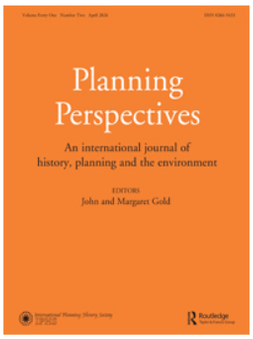

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Urban green spaces in historic Hungary: planning, design, and modern legacy (1867–1918)

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ABSTRACT

Following the 1867 Ausgleich, Historic Hungary as part of Austria-Hungary underwent an intense era of urban modernization. This study examines how urban green spaces evolved from representative tools into organic components of the urban fabric. While theorists like Camillo Sitte and Josef Stübben provided foundational models, local experts like Antal Palóczi synthesized and adapted these concepts to address specific Hungarian urban challenges and local circumstances. Through morphological analysis and integration depth studies of Sopron and Arad, the research evaluates how late nineteenth-century regulatory plans shaped contemporary structures. Findings reveal that Sopron's historic core maintains highly preserved urban green spaces. Conversely, in Arad, modern development has often led to the residential conversion of planned green zones, failing to fully utilize potential ecological connectivity. These historical principles remain decisive for the accessibility and spatial continuity of modern cities in the former Hungarian Kingdom.

KEYWORDS

Historic Hungary; urban planning; Camillo Sitte; urban green spaces; Antal Palóczi

Introduction

Economic, social, and urban planning changes resulting from the Austro-Hungarian *Ausgleich* (compromise agreement between the former Austrian Empire and the former Hungarian Kingdom in 1867) significantly influenced the development of urban green spaces and the underlying urban planning concepts within the Austria-Hungary. Following the Compromise, greater emphasis was placed on developing the urban landscape, with the establishment of parks and gardens serving as one means alongside the transformation of the built environment and urban structure. Green spaces developed for both representative and public health reasons, and established during the second half of the nineteenth century's progressive urban development as constitute part of the current urban structure, despite continuous changes in urban fabric and structure throughout the twentieth and twenty-first centuries.

A complex analysis of towns in the Hungarian part of the former Austria-Hungary[1] allows for the definition of these developmental characteristics (patterns) within Habsburg Central Europe.[2]

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[1]Lovra, Városok az Osztrák-Magyar Monarchiában.

[2]Blau, "The City as Protagonist," 11.

The study is focusing on green spaces developed in the second half of the nineteenth century and early twentieth century, whose location and accessibility also influence the fabric development of contemporary cities.

In the post-Compromise era (until the end of the nineteenth century), a greater emphasis was placed on the representative development of the urban landscape, with the establishment of parks and gardens serving as one tool for representation, alongside the transformation of the built environment and urban structure. From the last third of the nineteenth century, the professional aspects and principles of urban development and planning became a focal point for the architects and engineers of the time in the territory. Alongside the structure and built environment of cities, the function of urban green spaces (public parks) within the urban structure gained increasing importance in the cities of Habsburg Central Europe. Professional summaries and handbooks that appeared in the last decades of the century (authored by Josef Stübben, Camillo Sitte, Reinhard Baumeister, Antal Palóczi) also addressed the natural environment within the city, which was important from both aesthetic and public health perspectives. In addition to defining urban planning principles and in harmony with them, landscape architectural proposals were also put forth. This was because green spaces, which had previously been treated as separate entities, began to be viewed as organic, interconnected parts of the city's street-and-square system at the turn of the nineteenth and twentieth centuries, partly due to the theoretical works of the Austrian architect and planner Camillo Sitte [3], and partly of the German urban planner Josef Stübben[4] or the Hungarian architect and urban planner Antal Palóczi.[5] Within the discourse of Central European urban planning, Palóczi's significance remains relatively under-recognised; nonetheless, his theoretical contributions, masterplans, and proposals defined an era that prefigured ecologically conscious design.

By examining two case studies through a methodological synthesis of space syntax and urban morphology – analysing both the historical context (original plans) and the contemporary environment – this study aims to demonstrate the innovative nature of urban planning within the specific framework of Habsburg Central Europe.

The study addresses the following questions:

- How did the theoretical tension between engineering and artistic planning influence the implementation of green spaces?
- To what extent do late nineteenth-century regulatory plans continue to dictate the accessibility and spatial continuity of modern Hungarian cities?
- What was the role of influential planners like Antal Palóczi in adapting international theories to local urban challenges?

Literature review: theoretical foundations

Between 1867 and 1918 the Habsburg Central Europe, specifically the Historic Hungary where our case study towns lie, experienced an intense and productive era of urban modernization and growth. While urban structural development was most dynamic at the turn of the nineteenth and twentieth centuries, the economic and social shifts following the 1867 *Ausgleich* triggered

[3]Sitte, Der Städtebau.
[4]Stübben, Der Städtebau.
[5]Palóczi, Budapest főváros alaki rendezéséről.

significant urban growth. This agreement catalyzed progressive urban development and the industrial revolution, which had been comparatively delayed in the region.[6] The evolution of urban areas was profoundly shaped by a paradigm shift in urban planning, influencing urban fabric, typologies, and construction methods. New directions in urban structure development were largely driven by economic changes and the distinct functions of settlements, with landscape features playing a lesser role. During this time, the foundations of modern urban tissue, along with its associated forms and facilities, were established. However, the implementation of modern urban planning ideas did not always proceed smoothly within the Historic Hungary (1867–1918), where urban development often followed broader European urbanization trends, albeit with a noticeable delay.[7]

The evolution of urban areas was shaped by a paradigm shift in planning that established the foundations of modern urban tissue. Modern urban planning principles and a shared urban design language, characterized by elements such as ring roads, avenues, and city parks, served as a unifying framework for town shaping across the entire Austria-Hungary. Although, the urban planning practices commenced in the first half of the nineteenth century. Regulations enacted during this period, initially justified by safety and hygiene concerns,[8] partially addressed public health, transportation, and aesthetic requirements that became fundamental to late nineteenth-century urban design. While green spaces were integrated into the urban tissue within these regulatory decrees, without specific independent regulations, distinctions were made between front gardens, parks, and tree-lined avenues.

The engineering vs. artistic approach

The earliest regulatory frameworks in Historic Hungary drew upon the engineering-focused approaches of German urban planners (Reinhard Baumeister and Joseph Stübben). Stübben's comprehensive urban planning guide, Der Städtebau (1890, 1907, 1924),[9] documented the urban fabric, components, functions, and operations of cities during that era. Preceding Stübben's manual was Reinhard Baumeister's 1876 work, Stadt-Erweiterungen in technischer, baupolizeilicher und wirtschaftlicher Beziehung,[10] which laid the theoretical groundwork for engineering-based urban planning.

The Viennese architect and urban designer Camillo Sitte, in his work *Der Städtebau nach seinen künstlerischen Grundsätze,* re-established urban planning practices on new foundations, advocating for the arrangement and design of cities based on aesthetic principles. His work emphasized the importance of restoring continuity with the past, favouring streets that adapted to the terrain over modern, straight avenues. This contrasted with the engineering-functional design approach of his contemporary, Otto Wagner,[11] as evidenced in Wagner's urban planning competition entry, his study *Moderne Architektur*[12] and *Die Großstadt.*[13] Otto Wagner opposed Sitte's design concepts, rejecting the architectural and urban patterns of the past.[14] He championed the creation of urban fabric and structural forms based on their primary functions. In his plan for the Vienna

[6]Lovra, *Városok az Osztrák-Magyar Monarchiában.*
[7]Moravčíková et al., "Antal Palóczi," 371–81.
[8]According to the Building Codes for Vienna (1827), Pest (1839), Prague (1815).
[9]Different editions of the first handbook from 1890.
[10]Baumeister, Stadt-Erweiterungen.
[11]Wagner, Írások, tervek, épületek.
[12]Wagner, Moderne Architektur.
[13]Wagner, Die Großstadt.
[14]In his essay, Schorske, "The Ringstrasse," 24–115. Carl Emil Schorske explores the urban planning and architectural language prevalent during the era of Vienna's Ringstraße, and by extension, the liberal cultural system of that time. He illuminates the contrasting ideologies and principles of the period's two leading urban planners, Otto Wagner and Camillo Sitte.

urban planning competition, *Die Großstadt*, Wagner defined urban blocks as new, functional entities forming cohesive units. These units comprised parallel radial and perpendicularly intersecting streets and public squares, created by the open spaces resulting from building blocks. According to Wagner, the ideal metropolitan districts consisted of uniform residential blocks situated between monumental public buildings arranged along a central axis of green spaces.[15]

The works of Sitte, Stübben, and Baumeister are closely linked to the discipline of urban morphology, which emerged in the mid-twentieth century, as their writings incorporate typologies of space and urban morphological analyses. Sitte not only examined the physical forms of spaces but also identified them as venues for social interaction. Christian[16] draws parallels between Baumeister's and Sitte's interpretations of space, highlighting the divergence between their two distinct approaches to urban planning. While Baumeister analyzed 'model configurations' and 'considers public places primarily as factors for traffic, fire hazard, air quality, or future planning purposes',[17] Sitte studied towns to derive his aesthetic and social conclusions.

