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Youri Rotchniak

TO THE PROBLEMS OF FORMATION OF ARCHITECTURE OF THE RAILWAY PASSENGER NODES IN LVIV

Lviv Polytechnic National University
12, S. Bandery Str., Lviv, 79013, Ukraine
rotchniak.youri@gmail.com

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Annotation. The possibility of functioning of the inner city passenger railway in Lviv and the architectural foundations of the passenger stops and nodes are analyzed. The necessity of such implementation on the basis of a social request, problems of transport overload of the streets in Lviv, usage of existing resources, experience and new trends is expound. In this case, passenger railway buildings are understood primarily as a continuation of the urban communication space.

Key words: city railroad, railway passenger nodes, passenger platform.

1. Introduction

The city passenger railway, according to its technical bases, infrastructure and services, is based on the "classic" railway and is, at the same time, one of the types of urban rail systems. It refers to the broader concept of rail transport, which also includes tram, subway and partly a funicular. In general, it has features of suburban transpotation, subway and to a certain extent of trams. Urban railway passenger nodes (junction) are understood as a combination of stations and railway stations of the city railway with landings of the other types of public transport.

2. Problem statement

The expansion of motor transport in cities, in addition to obvious advantages, has a number of negative aspects, which are due to pressure on street network, seizure of urban space, air, noise and other types of pollution, accidents, etc. The use of rail transport, and in particular, on the basis of the railway, is an important complement to the traffic in cities. It takes over, to certain extent, the task of passenger transportation. As it can be noticed, one of these areas of development is the introduction of urban rail transport, which can effectively use the existing rail tracks, infrastructure and territorial resources of the rail transport. Future passenger stops are understood primarily as passenger transfer nodes. The General plan of Lviv does not specify the use of the railways for intra-city passenger transportation. The experience of the cities of the other countries demonstrates a positive effect of such functioning with the engagement of architecture in the arrangement of passenger stops and nodes.

3. Analysis of recent research and publications

Railway transport is the pivot of communication of the state and regions. It is as well one of the factors of urbanism. Practically all essential urban studies refer to urban transport, in which is always spoken about internal urban movement. For example, in various publications a question of rail transport is considered, first of

all, as out-of-town transport, at the same time road transport is considered as a public one (bus, trolleybus, electric car, taxi). The same is with private transport which is understood as well as one the really main things in the urban on-land transportation [1–9]. These main urban on-land street-road movements have their own usage and development limits, which prompts the search of alternatives.

Researchers claim the importance of railway station complexes as the urban planning multifunctional formations in the urban process (Dreval I., Radlbeck K., Ryabova O., et al. [10–13]). About the role of railway stations for various types of railways and about them as a kind of specific cities inside the cities is mentioned in a number of publications [14–16]. From time to time the attention to the railways in the cities is drawn by scientists and public, which is reflected in the professional and other periodicals [17–20]. The subjects of rail passenger stations and stations in cities were diploma projects of different levels of training of the specialists at the Department of Architectural Design and Department of Urban Development of Lviv Polytechnic [21, 22].

4. Drafting of the the goal of the article

We have an aim to follow up the emergence and conditions of the existence of intra-city rail passenger traffic, the operation and features of the architecture of passenger stops and nodes, as well as the possibility of their implementation in Lviv.

5. Presentation of the research material

Evolution of the city railway. Railway transport reached the greatest dynamics of its development at the beginning of the XXth century. In the middle of the century, it gave way to the automobile transport, and in passenger transportation it gave up to aviation as well. At the end of the century the railway in European countries was revived. In the cities with a rail network the internal urban passenger trains were introduced. To do this partly new lines were planned and old ones renovated. In the German-speaking countries the “Fast Railway” (S-Bahn, from Schnellbahn) has been established as a successful development and implementation of older ideas of urban trains on steam traction.

