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The First Continental Underground Electric Railway and the Budapest Urban Development Context, 1867-96

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Budapest, minor capital of the Empire

After 1860, with the loss of the Italian provinces, the reorganisation of the Austro-Hungarian Empire took a turn to adopt a model that was relatively close to the federalist model. For instance, the Diets of the various countries within the Empire and the Imperial Council (*Reichsrat*), which was to become the Austrian Parliament from 1861 to 1918, were re-established.

In this political and institutional context, a compromise was made in 1867 allowing Hungary to have special autonomy prerogatives in terms of administration.

From then on, two governments and two administrations separately managed Austrian and Hungarian internal affairs, their respective territories having different capitals, Vienna and Budapest, while the Habsburg monarchy alone governed external affairs and defence, and decided on global economic and financial measures.

In spite of the aggravation of internal opposition, due to ethnic demands and emerging social conflicts, Austria and Hungary went through a decade of economic and industrial growth, associated with significant infrastructural and urban transformation.

Although political decisions and measures remained the prerogative of the aristocracy, medium and large manufacturing companies developed rapidly, mainly around Vienna and Prague, in Agram - today's Zagreb - as well as in Bohemia and Moravia.

The same went for agriculture the productivity of which increased rapidly thanks to the development of mechanisation, but also due to increased pressure on the rural classes. The banking system, which served both the industrial and agricultural sectors, facilitated the process of capitalist concentration.

In terms of urban hierarchy, the political and economic configuration of the Empire was reflected in Vienna's natural supremacy as well as in the architectural and urban transformations of the second capital, Budapest - we shall be examining some of these in detail - and the port city of Trieste. In all these places, the rigour of urban administration impelled ordered and rational extensions.

As of the middle of the century, Vienna reinforced its position as a political capital and main centre of material and cultural production. Indeed, profits emanating from the exploitation of peripheral or less advanced regions converged towards the capital, thus accentuating the gap between Viennese vitality and the provincial rhythm of other cities (Molnár and Reszler, 1989).

Not only did the profound transformations of Vienna – the development of the *Ring*, the internal remodelling and the expansion plans – constitute the materialisation of the capital's superiority and serve as models for the plans of other European cities, but they also prefigured the urban operations that were going to take place from 1868 onwards in Budapest, which had become the capital of the Hungarian provinces and the second city of the Empire.

The urban transformations of the second half of the 19th century

The urban and architectural studies and projects proposed after Franz Joseph acceded to the throne in 1848 constitute the first stage in Vienna's transformations, and those of Budapest a little later.

The project of the Budapest Academy of Sciences (1862-65) conceived by architect Friedrich August Stüler from Berlin, calls to mind the serenity of the Prussian *Rundbogenstil*. Frigyes Feszli

adopted the same style, borrowed from Berliner and Viennese models, for the Vigadó concert hall (1859-65), which is in harmony with Heinrich von Ferstel's palace housing the Austro-Hungarian Bank and the Vienna Stock Exchange. This hall can also be considered as the first attempt to develop a national style from Hungarian Medieval traditional elements combined with the influences of the Italian Renaissance.

The architectural interventions that were to follow were driven by a more general desire to adopt a new plan for the city. This was even truer for the remodelling of roads and for infrastructure equipment, which we shall return to later.

The drive with which the Budapest institutions committed themselves to this new phase of urban development is a testimony to its aspiration to final independence, even though Vienna's political and cultural supremacy remained undisputed, as a number of operations can testify.

The administrative merger of the cities of *Buda* and *Óbuda*, on the West bank of the Danube, with the city of *Pest*, on the East bank, which the Hungarian revolutionary government wished for as early as 1849, but which had been revoked by Habsburg authority, finally became effective with the Austro-Hungarian Compromise of 1867.

In 1850, Buda had 50,000 inhabitants and Pest 100,000; in 1869 they had respectively 70,000 and 200,000 inhabitants. As of 1868, the second capital began to grow rapidly and by 1870, a Municipal Commission in charge of urban planning, public works and infrastructure was formed (*Fővárosi Közmunkák Tanácsa*).

In 1871, the organisation of a competition for a new renovation and extension plan led to the adoption of a blueprint based on a concentric annular structure with several large radials. A law authorising expropriation to allow interventions designed to align street façades made it possible to implement the project.

The plan of the new Budapest, clearly inspired by Haussmann's achievement, is a testimony to the great attraction exercised by the new Paris, which had become the model of reference for numerous European capitals, even in areas geographically and culturally dependant on Vienna.

The initial structuring element is of course the Danube. The new public buildings are surrounded with gardens and overlook the river, from which they are separated by wide banks.

The Pest sector developed outwards in a prodigious manner. Its central part, resting against the curve of the river and limited on the East side by the arcade the tracing of which was established in 1873 and which was completed around 1900, defines a large eye-shaped area where all the public and institutional buildings are concentrated (Figure 1).

Beyond the tree-lined boulevards of the new *ring*, the *Nagykörút*, along which were aligned the residential buildings of the bourgeoisie, spread out the expanding zones of the city, some of which were characterised by a high density of population.

The inner older city was defined by the small boulevard (*Kiskörút*), which forms an incomplete semi-circle between *Deák Ferenc tér* and *Fővám tér* and which, as opposed to *Nagykörút*, only touches the Danube at its Southern extremity.

The three main Eastern radials converged towards the old centre of Pest and its small boulevard, cross the *ring* and go through the expanding zones; they were to be prolonged later on towards the outer ring, which was barely traced out at the time. The intermediate radial directly linked the centre with the new East Station.

At the turn of the century, the most impressive demographic expansion took place in the first industrial zones, situated close to the river, to the North and South of Pest. The size of *Újpest* – the quarter on the Northern periphery of Pest – more than doubled between 1890 and 1910, and that of

Kispest – towards the South – grew five-fold between 1900 and 1920, when many industries concentrated around the city (Hanák and Benda, 1991).

To the main radials was added the fascinating *Andrássy-strasse* (*Andrássy út*), a long straight avenue linking the inner city with the *Stadtwäldchen* (*Városliget*), a very large park of about 500 hectares behind which spreads the outward most arcade, (the tracing of today's *Hungária körút*).