Camillo Sitte, in his 1889 work that reframed urban planning with an aesthetic approach, addressed the aesthetic and public health aspects of urban green spaces within chapters dedicated to urban planning systems and their development. He distinguished between individual trees, tree-lined avenues, and gardens as elements of urban greenery. From a functional perspective, he categorized green spaces as either decorative (serving an aesthetic function) or public sanitation/public health (hygiene-related) green spaces.[18] The latter category included larger green areas located in suburbs and enclosed gardens (surrounded by building blocks). This classification reflects his assertion that green spaces within a city can only fully serve their purpose if they are situated in areas enclosed by rows of buildings.[19] Decorative green spaces, serving aesthetic functions, were to be located on streets, in squares, and near transportation hubs. Sitte also recommended incorporating water features in their design and highlighted the contrast between small, picturesque green spaces and adjacent buildings. Greenery, according to Sitte, '(…) constitute an important hygienic factor, and they also afford the undeniable charm of landscape elements in the middle of the big city and, occasionally, a splendid contrast between groups of trees and architecture.'[20]

In his work, Stübben also analyzed green space systems,[21] which he termed *Gartenplatz* (garden square/place). Stübben consistently employed the term *Platz* (place) in his explanations and classifications for both public squares and green spaces, partially including avenues within this designation. Notably, two sections of his handbook, '*Gartenplätze*' and '*Architekturplätze*,' are particularly significant, as they study the relationships and types of public buildings (both sacred and secular) and open spaces. Fundamentally, he examined variations of public spaces within the context of an open place (*Platz*), specifically their relationship to a particular building or complex of buildings.

Josef Stübben approached urban spaces based on their significance from an urban planning perspective. He specifically differentiated urban green spaces, or *Gartenplätze* (garden squares/places), dedicating a distinct chapter, '*Städtische Parkanlagen*' to their analysis and typology. In this section, he defined the concept and criteria for each type of green space. His further classifications included planted streets (*Bepflanzte Straßen*), planted squares (*Bepflanzte Plätze*), and parks (*Parkanlagen*). Within these categories, he extensively discussed additional types, such as ornamental parks

[15]Bohl and Lejeune, Sitte, Hegemann and the Metropolis, 251.
[16]Christian, "The Sociality of Form," 499–500.
[17]Ibid.
[18]Collins and Collins, Camillo Sitte, 319.
[19]Ibid., 266.
[20]Ibid., 238.
[21]Stübben, *Der Städtebau*, 161–70.

(*Schmuckanlagen*), which fulfilled both aesthetic and public health criteria, and recreational areas (*Erholungsplätze*) significant for public health. A park was defined as a continuous green area, with types including the city garden (*Stadtgarten*), people's garden (*Volksgarten*), city park (*Stadtpark*), civic park (*Bürgerpark*), and city forest (*Stadtwald*). Thus the *Gartenplatz* manifests at various levels of planning, encompassing tree-lined avenues, parks, or tree-filled urban squares. Stübben recommended planting of tree-lined avenues (Figure 1), stating that streets should feature avenues, garden squares, and other decorative elements.

However, Sitte, driven by aesthetic considerations, directly opposed what he considered the monotonous symmetry created by the rhythmic and predetermined placement of trees. He articulated this opposition, stating that 'That motif of the allée is in itself a burning indictment of our taste. Can there then be anything more absurd than to take the free and natural forms of trees, which in the city serve the precise purpose of reminding us of open nature, and to arrange these repetitiously, identically in height, at mathematically exact intervals, in geometrically straight lines (…)?'[22] Beyond monotony, Sitte argued that tree-lined avenues obstruct views of public buildings and villas and interrupt the overall visual experience.

While Sitte's and Stübben's work did not yet frame green spaces within a systemic context, it foreshadowed the increasing emphasis on establishing parks and strengthening their role in urban design and urban planning.

Antal Palóczi's synthesis

The integration of modern urban planning practices and the establishment of a unified urban regulatory system[23] in Historic Hungary (as constitutional part of Austria-Hungary) experienced a notable delay. This occurred despite contemporary urban developers being well-informed about the prevailing trends of their time. Consequently, the foundational principles and direction of urban regulation during this period were not shaped by the pioneers of urban development theory and practice. Instead, this task fell to experts who synthesized the insights and experiences of their foreign predecessors and peers and skilfully adapted them to address local circumstances and challenges. Antal Palóczi, from the 1880s onward, closely monitored various currents within modern urban planning theory, practice and principles (public health considerations, the demands of transportation, and aesthetic design in planning).[24] In his influential role with the Hungarian Society of Engineers and Architects (Magyar Mérnök- és Építész-Egylet), Palóczi analysed and critiqued contemporary regulatory decisions, assessed the outcomes of urban planning competitions, and provided comprehensive critical summaries of the annual operations of the Metropolitan Public Works Council (Fővárosi Közmunkák Tanácsa). He also put forth numerous proposals aimed at enhancing urban regulation specifically within Budapest. Drawing on these innovative concepts, he developed a substantial number of urban development proposals and architectural designs.

Antal Palóczi, in his seminal study from 1903, *The Regulation of Cities – A Comparison with Budapest's Conditions* (*A városok rendezése – Budapest viszonyainak egybevetésével*), quotes the first tenet of urban planning requirements from the German Congress for Public Health (*Deutscher Verein für öffentliche Gesundheitspflege*): 'Every developing city needs an urban plan that encompasses a unified and plenty of area for external expansion, as well as for the improvement of its

[22]Collins and Collins, *Camillo Sitte*, 320.
[23]The first building regulation, which not only regulated the building process but could be considered urban regulations, was named in the early 1870s (*Az építési ügyet a fővárosban szabályozó utasítás. 1870. évi X. t.-cz. 22.§.*).
[24]Lovra, "The Forgotten Urbanist," 212–23.