Around a hundred years ago, “steam locomotive” city railways in some cities, such as Berlin, Vienna, Salzburg, Innsbruck, Kolomyia, and Lviv [20] were being designed and implemented. Due to a number of technical and sanitary problems they were either not brought to the realization, dismantled, or replaced by an electric motor transport. Due to the application of the electric drive, it became “understandable” when the railway lines on off - road tracks penetrated to the centers of Berlin, Vienna, Munich and the other cities. Similar developments are now observed in the Ukrainian cities, and in particular, in organization of the city electric trains in Kyiv. In Lviv in 2009–2010 there was a trainroute of the city railway passenger motor carriage on the diesel drive called “the rail bus” along the Sykhiv – Lviv Main railway station – Pidzamche route. For the servicing of passengers, landing platforms with canopies and pavilions were built, but this form of urban passenger transportation has not been developed.

The railway connection in the European cities is primarily the result of the expansion of settlements outside the railway stations, which in the middle of the 19^{th} century were most often a dead-end at the dead-end stations. Later, the railway link between dead-end stations and city railway stations was achieved by main ways: 1) reconstruction of the existing dead-end stations into the passage railway stations; 2) laying of roundabouts along the city center; 3) construction of the subway.

Over time with the expansion of cities, these by-pass lines, like railway stations, have found themselves in the body of cities and are now perceived ambiguously because of the existing barriers / connections, zoning, resource utilization, safety, cleanliness of the environment, etc. However, since then in the cities there has been created a rail road network with a large communication resource [14].

Architecture of the passenger railway stops and nodes . With the laying of city railways, the task arises to provide space for the provision of access, stays and transfer of passengers. The experience has shown that the terminal stations and nodes stations of the city railways are connected primarily with conventional railway as well as with other types of urban public transport.

The trains of the city railway arrive accordingly to the designated landing platforms by common tracks. City trains have separate marking including separately prescribed schedule and sometimes separate platforms. There are no fundamental differences in the way of the arrangement of landings compared to commuter trains. The difference is in the rythmical and high frequency of motion with short-term stops of the short trains with train cars having more doors, which makes them similar to the subway trains.

The basic design, architectural and construction unit of railway stops and railway stations is a passenger platform connecting pedestrians and people in wheelchairs (or persons with carts) with other routes and spaces. Such exterior structure is often built in the form of pavilions or roof coverings over the platforms. On such platforms there are waiting places and information boards with weather protection over them. Cash premises and other premises in the form of the buildings are absent. The general nature of the construction is spacious, simple, clear and has the appearance of an open passage. The railway station as a building in the "classical" sense is not substantive. In many cases the passenger stops of urban railways have an open non -interior appearance, pretending not to attract attention. They are designed not to facilitate retention of movement and aimed at moving faster.

At the formation of the railway passenger node the concept of approaching of landing to other types of public transport is being implemented. The idea of a short barrier-free communication requires introduction of ramps, elevators since the lines of inernal urban railways have to avoid the crossings of the tracks at one level with motor ways. This spatial-transport conflict is solved by the way of separating the movement on different levels (Fig. 1, 2).

Fig. 1. The platform of the Praterstern railway station in Vienna. Photo by the author

Fig. 2. Klosterneuburg-Kierling stop for the urban and suburban trains. Lower Austria. Photo by the author

Intensification of passenger rail transportation motivates active use of the existing resource. For quick reaching of the city center or nodal stations of public transport more intermediate stops at the end stations are arranged even for distant and high-speed trains, as, for example, in Budapest (Kelenföld), Vienna (Meidling), Lviv (Pidzamche), Kyiv (Darnytsia) and others. There is also a trend in laying of tracks to the airports as the end railway stations for distant and high-speed trains (the Vienna airport). Thus in some cities there is a separate railway for the transportation of passengers to the airports from the railway stations and other transport means.

The city railway of Lviv. The Lviv railway network coincided with the beginning of the XXth century. It is subordinated to the main transit highways with intersection of them at the Lviv railway station: 1) Krakiv / Kraków – Peremyshl / Przemysl – Lviv – Chernivtsi – Suchava / Suceava (constructed in 1850s – 60s) and 2) Kyiv / Odessa – Krasne – Lviv – Mukacheve – Chop (constructed in 1870s – 80s) [23]. The mentioned highways pass partly through the city territory including residential areas. The remaining tracks around the named railway station form a network, which is situated also partly within the city limits. There are quite a lot

of bridge crossings of railways and main highway. These and other factors suggest the possibility of arrangement of stops and allow the installation of passenger platforms for trainstops.