A number of demolition and reconstruction projects transformed the landscape of the historical centre, particularly at the points of intersection between the radials and the boulevards.

New squares were created, among which *Octagon Platz* (*Oktogon*) and *Rund Platz* (*Kodály körönd*) particularly deserve to be mentioned; they are both geometrical in shape and both located on *Andrássy út*. The former was generated by the intersection between the avenue and the *ring*, while the latter, which is virtually a roundabout in the very centre of the new residential neighbourhood, is exactly equidistant from the Octagon and the outer extremity of *Andrássy út*, where the main entrance to the city park (*Városliget*) is to be found and where the monumental Heroes' Square (*Hősök tere*) was to be created.

Among the large buildings along *Andrássy út*, the most important is the National Opera (*Allami Operaház*), built in Neo-Renaissance style by Miklós Ybl between 1875 and 1884. The specific shape of the modern city of the 19th century was complemented by other eclectic buildings, which were all completed during the last quarter of the century, while new residential neighbourhoods were being built. During this period, the population, totalling 155,000 inhabitants in 1850, increased rapidly and reached about 715,000 inhabitants by 1900.

New infrastructure elements for mobility

With respect to infrastructure equipment, it was exactly at that time when the city endowed itself with two railway stations, the West Station in 1874-77 and the East Station in 1881-84 (Budapest's first railway station had been inaugurated in 1846), and proceeded to reorganise railway lines towards the capital.

It is common knowledge that since the middle of the 19th century, the railway station has stopped being a minor or experimental topic and has become an autonomous and specific topic to which eminent architects have devoted themselves. The architecture of railway stations, which are structuring elements of urban development, tends to have a dual significance: it is both a new gate to the city and a totem of technical progress.

The Paris East Station (*Gare de l'Est*) of 1847-52 by François Duquesney corresponds to the acquisition of a relatively rational typological model which was to be unanimously considered as a paradigm. According to this model, the façade obeys a precise hierarchic plan, generally tripartite and symmetrical, corresponding to a main central body that is set back and two lateral bodies of lesser importance. The semi-circular bay, that is to say the most obvious motif and the most functional element of the façade, appears for the first time on the pediment of the Paris East Station (Colquhoun, 1995). These general principals were to be applied in both transit and terminal railways stations.

In Budapest's two new stations, the translucent volume defined by the metallic structures that protect the track and platform area is immediately visible from the outside through the façade. The latter, which is tripartite in both stations, has extensive glass panelling in its central portion, which announces the glass roof above the platforms and allows it to be lit by natural light.

In the West Station (*Nyugati pályaudvar*), built by the Eiffel Company and based on a project by architect Auguste de Serres and engineer Théophile Seyrig, two distinct masonry and stone buildings frame the entirely glazed pediment with tympanum of the central shed, which is therefore

directly visible from the street. Polonceau trusses on consoles cover the width of the train shed, which is about 41 metres across.

Through its functional character and general composition, the precise rhythm of the lateral pavilions closed by turrets and of the central iron and glass tympanum, the alternation of opaque and translucent parts, and the chromatic effect of the various materials, Serres' station displays the intentions and processes of metallic frame architecture of the middle of the century, and therefore rightly belongs to this stylistic family (Vadas, 1998). An identical scheme was indeed going to be used by Jean Formigé for the project exposed at the Paris Salon of 1876, where the glass impediment was subdivided vertically by slender and polychrome metallic columns (see *L'Encyclopédie d'architecture*, 1876).

Conceived by architects Gyula Rochlitz and János Feketeházy, the East Station (*Keleti pályaudvar*), also located inside the city of Pest, constitutes a different case.

As in other stations at the end of the century, whether it be new constructions or enlargement or renovation projects, the entrance hall, a distributing element between the city and the tracks, is particularly accentuated to the point of projecting out onto the main façade. This artifice is also found in the Strasbourg Station (1878-83), which was not a terminal station however, or in the Frankfurt Station (1879-88).

The most important stations of this period generally adopted a classical style with Neo-Baroque or Neo-Rococo variants, the rhetoric of which had shown its capacity to produce measured effects of grandeur. The Parisian stations are examples of this, as is the Dresden Station (1892-97). The Budapest East Station also conforms to this classical language but draws its inspiration above all, like the Potsdamer-Bahnhof in Berlin (1868-72) or the Mannheim Station (1871-76), from modules that are characteristic of the Italian *Cinquecento*.

Three of the five bridges that span the Danube in the central part of Budapest are among the main infrastructural achievements of the second half of the century.

Extending beyond the Pest great circular road - as drawn in 1873 - the Margaret Bridge (*Margit-híd*) constitutes the means of access to Buda and Óbuda. The unicity of the bridge resides in the fact that its planimetry is in the shape of a circumflex accent that barely touches the Southern tip of Margaret Island; it therefore seems to be exactly perpendicular to the Danube, where both arms surrounding Margaret Island join up. This bridge was built by the French engineer Ernest Gouin between 1872 and 1876, and the junction allowing one to get onto the island directly was added in 1901, when the circular road was completed.

One of the most scenic constructions of that time is the Franz Joseph Bridge (*Ferenc József-híd*), conceived by J. Feketeházy, A. Czekelius and V. Nagy in 1894 and built in 1896 - nearly half a century after the *Széchenyi lánchíd*, the city's oldest bridge and the first permanent link between Buda and Pest. This metallic bridge with cantilever beams, painted green, topped with crenellations, crowns and eagles - or more specifically the mythic bird known as *turul* taking flight -, links the two banks of the Danube and prolongs the small boulevard, between *Nagycsarnok* (Great Market) of the *Vámház körút* and *Szent Gellért tér*, on the Buda side. Destroyed during the war, it was rebuilt as an exact copy of the original in 1946 and renamed *Szabadság-híd* (Independence Bridge).