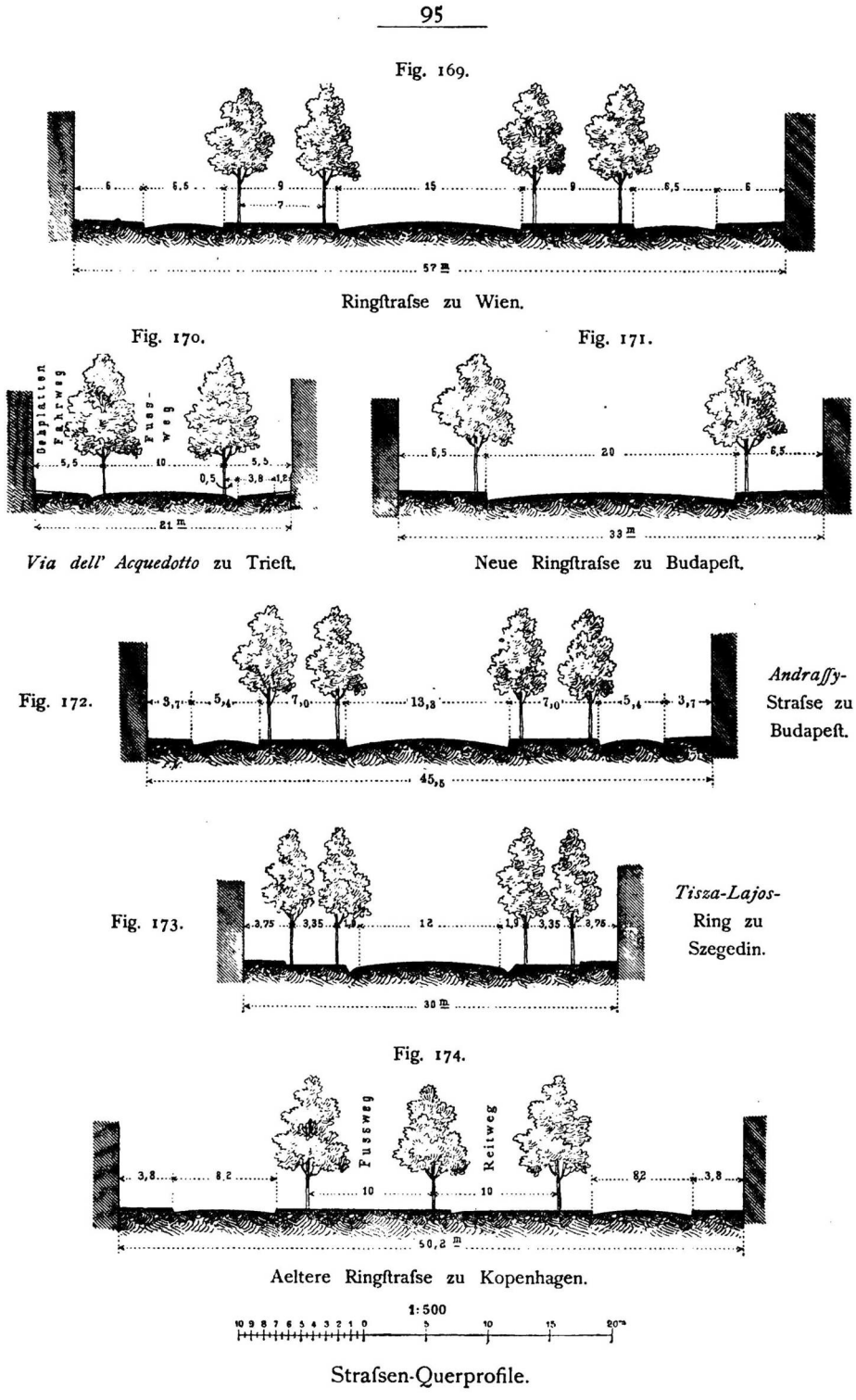

Figure 1. Ringstrasse in Budapest and Szegedin (Szeged). Source: Stübben, *Der Städtebau*, 95.

internal parts.'[25] By citing this, Palóczi introduces and highlights the post-1867 efforts in Historic Hungary that sought to regulate and expand cities not as zones, but as cohesive entities. Furthermore, his theoretical work also explored the planning of green spaces for Budapest, but in his practice he implemented the ideas to his urban plans. In his practical urban planning endeavours, Palóczi primarily adopted the functional principles and artistic approach to urban design by Camillo Sitte. Conversely, in his theoretical writings, he drew upon the analytical insights and systematic methodologies of Josef Stübben,[26] as well as the theories of Reinhard Baumeister. Palóczi acted as a bridge between international theories and local practice. While he valued Stübben's systematic methodology, his own proposals often reflected Sitte's artistic influence, particularly in his emphasis on visual variety and the preservation of historical character.

Palóczi considered the German system and the example of Vienna to be exemplary models for urban and building regulation in Historic Hungary: 'In Germany, Adickes and Baumeister initiated the progressive building regulations that, during the 1890s and the first decade of this century, particularly through the advocacy of the »*Deutscher Verein für öffentliche Gesundheitspflege*«, became widespread in all large and medium-sized German cities, in Scandinavian countries, and in the Netherlands, and also took root in England in a somewhat modified form. However, they have not yet gained traction in Belgium, France, Italy, etc.'[27]

Professional summaries and handbooks from the upper mentioned authors, alongside the development of the built environment, also addressed the natural environment within the city, which was crucial from both aesthetic and public health perspectives. Beyond defining urban architectural principles, and in conjunction with them, these works also offered concrete landscape architectural proposals. While in urban morphology green spaces are typically regarded as distinct units of cities, leading to a diminished focus on the urban morphological study of green areas, at the turn of the nineteenth and twentieth centuries, influenced by the theoretical works of Camillo Sitte, and to some extent Josef Stübben or Antal Palóczi, public parks and smaller green areas were treated as organic, interconnected components of the cities' street-and-square systems.

The economic, social, and urban planning transformations that emerged as a result of the *Ausgleich* significantly influenced both the development of urban green spaces and the underlying urban planning concepts. Frigyes Podmaniczky, vice-president of the Metropolitan Public Works Council, established in 1870 in the Hungarian capital of Austro-Hungary, also advocated for the creation of parks (public gardens / public parks). Beyond establishing new ones, also transforming of existing ones to meet public health standards, thereby creating green zones within the capital. He proposed the establishment of green spaces (public parks, avenues) not only in newly developing urban areas but also along the promenades and squares of the city's inner, already built-up areas (he latter reflecting the *Platz* concept of Stübben and Sitte). Podmaniczky articulated this vision, stating: 'Wherever a square (or space)[28] exists in our capital that can be dispensed with, it should be transformed into a promenade, following the English example; this is all the more our duty because, during the establishment of the suburbs and newer city districts, we neglected the principle, so successfully adopted abroad, according to which entire rows of gardens run in front of houses, lending such a pleasant and cheerful appearance to those cities; here, the heap of stones has completely silenced nature – wherever possible, let us open a path and space for it.'[29]

[25]Palóczi, *Városok Rendezése,* 47.
[26]Palóczi translated sections from the handbook by Stübben and used in his works. See more in Lovra, "The Forgotten Urbanist."
[27]Palóczi, "Az építésügyi szabályzatok kérdéséhez," 28.
[28]*Tér* in Hungarian means both space and square / plaza.
[29]Podmaniczky, Egy régi gavallér emlékei, 441.

In the development of green spaces, which formed an integral part of the cityscape and encompassed various scales of the natural environment, their accessibility played a decisive role. Efforts to improve access to urban parks and recreational areas gave rise to public transportation; for instance, the first urban railways connected these recreational zones with the city.[30] A significant portion of urban green spaces (including private gardens and public parks) transitioned into municipal ownership during the last third of the nineteenth century and the early twentieth century.[31] These primarily served purposes of urban beautification and representation, with public health considerations playing a less prominent role. Newly established parks and gardens were typically developed along new road infrastructure. Antal Palóczi believed that tree-lined avenues emphasize the significance of a street. He stated: 'Tree-lined avenues can only be successfully planted in a street if they can be placed at least 6 m from building facades. Therefore, 24–26 m is the minimum street width where tree-lined avenues can be employed.'[32]

Landscaping of market squares, the creation of green areas along the former city walls (in the glacis zones) and on the sites of demolished fortifications (urban fringes in the urban fringe belt concept) were crucial for urban green spaces development in the nineteenth century. These open spaces remained undeveloped despite dense urban construction, allowing the increasing demand for establishing green spaces to be traced through the process of landscaping market squares. In the post-1867 era, the representative development of the cityscape received even greater emphasis. One prominent tool for this was the establishment of parks, which not only became integral to daily life but also served to represent national identity (through statues and monuments placed within these green areas) and civic consciousness.[33]

Data and methods

This research employs a dual-methodological approach to evaluate the relationship between historical planning and contemporary urban form.

Urban morphology and fringe belts

The study utilizes the 'fringe belt' concept, as in urban morphology J. W. R. Whitehand[34] conceptualizes urban green spaces through the lens of the fringe belt, a concept defined by M. R. G. Conzen as a distinctive zone of land-use units formed at the definitionally static edge of a town.[35] Fringe belts are zones of land-use units that form at the edge of a town during periods of slow growth. Whitehand distinguishes between 'continuous' and 'discontinuous' green-space fringe belts:[36] the former typically arise from physical limitations such as topographical barriers, while the latter result from temporary pauses in urban expansion. Urban green spaces are often key components of these belts.[37] This study identifies and classifies green spaces into inner, intermediate, and outer fringe belts to track the city's expansion phases.

