to two o'clock in the dawn.

Metro operators concentrate utmost upon travel comfort and quality. About 800 thousand passengers using the metro every day may enjoy paintings



and statues, since the longest exhibition of fine arts is implemented along the line. More than one hundred contemporary painters and industrial designers-artists contributed to the embellishment of 57 metro stations. The local government spends a sum equivalent to HUF 60 million every year on the development of metro lines.

No direct extension of the metro lines in Stockholm is envisaged. City plans include just the updating of existing metro stations and the construction of a circular tram track connecting several metro stations.