Just upstream of this bridge, the Elisabeth Bridge (*Erzsébet-híd*) was built between 1897 et 1903, based on a project of A. Czekelius, A. Kherndl and V. Nagy. Both bridge and gate to the city, situated exactly in the geographical centre of Budapest, it allowed extending towards the hills of Buda and beyond the avenue that goes through the old part of Pest and ends up at the East Station in the opposite direction, after crossing the new *ring*. Characterised by triumphal access points, piles and cable arrays, it was destroyed in 1945 by the Germans and rebuilt in 1964 with the renewed and elegant forms of a white steel construction (by Pál Sávoly, 1964).

An underground line for the city, preliminary phases and project, 1885-1894

During the discussions concerning the *Andrássy út* project, one of the most controversial issues was that of public transport in the new avenue. The Municipality was in favour of a horse-drawn tramway line. Many European cities having adopted this type of tramway network - a means of transport that superseded omnibuses before evolving further in the form of steam and ultimately electric tramways -, but this solution, which did not seem to succeed in reducing traffic intensity and the congestion in central arteries, met with the opposition of the Public Works Council.

Shortly afterwards, and based on an idea of Mór Balázs, the tramway company director of the city of Budapest, the company Siemens & Halske developed a project for a light and low-depth underground railway line travelling precisely along the length of the new avenue.

Mór Balázs was born to a middle-class family on 5th March 1849 in Pest. After studying in England, he returned to his native city and, in 1885, wrote an essay devoted to the project of steam tramways for Budapest. This work, among others, exerted a strong influence on the organisation of public transport in the city. Balázs was the first director general of BVVV Rt., the electric tramway company in Budapest, which preceded the current BKV Company. His merits and position allowed him to support and participate actively in the construction of the new line, which was inaugurated on 2nd May 1896 and became the first electrified underground railway on the continent, thus succeeding to the London Underground, opened to the public in 1890. (Trains of the *Metropolitan Railway* in London, which was opened to public traffic on 10th January 1863 and was the first urban underground, were still driven by steam. The *City & South London Railway*, which opened in 1890, was the first deep-level electrically driven line). Balázs died on 1st August 1897.

The country had been preparing for a long time for the celebration of the thousandth anniversary of the conquest of Hungary by the Magyars. The main event of this was to be the Millennium Exhibition organised in *Városliget* Park, which was only accessible from the centre of the city by omnibuses that were often overcrowded.

Drawn in 1873 and completed in 1884, the avenue that ended at *Városliget* was about 2310 metres in length. Paved with wooden blocks and until then simply called *Sugárút* (avenue), it was renamed *Andrássy út* in 1885.

An application for authorisation to build a tramway line along the *Sugárút* had been submitted on several occasions. After debates that lasted nearly two decades, the authorities decided to reject the proposition.

In 1893, the Budapest electric tramway company (BVVV) and the Budapest public railway company (BKVT) presented a new plan for the construction of a tramway line along *Andrássy út*.

The contract memorandum also contained a Siemens & Halske plan for the construction of an underground railway, this second scheme having to be submitted in case the proposition for a tramway line was rejected.

In the end, the plan that was approved was the new underground railway. The project, initially published in Vienna before being examined in Budapest (Figure 2), benefited from a particularly favourable context for its implementation given that the date of the Millennium celebration was approaching. The authorisation was indeed speeded up so that the work could be completed and the 3690-metre-long line delivered in time for the event (Csendes and Sipos, 2000).

The city wished to organise a large exhibition inside the city park; inaugurated in the spring of 1896, the event was planned to last for 6 months. Although it was different from the other universal exhibitions of that period, the Paris Exhibition of 1889, the Chicago Exhibition of 1893, and the Antwerp Exhibition of 1894, and although it was strictly national in character, the Millennium Exhibition could not fail to attract a large number of visitors, particularly from Vienna.

Concerned about managing the flow of expected tourists, the Public Works Council approved the project of this new infrastructure and, with the approval of the Municipality, the ministries delivered

the building authorisation in the spring of 1894. The institutions put pressure on the companies in charge of the work so that it would be completed within two years, for 1st April 1896, thus allowing the opening of the line to the public for the inauguration of the exhibition.

The execution of the work, 1894-1896

The diary kept by engineer Ödön Vojtek from 6th August to 29th December 1894 provides us with a detailed account of the initial phase of the work, which was begun simultaneously at both ends of the line (Figures 6, 7).

The permit holders confirmed the choice of the Siemens & Halske Company for the construction of the railway system and entrusted Róbert Wünsch, a Budapest contractor, with the excavation of trenches, civil engineering and construction work.

The companies Schlick Vasöntő és Gépgyár (Schlick foundry and mechanical industry) and Diósgyőri Vasgyár (Diósgyőr forge) provided the iron posts and beams (Hidvégi, 2004).

The line is located at a depth varying between 4.25 m and 4.45 m under the street surface, just below *Andrássy út* and barely above the first level of ground water. The low inner height of the tunnel, 2.85 m, allowed the new infrastructure to go above the main sewer line (Figures 3, 4, 5).

Sophisticated concrete mixers were used; leaves and pumps were used to drain the water from the ground.

The structure was composed of a foundation base, lateral walls made of reinforced concrete, and an alignment of iron columns divided the transversal section of the tunnel into two halves for the double track.

The iron beams of the covering structure lay on supports provided by the lateral walls and columns. The cover was complemented by solid brick masonry work, forming a vaulted slab between the beams. The new support and pavement were laid out on this jack arch floor.

Rough felt was mixed with bitumen and a thin layer of asphalt was laid between the concrete cover and the road surface to ensure watertightness, a technique which proved to be reliable for decades.

The 1435 mm gauge tracks with iron cross-pieces were composed of asymmetric Vignoles rails connected with bolted lap joints, a technique patented by Haarmann.

Delicate pavilions were built at each station except for the Opera station just opposite the Ybl building. These small ornate buildings, occurring in pairs on either side of the tree-lined avenue, designed to protect the stairs providing access to the platforms and conceived in three different versions, were later demolished unfortunately (Figures 8, 9, 10).