[30]Magyar, "Társalkodási kertek."
[31]Csepely-Knorr, Barren Places to Public Spaces, 27.
[32]Palóczi, A mai városépítés, 9.
[33]Magyar, "Társalkodási kertek."
[34]Whitehand, "Urban Fringe Belts," 47–58.
[35]Conzen, Alnwick.
[36]Whitehand, "Green Space in Urban Morphology," 5–17.
[37]Bereczki, "Elválaszt, majd összeköt," 164.

Space syntax analysis

Space syntax is used to quantitatively measure the accessibility and connectivity of urban green spaces. This method treats the urban environment as a network of interconnected spaces.

- Axial Maps: These maps represent the longest visibility lines within the urban fabric.
- Integration Values: We calculate the average depth of green spaces relative to all other spaces in the network. A high integration value indicates that a space is easily accessible and well-connected to the rest of the city.

To represent the overall change in the urban fabric, it is crucial to define the integration depth of urban green spaces within the built environment. This is achieved by calculating the integration of green spaces with the average depth of urban green areas compared to all other spaces.[38] Axial maps can then analyse the continuity of the urban fabric. The main focus is on the location of green spaces within each selected city. The presence of urban green spaces in the landscape is a key measurement to understand how different components of the built environment shape the spatial and temporal aspects of urban structures. These structures evolve over time, defining the urban environment. The presence of urban green spaces in an urban landscape is a crucial indicator of understanding the spatial and temporal aspects of urban structures. These structures are shaped over time through the integration of various components of urban form, defining the urban environment. The space syntax theory, developed by Bill Hillier and Julienne Hanson,[39] utilises streets as the integration dimensions (components) of urban spaces. Green space typologies were derived from historical developmental stages, identifying spaces as artifacts of fringe belts caused by stagnation in the urban tissue. Consequently, inner, intermediate, and outer fringe belts were distinguished by the spatial continuity of the green fabric within urban boundaries.

Case study selection: Sopron and Arad

Sopron (in present-day Hungary) and Arad (in present-day Romania) were chosen as case studies because they represent significant settlements of historical Hungary where modern planning principles were applied with distinct results in the early twentieth century. Antal Palóczi played a role in the planning for both cities, acting as either an advisor and reviewer of the development plan or as the lead urban designer. The differing approaches in these studies also highlight the level of complexity involved: while Sopron involved a comprehensive development plan, the Arad case was limited to two zone plans.

- Sopron: A city with a well-preserved medieval core where the 1905 development plan for the whole city aimed to integrate new residential zones with existing green structures.

[38]The Urban Atlas 2018 vector dataset was utilized to extract urban green space locations, which were subsequently intersected with OpenStreetMap (OSM) road networks in QGIS. To ensure interpretability, composite attributes were reclassified according to historical developmental stages, isolating remnants of fringe belts derived from urban stagnation periods. Three fringe belt categories (inner, intermediate, and outer) were identified based on green fabric continuity. Quantitative indicators of the spatial system were generated via the Space Syntax Toolkit (DepthmapX) and overlaid with green space data. This analysis integrated georeferenced historical maps with descriptive morphological approaches. Global integration (radius) measured the spatial hierarchy, with blue representing high integration and red indicating low integration (limited accessibility).

[39]Hillier and Hanson, The Social Logic of Space; Hillier, Space Is the Machine.

- Arad: In this larger regional centre, grid-based expansion presented distinct challenges for the integration of green systems. The inclusion of urban green space was limited to large, isolated areas, as a comprehensive development plan for the entire city was lacking during the period studied.

Findings and results

Sopron: artistic integration and preservation

Sopron, the former capital of Sopron County within the Kingdom of Hungary, lies at the interface of the Eastern Alps and the Pannonian Basin. Following the Treaty of Trianon (1920), the border was demarcated such that the city is surrounded by Austrian territory on three sides (north, west, and south). Today, it holds the administrative status of a city with county rights (*megyei jogú város*) within Győr-Moson-Sopron County, Hungary.

In 1892, Sopron's legal status was that of a free royal town with municipal rights; at that time, the city comprised 1,332 buildings and 27,213 inhabitants, encompassing a territory of 23,195 cadastral yokes.[40] By 1913, the year preceding the outbreak of the First World War, the city maintained its status as a town with municipal rights. During this period, the number of buildings had increased to 1,926 and the population to 33,932, while the total territory had decreased to 22,512 cadastral yokes.[41]

In Sopron's building regulations from the late nineteenth and early twentieth centuries (1898,[42] 1905,[43] 1937[44]), green spaces were primarily addressed in relation to permissible building densities and methods. The city's administration initiated a competition for the development of Sopron's regulatory and development plan, entrusting the preparation to the Hungarian Society of Engineers and Architects (*Magyar Mérnök – és Építész-Egylet*). Antal Palóczi was involved in these preparatory works already in 1901. József Wälder, the chief town engineer, was commissioned to prepare the regulatory plan, and Palóczi was invited to review the development plan in 1904. Antal Palóczi also contributed guidance in drafting the building regulations that supplemented the plan.[45] Notably, these regulations were formulated after the plan proposal was submitted. The 1905 building regulations, applicable to the Free Royal Town of Sopron (*Sopron szab. kir. város területére érvényes építési szabályrendelet)*, served as an amendment to a comprehensive regulatory and development plan (Figure 2) created by József Wälder.

The regulatory plan[46] was based on the city's survey map (*Sopron sz. kir. város belső területének átnézeti térképe*) from the early 1900s.[47] Wälder's visionary plan played a crucial role in shaping the city's construction throughout the early twentieth century. Wälder divided Sopron into eight administrative districts, with each district featuring a central square or a cluster of squares. The urban development plan was discussed by both the author Wälder and Antal Palóczi[48] during

[40]Jekelfalussy, Helységnévtár.
[41]Helységnévtár I. II.
[42]"Szabályrendelet az indóházúton," 1888, MNL-GYMSVSL T8/3847.
[43]Wälder, Sopron szab. kir. város, 1905, MNL-GYMSVSL T4/504.
[44]Heimler, Sopron szabályrendeleteinek gyűjteménye, 1937, MNL-GYMSVSL T2/4533.
[45]See more: Lovra, "The Forgotten Urbanist," 212–23.
[46]Source: HU-MNL-GYMSVSL Sv T 16.
[47]Source: HU-MNL-GYMSVSL XIV.1.b. Sv T 20.
[48]Wälder, Indokló jelentés; Palóczi, "Sopron szab. kir. város," 274.

