

metrő4

THE NEW METRO OF BUDAPEST

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TUNNELLING SHIELDS NOW WORKING ON PEST SIDE

A few decades ago it took almost a year to build a metro tunnel beneath the river Danube, but this has been achieved by the builders of the Metro4 line in scarcely more than one month. The construction of the stretch of tunnel beneath the Danube was one of the most hazardous and exciting phases of the current metro investment project. Tunnel construction is advancing at a good pace on the Pest side as the southern tunnel shield has already reached the station at Kálvin square. Still, simultaneous with successful technical progress, the tunnel building entrepreneur has prognosticated further delays on the Pest side, which including associated works may lead to as much as ten months' delay in the final term of the entire project. DBR finds this further delay unacceptable so it continues to hold negotiations with the tunnel building consortium.



Tunnel under the Danube

Careful preparations, modern technology and the skill of experts have borne fruit as the southern and northern tunneling shields have drilled out 333 metres of southern tunnel (using 222 tunnel lining rings) and 328.5 metres of northern tunnel (using 219 tunnel lining rings), in 52 days and 38 days, respectively. Building beneath a river is not a task without its dangers and even the most modern technology cannot eliminate every obstacle. The southern shield, for example, was brought to an unavoidable halt for several days beneath the Danube after the machine's cutting wheel clogged up with material that was harder and more viscous than expected. Eventually the situation was safely remedied by modifying the alignment of the shield and cleaning the cutting wheel "by hand." The shield was thus successfully set on its way again and the construction completed. The southern shield has reached the station at Kálvin square today and its northern counterpart is also drawing closer.

Although the negotiations on the schedule of tunnel building have not yet been concluded, still, based on the latest work schedule of the constructing BAMCO consortium the tunnels on the Pest side will be constructed over a significantly longer time than planned. Nevertheless, the actual progress of the shields suggests a contradictory development: no

Some interesting data on construction beneath the Danube:

Maximum speed of the southern shield beneath the Danube: **18 metres/day**

Maximum speed of the northern shield beneath the Danube: **16.5 metres/day**

Narrowest distance between the bottom of the riverbed and the tunnels: **7 metres**

Depth below sea level of tunnels at Műegyetem rakpart: **31 metres**

Depth below sea level of tunnels at Fővám tér: **32.5 metres**

more than one month had to go by to build the tunnel between the first station on the Pest side at Fővám square and the second station at Kálvin square.

In 1967, construction of the stretch of Line 2 beneath the river between Kossuth tér and Batthyány tér took almost one year. Shield experts at that time had to work within a caisson, while progress through the harder layers of rock required blasting. Moreover, methane often seeped into the workspace, potentially endangering the lives of those working there. The technology applied in the construction of Metro4 is fundamentally different. Now, the shield has closed supporting faces which protect against flooding, while the cutting wheel can be readjusted by experts at any time in accordance with changing geological conditions.



Construction at Gellért tér station next to the Danube

WE'RE ALREADY OVER HALF-WAY...

Most of the talk during the metro project so far has been only of closures and diversions. From now on, however, we are likely to hear more and more news about how builders are returning sites to the citizens of Budapest freshly renovated and smartened up, most recently at the Bocskai út station.

Even if the light cannot yet be seen at the end of the tunnel, the time for "giving the streets back" to the people is soon set to start following the period of closures. With the project now almost 60% complete, there will be no more need for major closures or diversions on the surface, while continuing tunnel construction will not disturb surface traffic. Although most building sites will remain in place in the vicinity of station

construction works until the end of 2010 and the first half of 2011, as work progresses the metro builders intend to return as much space as possible to the city's population as soon as they can.

This is how one of Budapest's most attractive playgrounds came to be built and handed over by the metro builders to the children of Újbuda in mid-September. At Fővám tér, meanwhile, the number 2 tramline is expected to return to service on the Pest side of the Danube at the end of October. At nearby Kálvin tér, one lane of the road between the pit of the building site and the tramline will be ready to receive traffic by the end of October, thus opening up circulation from Szabadság Bridge towards the Kiskörút, reconstruction of which is also scheduled for completion by the end of October



Surface investment: new playground at Bocskai street station

"NEXT STOP TÉTÉNYI ÚT" SUNSHINE UNDERGROUND

One of the most striking stations of the Metro4 line on the Buda side will be the Tétényi út stop to be built at the centre of the largest housing estate in District XI.

This is not only because the metro station will further enhance the area's character as a district centre, with new passengers expected to bring new shops and services, but because the architects have applied extraordinary solutions in designing the station. An enormous glass cupola will be built over the station structure, providing the platforms with natural light. Passengers will thus be able to pass underground in natural light during the daytime, making both their travel and waiting time more pleasant and comfortable. Six escalators and two lifts will transport passengers to the station platforms, built at a depth of 14.5 metres.



Tétényi út station now...



... and when it will be constructed

PLEASE LOOK OUT, TRAIN APPROACHING SHORTLY! CONSTRUCTION OF THE METRO4 VEHICLE DEPOT BEGINS

The new metro line will be entirely automated, with the circulation and speed of the trains overseen by one of the world's most advanced computerized control systems. The trains will be controlled from the vehicle depot under construction close to Etele tér.

Project leaders laid the foundation stone of the vehicle depot located close to Etele tér on 28 July 2009. The modern complex of buildings, covering an area of almost 20,000 square metres (more than 30 football fields!), will provide

maintenance and cleaning of the automated trains and will also house the Metro4 dispatcher centre and IT base, overseeing and controlling the new metro trains. The vehicle depot will have capacity for 100 trains, and will thus be able to accommodate additional trains that may be put into circulation following a potential extension of the new line. The tender for the investment, announced last summer, was won in an open public procurement procedure by Swietelsky Hungary Kft from among five competing

firms, and the Ft 11.5 billion contract was signed in April of this year. The company is contracted to build the depot within 107 weeks. Works towards the Kiskörút, reconstruction of which is also scheduled for completion by the end of October.