The pavilion at *Deák Ferenc tér*, which arched over both directions and therefore hung over both sets of stairs, was the largest and the most beautiful. This and other, more simple pavilions were conceived by György Brüggemann. The two pavilions at *Gizella tér* and the four pavilions at *Oktogon* (two on either side of the avenue), in the Neo-Renaissance style, were conceived by Albert Schickedanz and Fülöp Herzog. The pavilions and the stations were covered with ceramic tiles and decorative *pyrogranite* elements (a durable ornamental ceramic that could resist freezing temperatures) produced by the Zsolnay porcelain manufacturers in Pécs (still in existence).

Near Artézi fürdő station, which was the terminus in those days and, like the previous Állatkert station, was on the surface, an iron and concrete footbridge, built with a mixed construction system patented by Róbert Wünsch, spanned the railway line.

The 350-V traction current required for the operation of the underground was generated by the Kertész utca power plant.

The electrical traction equipment was manufactured by Siemens & Halske, whereas the mechanical parts for the carriages were provided by the Schlick Company. The final assembly was performed by the tramway company itself.

After about twenty months of work, the new line was inaugurated during a brief ceremony and was opened to the public on 2nd May 1896, on the day of opening of the Millennium Exhibition. While he was visiting on the following 8th May, Franz Joseph used the underground and since then, the line was given the Emperor's name, with his consent.

In order to meet traffic requirements, twenty carriages had been ordered but for the inauguration, only ten carriages covered with metal sheeting (carriages 1 to 10) and the royal carriage (carriage number 20) were ready; the nine missing carriages with wooden boxing (numbered 11 to 19) were brought into service only two months after the opening of the line, in July 1896.

The route of the new underground line started at *Vigadó utca*, went through *Gizella tér* (today *Vörösmarty tér*) and *Deák Ferenc tér* (which was to become the only connecting station between the three lines of the metropolitan) until *Bajcsy-Zsilinszky út*, to become rectilinear thereafter under *Andrássy út* up to the main entrance of the Millennium Exhibition, situated in the *Hősök tere*, facing *Városliget*.

The depot located at *Arena út* (today *Dózsa György út*), built to house twenty carriages, allowed exploitation operations to be carried out; the carriages had been assembled there in the central workshop. Connexion with the terminus was made on the surface along *Állatkerti körút* (the zoo boulevard). This was also where an experimental tunnel section had been tested.

The Budapest underground received a gold medal at the 1900 Universal Exhibition in Paris.

The new century, the prolongation and recent restoration of the M1

On 1st January 1923, the Franz Joseph underground electric tramway company (FJFVV Rt.) handed over the administration of the railway to the newly created Budapest capital city transport company (BSZK Rt.).

From the 1920's onwards, the railway underwent significant technical restructuring (Medveczki, 1975). The tracks were replaced, the security systems were improved and the access pavilions were demolished, probably because they were considered unnecessary and cumbersome. The carriages were equipped with more powerful traction engines and standard bogies; in addition, the doors of the carriages were made larger. The 550-V operation voltage used by most public railways was adopted.

The access to the various stations was renewed in the 1930's. This intervention was responsible for the painted yellow balustrades of the openings providing access and the outside signposts that are still in use today.

On 1st October 1949, the Electric railway municipal company (FVKV) resumed exploitation of the underground line.

In order to satisfy the demand for mobility and meet the growing need for passenger transport, in 1959, the Company began building sixteen second-class carriages with driver cabin in the Central workshop. The new set of carriages, including motor carriages and second-class carriages, covered about one per cent of daily passenger transport in the city.

In 1970, to differentiate it from the new underground line that was then being built, the historical line was renamed *Millenary Underground - M1*; the works for its prolongation were started at the same time.

At the beginning of the 1970's, full remodelling turned out to be urgent due to the increase in traffic, ageing of the line and the construction of the metropolitan network. The operation mode was modified and the sets of carriages, which initially ran on the left, were made to run on the right, (under the Austro-Hungarian Empire, traffic moved on the left).

In 1973, the short surface route inside the park between *Hősök tere* and *Széchenyi fürdő* was removed, the segment between the two stations was buried and the line was extended up to the current terminus of *Mexikói út*, beyond the outer boulevard *Hungária körút*. Finally, a direct link was established between the town centre and two other Budapest quarters, Zugló and Újpalota.

Between 1971 and 1973 and in 1987, the Railway Company ordered tripartite articulated trains. The twenty-three carriages were designed and built by Ganz Villamossági Művek (Ganz electric equipment) and Ganz-MÁVAG (Ganz Hungarian carriage factory). From 1985, along the whole length of the line, the platforms of a number of stations were made longer in order to adjust to the new and longer trains.

In view of its upcoming hundredth anniversary and as part of a more general plan to improve traffic in the capital, the Millennium underground railway was totally refurbished in 1994-96. The European Bank for Reconstruction and Development (EBRD) was partly responsible for funding the project, which plays a central role in public transport supporting policies and addresses the concern for greater care of the environment. This operation also allowed the preservation of a unique historical monument, while offering passengers a safer and more reliable service.

The railway structure and cover, as well as the lining of the tunnel and of the various areas were renovated. The original features of the stations were completely restored, with the renovation of the decorated tiles, signalling panels, ticket office counters and other fixed furnishings (Figures 11-17). These interventions were entrusted to architects and engineers from the *Road and Railroad Planning Company* as of 1994 in compliance with the procedures and techniques for the conservation of modern architectural heritage. In 1996, for its centenary, the M1 line had been entirely renovated.

During this work, the depot at *Arena út* interrupted its activities, and the vehicle fleet together with the repair service garage, were transferred to *Mexikói út* station.

The twenty-three articulated vehicles, entirely renovated, benefited from the installation of additional equipment in order to improve passenger safety.

Since the refurbishment of the M1, the overall operation of the line and passenger traffic have been directed and are supervised from the central control station of *Mexikói út*.

With the advent of two new lines, the station *Deák Ferenc tér* – the only connection with lines M2 and M3 – as well as the site of the M1 line have been redesigned. This remodelling was accompanied by the installation, on an unused railway section, of the little *Földalatti Vasúti Múzeum*, a museum resource illustrating the history of the first underground line of the capital.