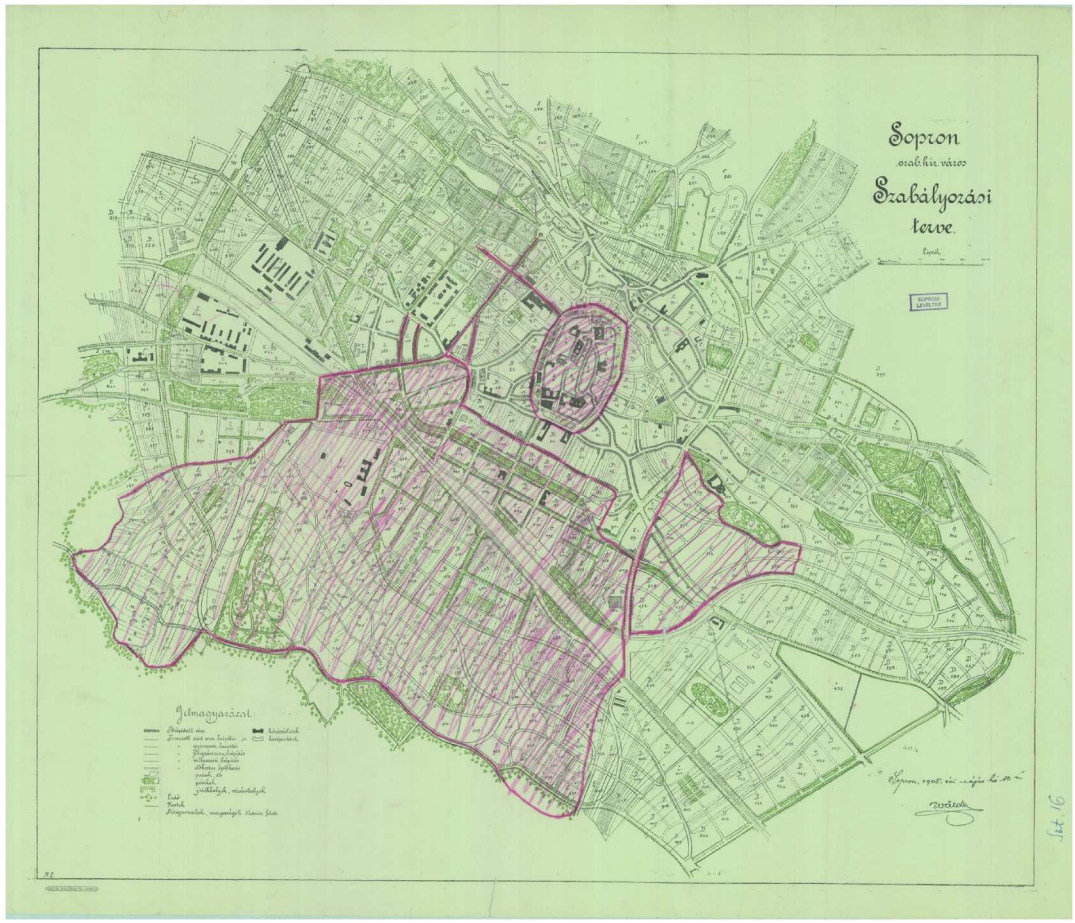

Figure 2. Regulatory plan of the Free Royal Town of Sopron by József Wälder, 1905. Source: HU-MNL-GYMSVSL-XIV.1.b. Sv T 16.

their time. Later, near the end of the twentieth century Mihály Kubinszky provided a detailed description of the plan and its impact on the built environment and urban structure of Sopron.[49]

Palóczi's assessment thoroughly addressed every aspect of the plan. He analyzed the innovative zoning classifications and the efficient layout of the roads. He frequently drew comparisons to Budapest, as it was a common practice in his analytical and comparative works.[50] In his analysis of Sopron's plan, Palóczi stated: 'It is evident, therefore, that 'public health' considerations are fully satisfied; unlike in Budapest, where for newer city districts, extreme ratios of 1:2.1 and 3:5 were established, meaning the building height is 2.1 times or 1.5 times the street width'.[51] Palóczi referred to the 1894 building regulations for Budapest, chapter X. Paragraph 151[52] and the airspace ratio, the building height tied to the width of the street. The regulations limited the height of the buildings – regardless of the zone – to a fixed two-story height of 17 metres in the entire capital, and

[49]Kubinszky, "Sopron," 185–8.
[50]Palóczi, *Városok rendezése.*
[51]Palóczi, "Sopron szab. kir. város," 274.
[52]Fővárosi Közmunkák Tanácsa, Építésügyi szabályzat, 45.

for taller (three- or four-story) houses, the height depended on the width of the street. According to the regulations, a three-story house may not be built on a street narrower than 10 metres and a four-story house may not be built on a street narrower than 15 metres. The maximum height of a three-story house is set at 21 metres, and that of a four-story house at 25 metres.

In 1906, while drafting the general regulatory and development plan for Sopron, Wälder applied Sittean artistic principles of urban design to challenge the monotony. In his explanatory report, he stated that 'as long, straight streets are tedious, I have rendered them varied and aesthetically pleasing through axial displacement, axial bending, or the provision of concave lateral walls'[53] – techniques directly reminiscent of Sitte's preference for enclosed, picturesque perspectives over the infinite vistas of the gridiron. Wälder's approach extended beyond mere aesthetics to the functional distribution of nature, he maintained that urban residential areas ought to be uniformly supplied with green spaces, landscaped squares, and tree-lined streets. This organic integration of greenery ensured that every four to five new urban blocks featured either a centrally located, enclosed landscaped square – resembalance of the *piazza* by Sitte – or a provision for green spaces within 80–100 m long widenings of the planned residential streets, thereby breaking the visual rigidity of the urban tissue.

In 1912, Wälder wrote about the extensive efforts undertaken for the city:

> "the city's inner area was surveyed and graded at considerable expense between 1894 and 1898. Subsequently, its regulatory and development plan, completed in 1905, was prepared. (…) Here, we encounter a city system inherited from earlier generations, still suitable in many respects today. Its alteration is not deterred by concerns of disrespect, but rather by the immense cost involved in removing the old and constructing new in its place.'[54]

The regulations that followed the plan also envisioned the creation of new parks together with the plan itself. According to Paragraph 13, 'if denominational cemeteries are abandoned for any reason, their areas, once the legally stipulated period has passed, shall not be built upon, but shall be converted into public parks and playgrounds.'[55] However, for other urban green spaces, the regulations primarily focused on front gardens. Coherent public building complexes, a type of urban tissue found in the outskirts of towns, also in Sopron, describe large, well-planned plots typically containing multiple public buildings. These complexes often include public gardens or smaller parks (Figure 3). The plots are usually bordered by streets, although this may not always be the case. The urban fabric of these areas shares similarities with industrial areas and privileged public building zones, but they have distinct features, functions, and specific building layouts. Examples of these complexes include public buildings or army barracks.

The outbreak of World War I in 1914 brought a halt to development, occurring barely a decade after the adoption of József Wälder's urban development plan.[56] Despite this setback, the plan remarkably remained in effect until 1939, when a new urban development plan was approved. A core principle of the new plan was that 'a proper urban development plan must be rooted in the past.'[57] Antal Palóczi had articulated this guiding principle even earlier, in 1909, in relation to Bratislava's urban development plan, stating: 'by understanding the past, I can comprehend the present and deduce its future.'[58] The 1939 urban plan aimed to increase green spaces in the city centre,

[53]Wälder, *Indokló jelentés*.
[54]Wälder, "Sopron," 23.
[55]Source: HU-MNL-GYMSVSL T4/504 7.
[56]Kubinszky, "Az első világháború hatása," 175–8.
[57]Bergmann, "Sopron," 241.
[58]Palóczi and Helmár, Szabályozási kérdések, 2–3.

Figure 3. Sopron's cityscape from Panoráma út (Panorama Road). In the foreground are the buildings which later became part of Sopron University, 1916. Source: Fortepan / Vargha Zsuzsa. Photo no. 273538.

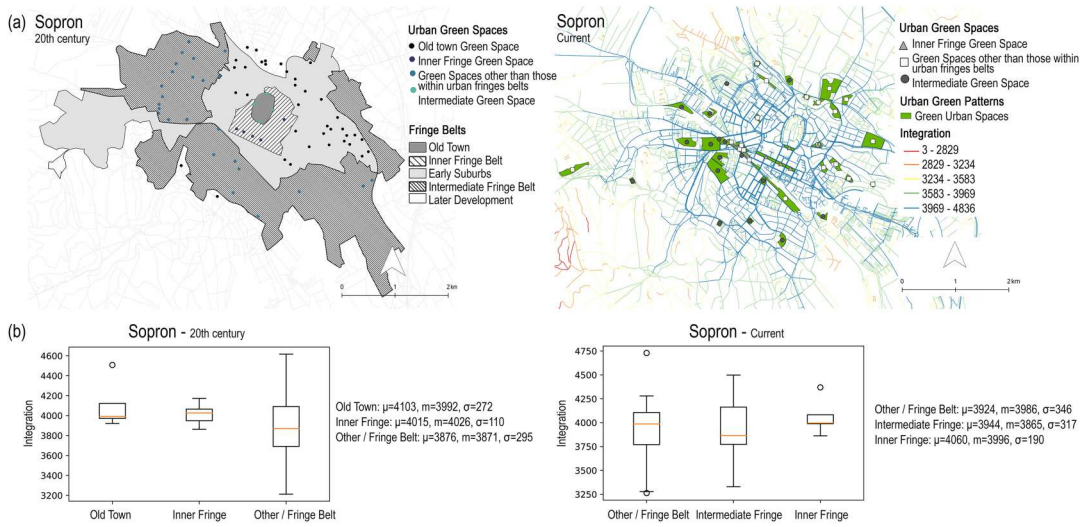

Figure 4. Spatial distribution (a) and Statistical distribution (b) of urban green spaces and their fringe belt formation for the map period of twentieth century and current. Source: Authors, 2026.

enhance accessibility to existing parks, and establish new parks and greenways. Nevertheless, the 1937 regulations primarily addressed only front gardens.