The main railway station Lviv and the other railway stations of Lviv are the nodal passenger stations within the city and they can serve for different categories of trains. From the urban planning and transport point of view as the potential railway passenger hubs, there are the existing Lychakiv, the Palace of culture named after H. Khotkevych, Pidzamche, Sykhiv stops / stations, as well as the non-existent yet railway passenger junction of the Lviv airport in case of building of a track connection to it. At some of the named stoppages, the urban, suburban and long-distance trains can stop, if the length of the landing platform permits, as it is already exists at Pidzamche station. Each of the named stops belongs already to the transport network and can serve as a nodal station. The platforms need to be updated and adapted to new needs. First of all, they need extension, lifting, expansion and marking. They need as well connection with near-station space, including mechanized segments (with elevators, escalators), for walking out and for transport links. In fact, the railway stops near the car bridges over Lviv-Khodoriv railway are the nodal ones.

Restoring, extending and connecting of relatively small sections of the railway tracks in the city and the nearer neighborhoods allows significant coverage of the potential area of passenger servicing. In this context, construction of the future sidecar link of Sykhiv – Lychakiv as the completion of the inner city railway ring in the east end from the center of Lviv becomes the nearest plan [17, 18]. The restoration of the track and the arrangement of the passenger traffic between Lviv and Vynnyki through the station of Lychakiv on the fragment of the former Lviv-Berezhany – Pidhajtsi line also addresses this problem. An important factor in using of the existing tracks for passenger purposes is the presence and proximity of lines and stops to the other types of public transport. Development of the new transport scheme of the city is the basis for further actions and orientation of passenger traffic becomes an integral part of the design process.

The schemes of architectural solution of railway passenger nodes of Lviv. After proper urban planning research and project activities, the architectural solution has to be the continuation of the idea of safe, simple, short, understandable movement, stays and services for passengers. In accordance with the specific situation, installation of landing platforms is consistent with technical capabilities and needs of moving of pedestrians and passengers with carts. The pedestrian and "wheel-roller "connection of the railway platforms with the city and other means of transport is the primary task for solution. Vertical movements become inevitable, both in the natural way by using stairs, ramps and mechanized (lifts, escalators), which are realized with the aim to reach different levels of the street, over- ground and underground passages.

If it is possible, the pedestrian movement has to be carried out by as short as possible trajectories and with light and open for visiting spaces. Visual openness is also achieved by the use of transparent enclosing constructions of serial production. The similar constructions are used in elevators. Organization and coverage of the floor for moving applies all possible tactile and visual properties to provide a sense of safety and comfort for people of different physical condition. The idea of an ongoing "platform-pavement" should be realized on a regular basis (Fig. 3).

For consideration, several districts of the city were taken around the existing railway tracks with a sufficient approximation of other types of public transport, in particular, the tram lines: "Lychakiv" (trams No 2, 10), "Pidzamche" (tram No 6), "Palace of Culture named after H. Khotkevych "(trams No 4, 5, 6),"E. Konovalets street "(tram No 2). These sections are considered as good grounds for the development of railway passenger hubs. A method of combining the landing platform of the railway with pedestrian ways to the sidewalks and landings of the other transport is a priority task. In case of large drops in hight of pedestrian levels it is necessary to use stairs, ramps and elevators. But in case of calculated increase of a large number of passengers the escalators are to be planned in addition as well.

The arrangement of pedestrian-wheeled connection on the sidewalks with elevators in the proposed railway passenger nodes, in addition to the direct passenger transfer function, serves as a spatial "constriction" between the points of landing. A specific compression of space causes a new perception of the city and enriches its image. Due to this, there is an opportunity of getting quickly from one district of the city to another, which, in spite of their physical closeness, are still quite isolated. This

is particularly noticeable in the case of the node near “Pidzamche” and “E. Konovalets street”. The railway passenger node “Palace of Culture named after H. Khotkevych” is the nearest railway “passenger point” to the historic center of Lviv. In addition to the transfer to the tram line, there is a transfer to the trolleybus line No 13 and a number of bus routes. The presence of the Palace of Culture, historical churches, schools, other educational institutions, the Monument to the victims of the Lviv Jewish ghetto and the Memorial to the victims of deportations, the Forum of Lviv, – intensify the attractiveness of this object. All this transforms it into an important railway and public node [10, 11, 13].