In 2002, Andrassy Avenue and the Millennium Underground were registered on UNESCO's World Heritage List, as an extension to a previous inscription, dating back to 1987 and involving the two banks of the Danube and the Buda Castle quarter (Figure 18).

From the 1980's onwards, the capital, like the rest of the country, has known growing emigration coupled with a natural decrease in its own population, a phenomenon that is common to other European regions. During the period 1983-2002, the population of Budapest has decreased by 17.3% (Oswalt and Rieniets, 2006).

A city like Budapest, the expansion of which seems to have slowed down over the last few years, could therefore do well to adopt an approach both moderate and directed towards acknowledging this fact with respect to the implementation of its urban infrastructural policies. Major works such

as the ongoing construction of the M4 underground line could in fact turn out to be overambitious and therefore less adequate and less likely to meet public needs than line M1, which proved to work optimally during the last century and which, through having been conceived at the time with measure, lightness, simplicity and economy of means, had all the assets to allow its perfect insertion in the complex urban structure and its integration in the transport network as a whole.

The reader can see the list of original and current *Line 1* stations and the current underground *M1*, *M2* and *M3* lines map (Figures 19, 20), as supplementary data linked to the online version of the paper.

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Captions

Figure 1. Layout of the city during the second half of the 19th century.

Figure 2. Route of the underground line with the location of stations, around 1893.

Figure 3. Sewers in the area crossed by the new underground line. From left to right, the Opera House, Oktogon square, Kodály körönd, 1894.

Figure 4. Position of the tunnel, station and sewers at Deák Ferenc tér.

Figure 5. Plan of Deák Ferenc tér station, 1923.

Figure 6. Pile-planking along Andrassy avenue between Epreskert utca (Munkácsy Mihály) and Aréna út (Dózsa György), 19 September 1894. Photo by György Klösz.

Figure 7. Construction of the ceiling at the corner of Andrassy avenue and Eötvös street, 3 November 1894. Photo by György Klösz.

Figure 8. Entrance to the underground station, Gizella tér (Vörösmarty), 1896. Photo by György Klösz.

Figure 9. Deák Ferenc square, around 1900. Photo by Mór Erdélyi.

Figure 10. Oktogon square with the entrance of the underground, around 1900. Photo by György Klösz.

Figure 11. Interior of the *Millenium Földalatti Vasút* (Millennium Underground), platforms, photo 2009.

Figure 12, 13. Interior of the *Millenium Földalatti Vasút* (Millennium Underground), photo 2009.

Figure 14. Interior of the *Millenium Földalatti Vasút* (Millennium Underground), extension of the platform, 1985, photo 2009.

Figure 15. Interior of the *Millenium Földalatti Vasút* (Millennium Underground), ticket office, photo 2009.

Figure 16, 17. Interior of the *Millenium Földalatti Vasút* (Millennium Underground), access to the platform, photo 2009.

Figure 18. The World Heritage site of Budapest, including the banks of the Danube, the Buda castle quarter and Andrassy avenue, scale 1:20000, 2007.