For the past century, Sopron has consistently balanced development with a commitment to understanding and preserving its past. While its outer areas have naturally expanded, incorporating some urban green spaces and forests, the city has maintained a strong focus on heritage. A major highlight of twenty-first-century urban planning has been the revitalization of Sopron's historic

core. This project successfully transformed a traffic-dominated area into a pedestrian-friendly public space, significantly enhancing urban green spaces along the town walls.

In Sopron, the 1905 development plan, prepared by József Wälder and reviewed by Antal Palóczi, reflects a strong Sittean influence. Wälder deliberately used axial bending and concave walls to avoid visual monotony. The fringe belt development (Figure 4) mostly reflects medieval city development, in which the inner core has survived for centuries. In response, the inner fringe belt came into being at the edge of the historic core. It is intelligible as a response to the first expansion of the city border, resulting in the formation of this fringe belt, as the burgeoning of green spaces at the urban core periphery for public purposes is associated with the fluctuation of urban land use development. Pressure for development toward the outer part of the inner fringe zone is a reflection on planning practice in relation to green fringe belt development, which has led to fragmented green areas, notably the growth of built-up areas.

We also noted that the spatial integration of the urban green spaces in Sopron city reveals a clear distinction between the inner, intermediate, and outer fringe developments, reflecting where the urban fabric has been historically preserved and where the integration of urban parks is consistent. The result of the lowest mean integration in the inner fringe belt, aligning with the placement of the historic medieval belt and showing no observable variability, remarkably reflects a uniform land type. This indicates that the historical green spaces are embedded in a way that respects the original urban structure. In contrast, the intermediate fringe belt exhibited the highest mean integration values and reflected moderate variability, likely emerging during more recent urban expansion with a more transitional character, where urban parks evolved alongside fragmented urban development zones. However, the outer fringe belt recorded very high variability and a wide range, suggesting the greatest spatial heterogeneity and a disconnected nature of peripheral urban green spaces that functionally not blend with their surroundings. The statistical distribution shows that green spaces were placed organically, approximately every four to five blocks, to ensure public health and aesthetic variety.

Arad (Romania): planned connectivity vs. modern conversion

Historically, Arad served as the capital of Arad County within the Kingdom of Hungary, a constituent part of the Austro-Hungarian Dual Monarchy. Presently, it functions as the administrative seat of Arad County, situated in the Crișana region of western Romania. The city's geopolitical status shifted on December 1, 1918, when the National Assembly of Romanians in Alba Iulia (supported by the Romanian National Central Council) declared the union of Transylvania and the adjacent territories – including Crișana – with the Kingdom of Romania. This territorial transfer was subsequently formalized under international law by the Treaty of Trianon (1920).

In 1892, the legal status of Arad was that of a free royal town with municipal rights, encompassing a territory of 19,522 cadastral yokes.[59] At that time, the city contained 4,031 buildings and a population of 42,052 inhabitants. According to the 1913 census, the town's territory remained relatively stable at 19,530 cadastral yokes; however, the built environment and demography saw significant expansion, with the number of buildings increasing to 5,785 and the population rising to 63,166.[60]

[59] Jekelfalussy, *Helységnévtár*.
[60] *Helységnévtár I. II.*

In 1890, the building regulations for Arad came into effect,[61] largely dictating the city's expansion until 1935. In 1934, reports indicated that the city was preparing new, modern building regulations,[62] drawing inspiration from urban planning designs in Berlin, Rome, and Budapest, and adapting their suitable elements for local conditions. These new regulations were projected for completion by 1935.

In Romania, all cities were mandated to develop urban planning schemes by 1930. Consequently, in 1927,[63] efforts began in Arad to realize such a plan, envisioning radial urban expansion across a large area. The city's contemporary state and structure were assessed using aerial photographs. A 1927 article in *Transylvanian News* (*Erdélyi Hírlap)* noted that while the city lacked a comprehensive urban development plan for its entirety, attempts had been made during the era of Austria-Hungary, though they remained unrealized. This aligns with Antal Palóczi's 1913 study on the regulation of the Free Royal City of Arad.[64] Palóczi observed (Figure 5):

> Regarding urban expansion, the immediate striking feature is the lack of preliminary systematic planning. The overall city plan consists of various districts established at different times, whose continuity is marked less by an organically developed main road network and more by their accidental juxtaposition. The picturesque disorder of the inner city's road network is surrounded by the regular grid pattern of newer settlements.[65]

In the central area of Arad, near the urban green spaces, a dominant urban tissue type characterised by regular road lines and buildings with dominant winged structures was prevalent (Figure 6). These buildings feature rectangular blocks surrounded by a gridiron street network. Buildings with both-side wings dominate within each plot series. While plots within an urban block have the same dimensions, their placements vary. An inner courtyard is attached to each building, although in most cases, groups of backyards are separated by back or side wings.

Although contemporary plans included the development of a comprehensive regulatory plan for the entire city, its implementation faced obstacles, as the outbreak of World War I, the dissolution of the Austro-Hungarian Monarchy in 1918, and Arad's annexation to Romania disrupted the process. Palóczi's work on urban regulation for Arad primarily focused on the development of Óvár Square (Figure 7) and Béla Square (Figure 8), a task entrusted to him by the Arad City Council.

The Óvár Square area, spanning 40 hectares, directly connected to the inner city area and could be independently regulated and divided into parcels. According to Palóczi's plan, the riverfront accompanying the Mureș river's flood defense embankment was designated as a promenade, adorned with diverse tree-lined avenues extending to the bridgehead.

Béla Square is situated in the city's upper northern part and serves as the entry point for visitors arriving from the railway station. The city authorities placed significant emphasis on the design of this square, aiming to arrange it 'with appropriate artistry and beauty, especially since the new grand railway station had also been completed and put into operation.'[66] Palóczi's design achieved this objective by incorporating a semi-circular park in front of the palace. This park ingeniously connected with the wedge-shaped lawn area, effectively eliminating the angle of the building relative to the main thoroughfare and its visual impact. The square's elevation was also designed to give

[61]Arad szab. kir. város, Arad szabályrendeleteinek gyűjteménye.
[62]"Uj modern építési szabályrendeletet," 5.
[63]"Repülőgépről," 3.
[64]Palóczi, "Arad sz. kir. város szabályozása," 1: 391–92, 2: 401–3.
[65]Palóczi, *Városok Rendezése*, 391.
[66]Palóczi, "Arad sz. kir. város szabályozása," 2:402.