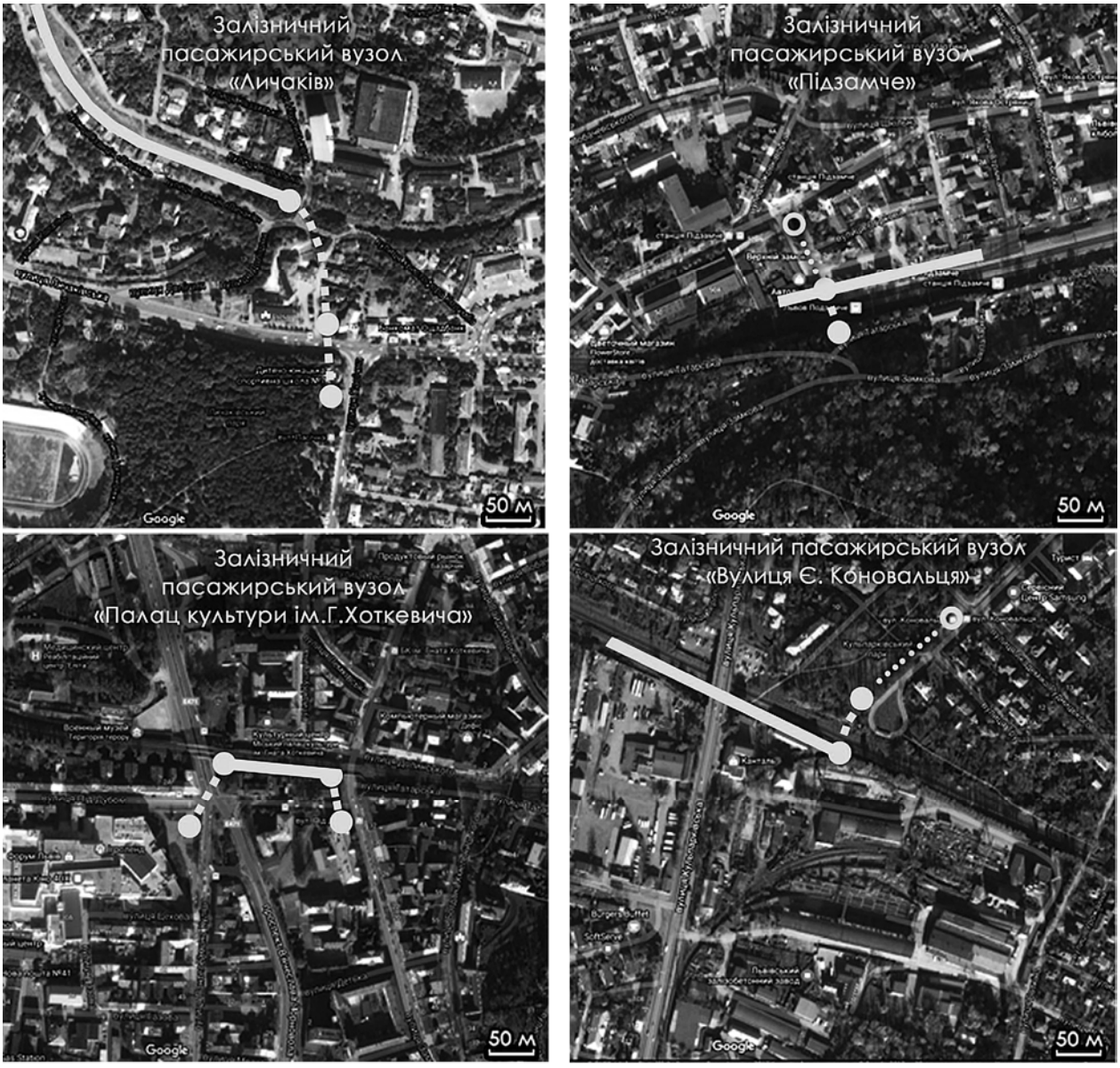

Fig. 3. The schemes of pedestrian movement at the railway passenger nodes of Lviv: “Lychakiv”, “Pidzamche” [21], “Palace of Culture named after H. Khotkevych” [22], “E. Konovalets street”. Denotements: unbroken line – perron (one or two platforms), interrupted line – pedestrian underground / over- ground connection, dotted line – on-ground connection, circle – vertical connection

6. Conclusions

1. City railways are understood as a part of rail transport in public transport in cities and as an addition and functioning within the framework of the united transport system of the city and the railways. Harmonization

of traffic schedules, the number of potential users and economic calculations are the basis for the installation of passenger stops in urban space.