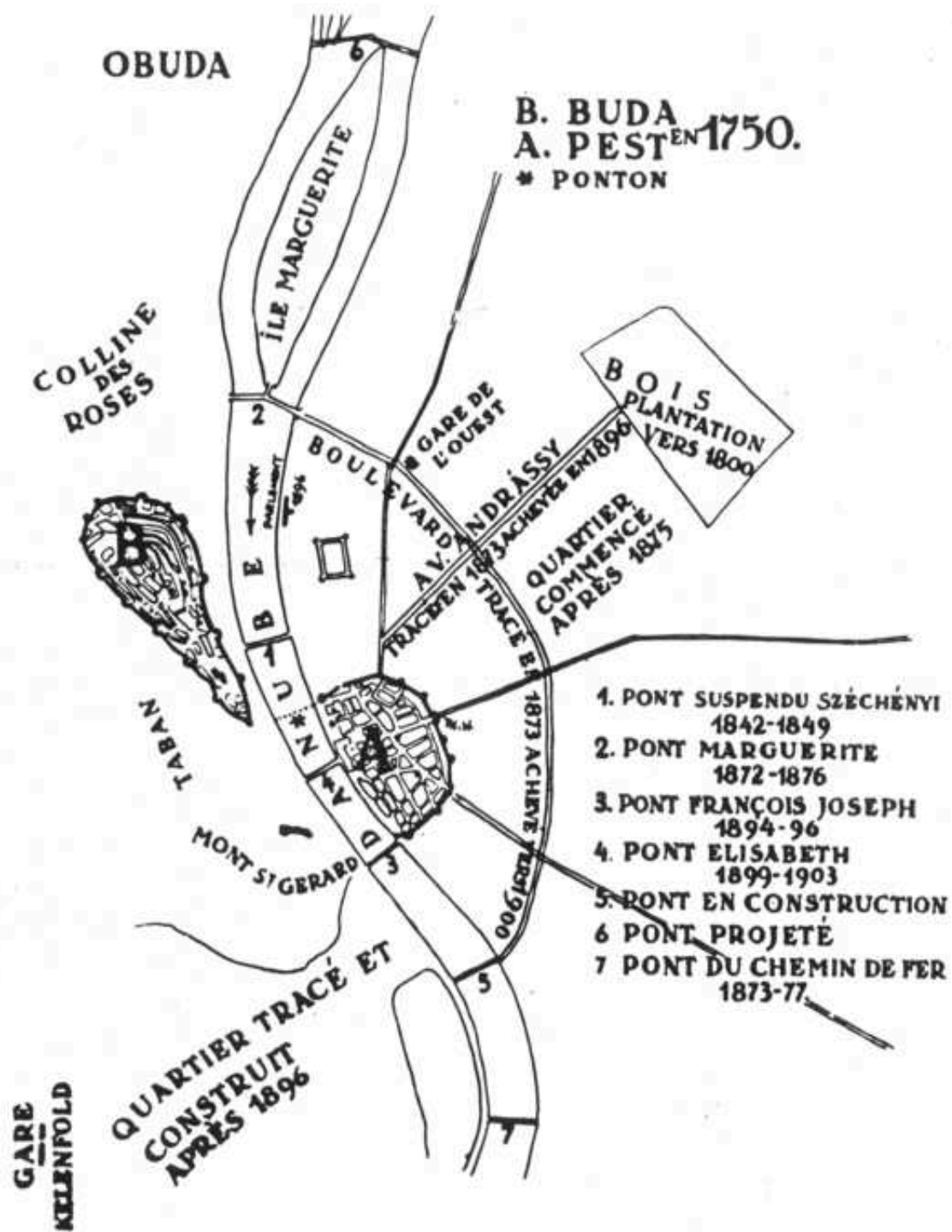


Figure 1



Figure 2



Figure 3

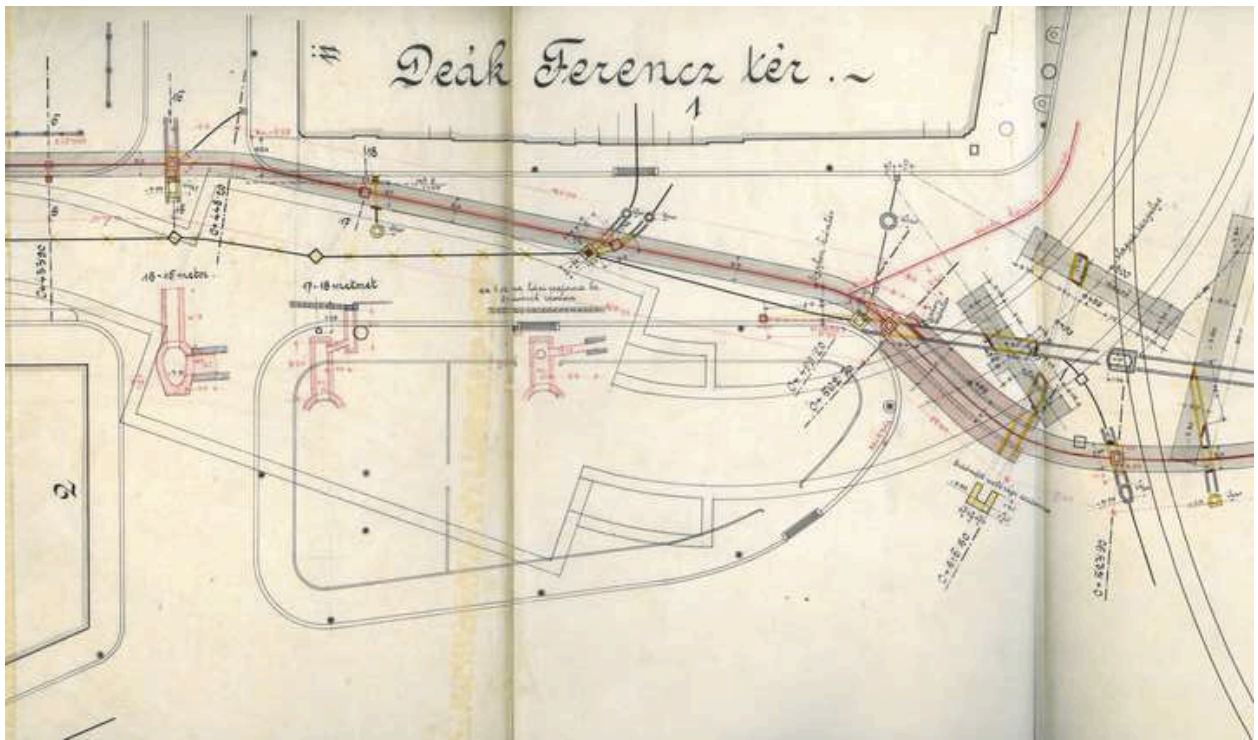


Figure 4