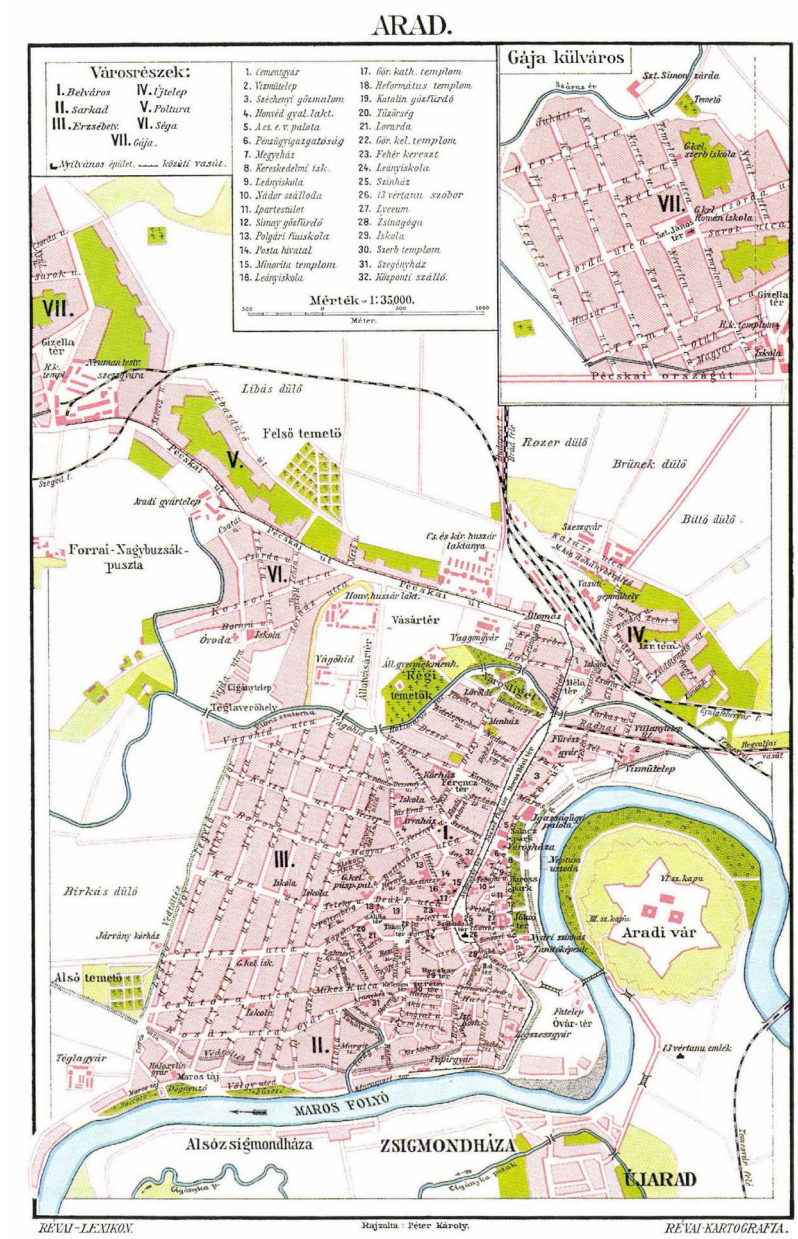

Figure 5. Urban plan of the Free Royal Town of Arad. Source: *Révai Nagy Lexikona* 1911. *Révai Nagy Lexikona*, s.v. 'Arad.'

the park sections a concave shape, making the building appear to rise from its surroundings. This main route, featuring wide, tree-lined pedestrian promenades, connected the railway station to the city centre and was intended for dense commercial development. The expansion of the city park was planned to incorporate the cemetery which lost its function and the marketplace; these additions were projected to quadruple its size compared to its 1913 status.

Figure 6. Arad, Romania: Mureș Riverbank Facing the Palace of Culture, 1919. Author: Vértes Károly. Source: Fortepan / Morvay Kinga. Photo no. 84252.

The plans for the two squares were not realized. Over the subsequent century, the city experienced progressive development, with its outskirts and the area adjacent to the Mureș river becoming built up. On the current city map, it is evident that the former Óvár Square is now entirely developed, whereas the area of the former Béla Square remains partially undeveloped.

When a fragmented urban development is to be sampled, as in the case of Arad, planned urban green space samples on a city scale may be adequate to represent their potential use (high integration). As investigated in the planned proposals of the two urban green spaces in the early twentieth century (Figure 9), two potential green spaces with the highest integration values had the highest degree of connectivity linked to the city centre through their main entrances. As shown in the figure, the integration values of the entrances are connected to the city's integration by lines with high integration values, implying that these connections are key sites contributing to the integration of green spaces into the town.

In the current state (Figure 10), the highest integration values of these two areas are preserved, supporting continued connectedness and accessibility, as the periphery of the old town is expanded.

The planned proposals for these squares show high integration potential, suggesting they were meant to be highly accessible public hubs. Although the highest integration values of the two park regions have been preserved, the planned green zones have so far been developed for residential purposes. This indicates that the potential ecological connectivity of the two sites has not been fully utilized, probably due to increasing demand for housing supply as a result of their connection with cross-border routes that provide access to the southern and northern parts of Arad city.

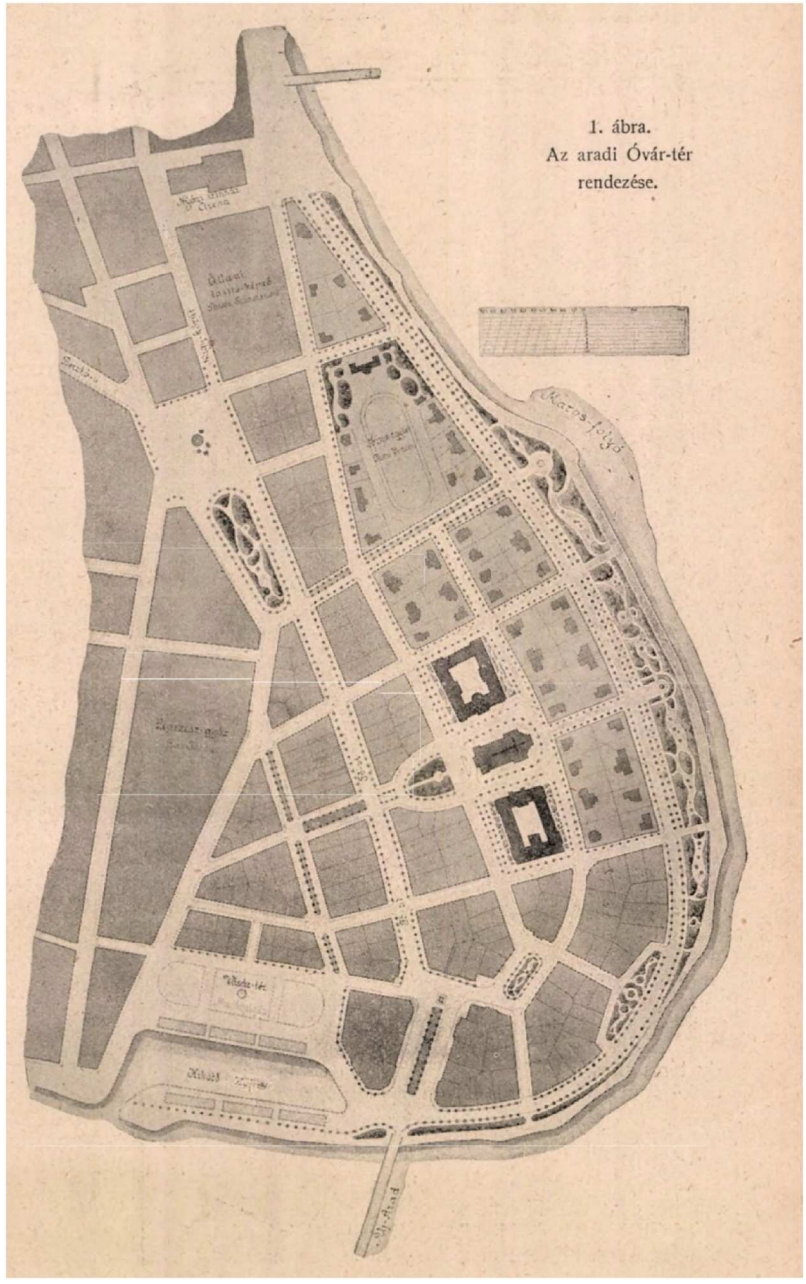

Figure 7. The Redesign of Óvár Square in Arad. Source: Palóczi, 'Arad sz, kir. város szabályozása, 1.', 391.

Despite this, the areas, which can be identified as the suburban area of the city and reflect intermediate fringe development, are capable of halting urban sprawl and improving the public transport network without creating an environmental burden, in addition to increasing the density of residential areas in relation to the development of the housing stock.