Vehicle depot is under construction

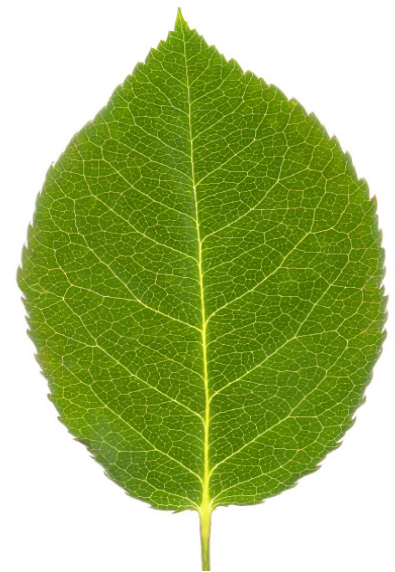
M4: NOT ONLY GREEN IN COLOUR – FOCUS ON ENVIRONMENTAL PROTECTION

The metro construction project is an investment that also meets European standards in terms of environmental protection. Issues of outstanding concern include the protection of karst waters at Gellért tér, as well as ensuring that no protected trees are cut down as a result of the investment. Even by international standards, it is perhaps rare to see as much money and energy expended on environmental protection during a metro project as the builders are spending on Metro4.

It is a priority of the Municipality of Budapest and BKV Zrt as investors to see that the construction works satisfy the highest and strictest environmental protection regulations and expectations in every regard. Despite this, the metro project was frequently attacked during the preparatory stage. Green and civil organizations primarily protested because they claimed that the route of the metro line and the tunnel under construction would have a detrimental effect on the karst waters at Gellért tér.

Planners and builders withstood the test well: with the tunnel completed beneath the Danube, the quality, output and composition of the water in the thermal springs has not changed at all. Even before construction began the karst waters were supervised at 26 observation wells, but as a further safeguard an additional observation well of almost 300 metres in depth was added to the karst water "monitoring system." With the help of these wells, changes in the quality, temperature, composition and output of the thermal springs could be – and still can be – continuously monitored. No significant change in the monitored data has been observed by experts during the construction works.

Naturally the metro builders are not merely "keeping an eye on things underground." On the surface, not a single protected tree has been cut down in the course of the investment, while unprotected trees have been replaced several times over. At Rákóczi tér, for example, the placement of trees was taken into account at the planning stage. In consideration of the protected sycamore trees in the area, a portion of the



station was built using "bottom-up" excavation methods, and consequently there was no need to break the surface in the vicinity of the trees. Although this increased the costs of construction of this station, protection of the environment is indisputably an issue of outstanding importance for the metro investment project. The same considerations applied during preparatory investments, for example in the renovation of Bartók Béla út. As is well-known, the investment project literally "by-passed" the protected trees along that street, and not one tree was harmed.

“I JUST WIPE MY SHOES AND CARRY ON” METRO CONSTRUCTION THROUGH A WOMAN’S EYES

Since the granting of equal rights to women, it is hard to find even the tiniest segment of work where women face almost the same challenges they once did. Today the question is no longer whether women are refused certain kinds of work, but rather how they are accepted when they take on “manly” jobs. The building of the Metro4 line entails planning and management tasks as well as the physical operations carried out at the individual sites. An increasing number of women engineers work at the construction sites, but they too started their careers working in an office.

For women engineers who started work in the 1980s and 1990s, opportunities were presented within the pleasant environment of the designing and writing desk. The male majority on building sites regarded it as natural that women would not be seen on site. Today this has changed.

“When we joined companies after college, it was still the general rule that men went to work on site, while women stayed in the

office,” recalls Mónika Hegedűs, who started work a few years ago. “I told my bosses that I won’t learn by shuffling papers to and fro. Construction management skills can only be acquired on site,” she explains. Once she appeared “hard” enough, she was sent to the construction site. Mónika is anyway a determined character, something female colleagues in similar lines of work regard as natural.

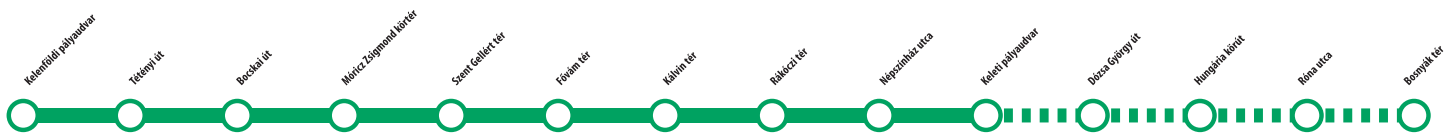
“I won’t say that it wasn’t strange at first to walk about in overalls with a hard hat on my head, but now I can easily walk around in them, even along Üllői út,” Mónika continues. Working at the Rákóczi tér construction site as an engineer, she often commutes between the two locations.

Today Mónika Hegedűs no longer balks at all at having to visit a construction site in the daytime in elegant high-heeled shoes. “If my shoes get dusty, I wipe them off and carry on,” she candidly reveals. And what if she goes on a date straight from the site? “This is me and this is what I do, if someone doesn’t like it then they’d better not want to meet me,” she replies. Dedication to

the job has its limits, however. When she goes out to have fun, she prefers to keep quiet about what she does: “Men either don’t know what to say about what I do, or they start to ask questions about what it’s like. When I’m out having a good time, I don’t want to talk about this.” So if they ask what she does, she answers: “I’m a hairdresser. There are never any more questions.”



Hegedűs Mónika works on Rákóczi út station



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