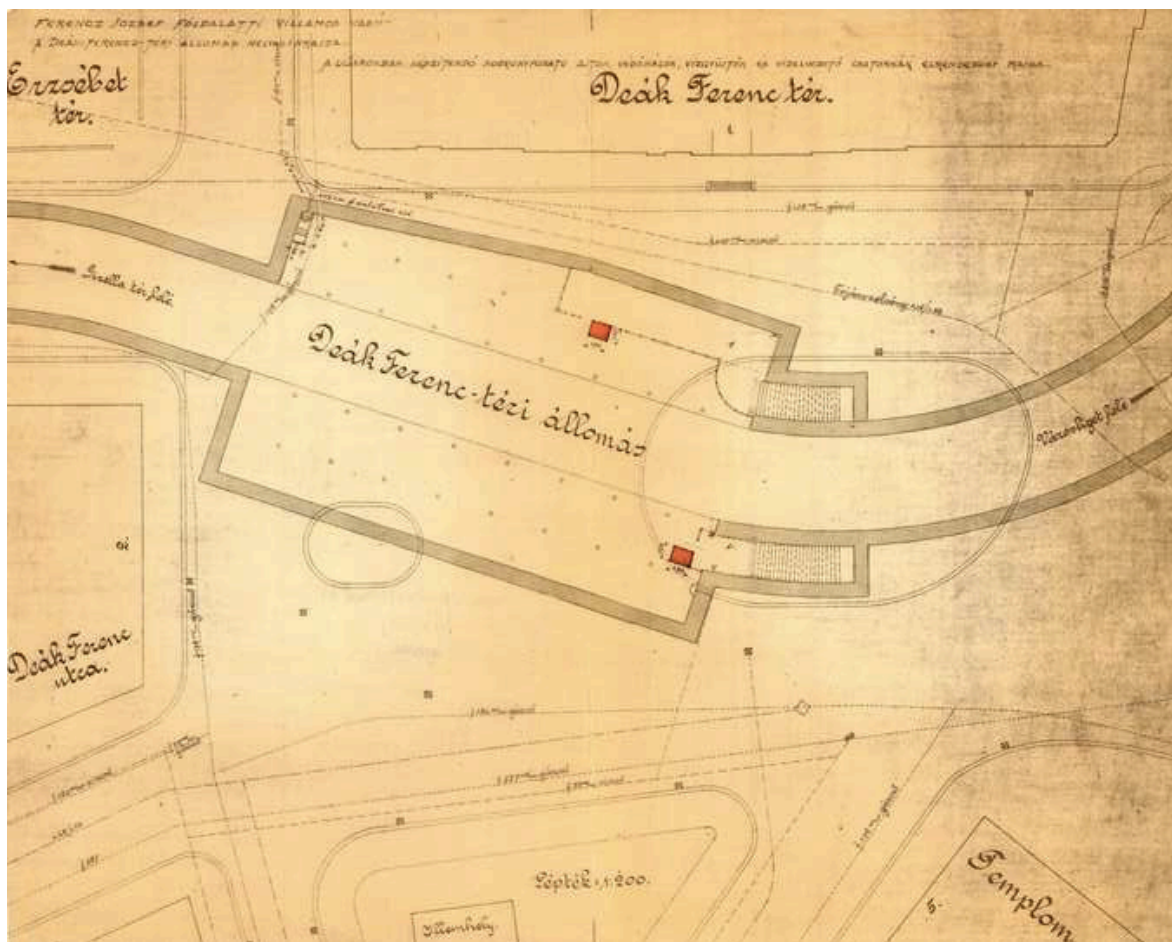


Figure 5

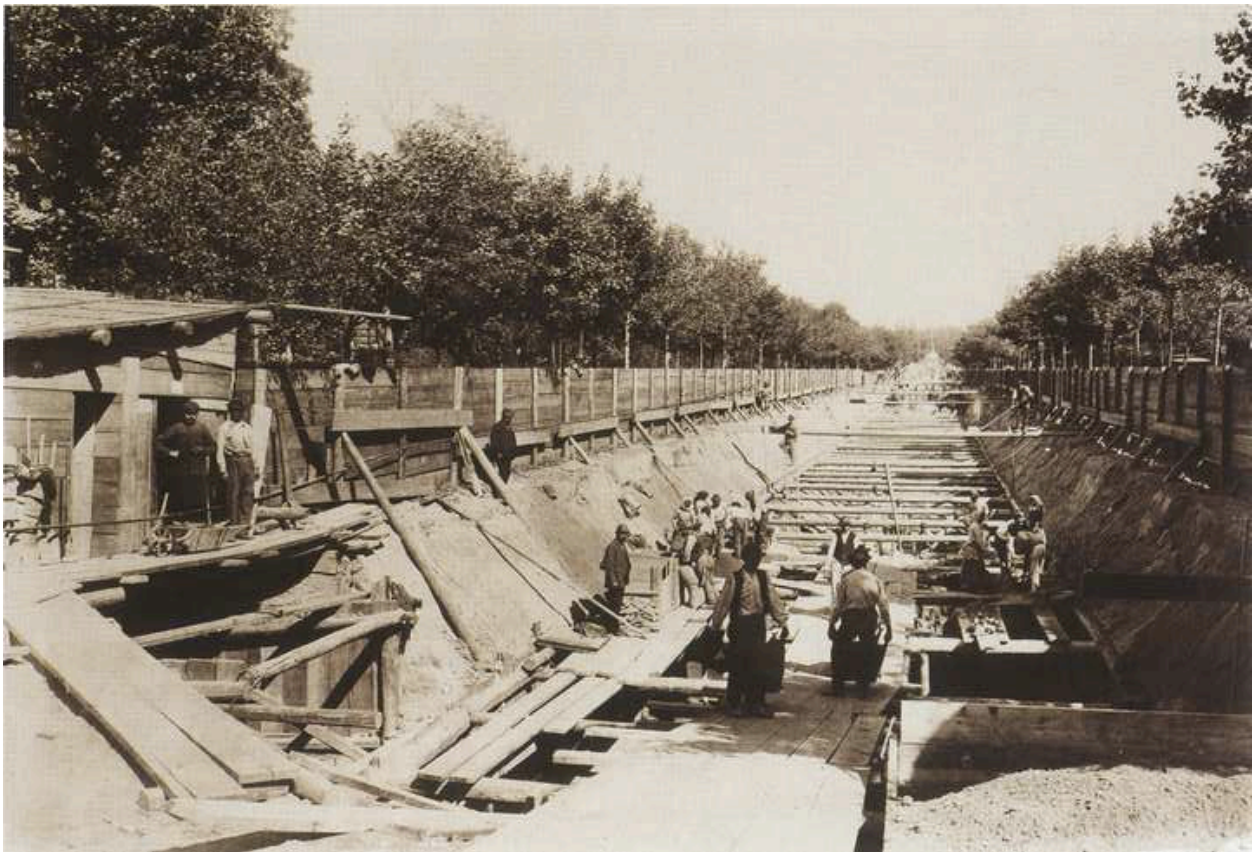


Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14