2. A city rail passenger node is formed at the junction of urban planning and design properties as well as a part the railway network. It develops pedestrian communication between transport units of its various types and as a connecting link for the needs of passengers. It also serves as an attraction of social activities.

3. The historically composed railway network of Lviv allows to introduce the urban railways for the passenger needs of the city. The installation of a number of passenger nodes in the most transportable and geographically suitable places around the historic center of the city becomes actual. These nodes are formed on the basis of other passenger types of the urban public transport.

4. Architectural solution of passenger stops of the city railways is subject to the idea of fast pedestrian moving (on wheelchairs, with trolleys) to and from landing platforms and connection with the other means of transport as well as the exit directly to the city. The idea of an uninterrupted platform- pavement is determined by the unceasing communicative space, which is formed by simple architectural and design forms using serial constructions.

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Юрій Рочняк

ДО ПРОБЛЕМИ ФОРМУВАННЯ АРХІТЕКТУРИ ЗАЛІЗНИЧНИХ ПАСАЖИРСЬКИХ ВУЗЛІВ ЛЬВОВА

Анотація. *Досліджено можливість функціювання внутрішньо міської пасажирської залізниці у Львові та архітектурні основи влаштування пасажирських зупинок і вузлів. З'ясовується необхідність таких впроваджень на підставі соціального запиту, проблем транспортного перевантаження вулиць у Львові, використання існуючих ресурсів, досвіду і новітніх тенденцій. При цьому пасажирські споруди розуміються насамперед як продовження міського комунікаційного простору.*

Ключові слова: *міська залізниця, залізничний пасажирський вузол, пасажирська платформа.*

Анотація

Досліджується можливість функціювання внутрішньо міської пасажирської залізниці у Львові та архітектурні основи влаштування пасажирських зупинок і вузлів. З'ясовується необхідність таких впроваджень на підставі соціального запиту, проблем транспортного перевантаження вулиць у Львові, використання існуючих ресурсів, досвіду і новітніх тенденцій, про що мовиться у ряді наукових праць. При цьому пасажирські споруди розцінюються насамперед як продовження міського комунікаційного простору. Міська залізниця розуміється як частина залізничного транспорту в громадському перевезенні у містах і як доповнення та функціювання в рамках єдиної транспортної системи міста й залізниці. Узгодження графіків руху, кількість потенціальних користувачів та економічні розрахунки є підставою влаштування пасажирських зупинок у міському просторі. Міський залізничний пасажирський вузол формується на стику містобудівельно-розпланувальних властивостей та колійної мережі. На ньому розвивається пішохідний зв'язок між транспортними одиницями різних його видів як сполучна ланка для потреб пасажирів та відбувається притягання соціальних активностей. Історично складена колійна мережа Львова дозволяє впровадити міські залізниці для пасажирських потреб міста. Актуальним бачиться влаштування ряду пасажирських вузлів у найбільш транспортно завантажених і територіально придатних місць довкола історичного центру міста. Ці вузли утворюються на базі інших пасажирських видів міського громадського транспорту. Архітектурне вирішення пасажирських зупинок міської залізниці підпорядковується ідеї швидкого пішого (на візках, з візками) переміщення до і від посадкових платформ та зв'язку з іншими видами транспорту й виходу безпосередньо до міста. Ідея тяглої платформи-тротуару обумовлюється неперервним комунікативним простором, який формується простими архітектурно-будівельними формами з використанням серійних конструкцій. Соціальний запит, проблеми міського транспорту, професійне надбання та світові тенденції мотивують залучення залізничних перевезень у міському просторі, а архітектурне вирішення подальших розробок в руслі доступності, зручності та гуманізації довкілля.