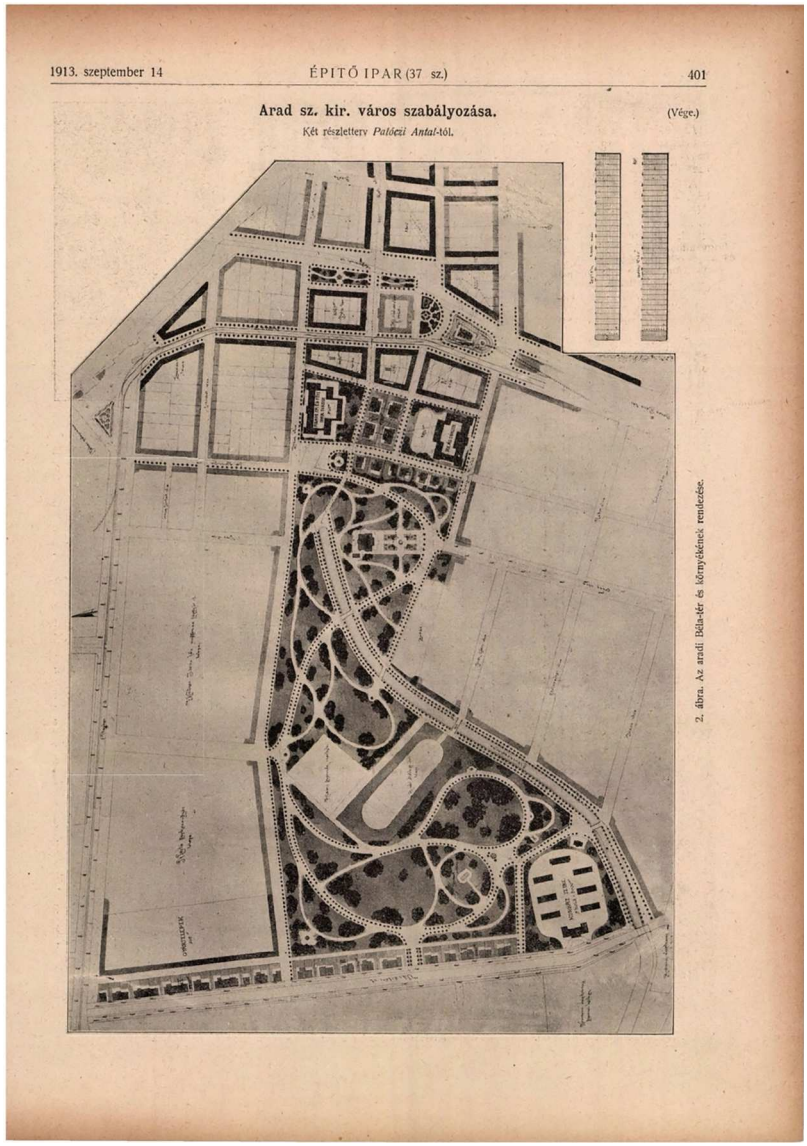

Figure 8. The Redesign of Béla Square and its Surrounding in Arad. Source: Palóczi, 'Arad sz, kir. város szabályozása, 2.', 401.

Discussion: urban green spaces' integration as a measure of change

The research demonstrates that the transition of cities into modern metropolises in Historic Hungary was rooted in the late nineteenth-century initiatives where regulations, public health, and urban planning first converged. The shift occurred at the turn of the century when green spaces began to be viewed as organic, interconnected components of the urban street-and-square system. Comprehensive urban development plans could not be created without accurate surveys of cities, a practice that only became widespread from the early twentieth century onward. Before then, and often even after, regulations focused solely on smaller areas, and the boundaries between these

Figure 9. Integration analysis of the two planned urban green spaces in Arad town in the early twentieth century. The blue axes represent the highest integration values, while red axes indicates the lowest integration. Source: Authors, 2025.

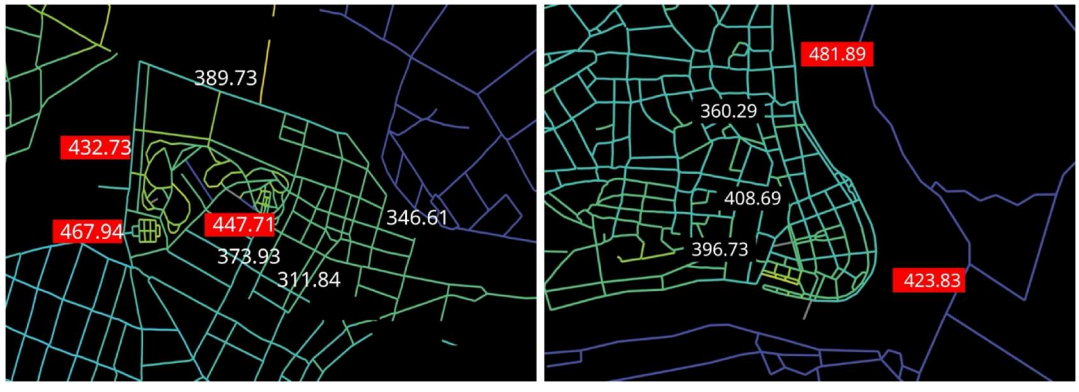

Figure 10. Integration analysis of the current state of Arad town, highlighting the locations of the planned urban green spaces. The red axes represent the highest integration values, while dark blue indicates the lowest integration. Source: Authors, 2025.

zones frequently became misaligned during their separate planning processes. City maps and planning regulations from the second half of the nineteenth century provided a suitable foundation for the initiatives that set cities on the path to becoming modern metropolises. Within the smaller towns of the former Historic Hungary, comprehensive or partial urban plans were drafted, some of which were restricted to individual quarters.

Gyula Éhen already in 1897, in his work *The Modern City* (*A modern város)* defined the main and most crucial conditions for creating a modern and livable city. Besides regulations, public health, and urban planning, emphasis was also placed on the establishment of green spaces:

'(…) planting of tree-lined avenues and the establishment of parks acts not only in accordance with the law but also in the interest of the public health of its citizens.'[67]

The selection of these plans was influenced by the involvement of the aforementioned Antal Palóczy in some capacity, thereby ensuring the implementation of urban planning based on Camillo Sitte's principles. A further criterion for selection was the particular emphasis placed on the design of green space systems within the given urban plan. The integration depth of urban green spaces indicates how historical planning influences contemporary accessibility. Palóczi's unrealized plans for Arad envisioned highly integrated, accessible green squares. A comparison of the case studies reveals significant local variations. Sopron presents a unique pattern, with its lowest mean integration occurring in the highly preserved inner core. The 1905 plan by József Wälder, reviewed by Antal Palóczi, successfully implemented Sittean artistic principles, using axial bending to ensure greenery functioned as natural pauses every four to five blocks. The moderate variability in its intermediate fringe suggests a more controlled, transitional expansion. In contrast, Arad represents a small city sample where high historical integration potential has been compromised. While Palóczi's unrealized plans for Óvár and Béla Squares envisioned highly accessible public hubs, these zones have largely been converted to residential use. The conversion of Arad's planned green zones into residential tissue reflects a failure to uphold what Gyula Éhen termed the legal duty of providing parks for public health and reflects a failure to utilize the high integration potential established by Palóczi's original vision.

The limitations of this study primarily came from its focused geographical scope. The empirical research is limited to two specific case studies, Sopron and Arad, which, while representative of different planning outcomes, may not fully demonstrate the complete diversity of urban development across the entirety of Historic Hungary or the broader Austria-Hungary. While the study highlights the period between 1867 and 1918, the subsequent geopolitical changes, such as the Treaty of Trianon, introduced new urban dynamics and borders that fall outside the primary focus of this research but influenced the modern legacy and physical boundaries of these green spaces.

Conclusion

The theoretical and professional debates of the late nineteenth and early twentieth centuries, particularly the tension between the aesthetic principles of Camillo Sitte and the engineering-driven approaches of Josef Stübben and Otto Wagner were aspects for discussion is the interplay between theoretical urban planning principles and their practical implementation. The evolution of urban green spaces in Historic Hungary was defined by this professional tension. While figures like Sitte and Stübben provided foundational theories for integrating green spaces, the case studies demonstrate how local conditions, economic pressures, and influential local planners like Antal Palóczi and József Wälder adapted and, altered these ideas: their plans consciously adopted Sitte's principles of adapting to terrain and preserving historical continuity. This study concludes that local experts, specifically Antal Palóczi, played a crucial role in synthesizing these international theories to address specific Hungarian urban challenges.

This study empirically demonstrates that green spaces function as structural elements fundamental to urban coherence rather than isolated artefacts, they are fundamental structural elements

[67]Éhen, A modern város, 97.

that dictate urban coherence and accessibility. The comparison between Sopron and Arad highlights how historical principles continue to dictate modern spatial continuity.

Sopron presents a unique pattern of preservation where the green belts are maintained within the urban fabric through the twentieth century. In contrast, Arad demonstrates the intense pressure modern development places on historical planned zones.

The networks established during the Austro-Hungarian era continue to dictate contemporary spatial configuration and accessibility. The integrated methodological contribution by transcending descriptive historiography and static spatial analysis was implemented to frame urban form as a dynamic process. By combining qualitative morphological insights with quantitative space syntax data, this research proves that the networks established during the Austro-Hungarian era remain decisive for the accessibility of modern cities as we can see in case of Sopron.

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