Figure 15

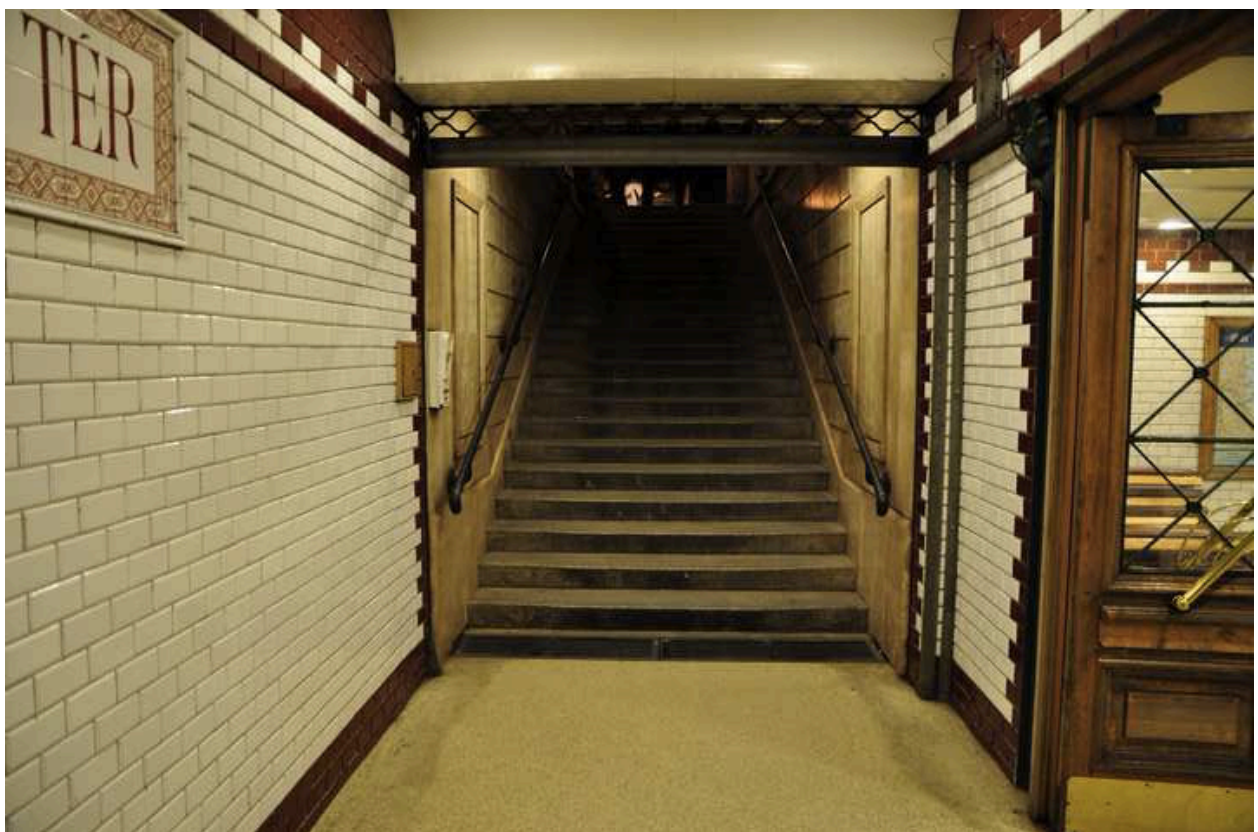


Figure 16



Figure 17

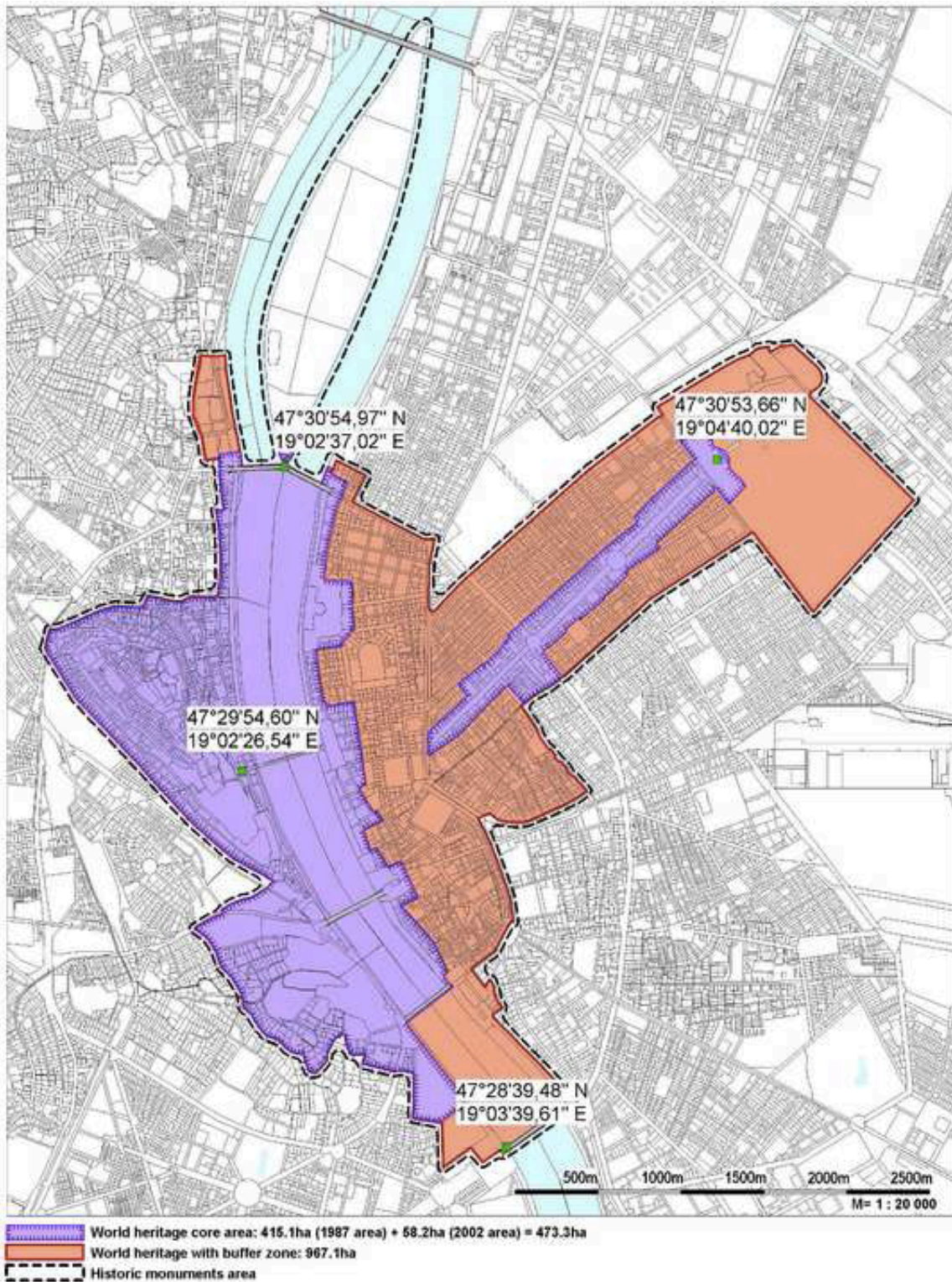


Figure 18