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**OVERVIEW OF ACCESSIBILITY ELEMENTS ON RAILWAY
TRANSPORT FACILITIES AFTER THE PERFORMED WORKS FROM
ASPECTS OF PERSONS IN WHEELCHAIRS: SECTION STARA
PAZOVA – (NOVI SAD)**

Keywords

Cross-checking
wheelchair
Users
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Abstract

The work represents the continuation of the monitoring of existing modernizations and reconstructions on the railways of the Republic of Serbia, including the application of standards both in design and in the execution of works, on different lines and sections. The obligation to comply with the application of domestic and foreign standards, instructions and regulations is defined by the Law on Planning and Construction. Although the project documentation provides the necessary control and approval of buildings that need to be reconstructed or modernized, in practice it has been observed that some built buildings do not meet the needs of all users or are not constructed in an adequate manner. The observed section in this paper is Stara Pazova – (Novi Sad). The paper presents elements of accessibility, with observed advantages and disadvantages, on facilities and planned services of railway traffic after the works performed from the perspective of persons in wheelchairs.

1. INTRODUCTION

Although significant progress has been made in the development of transport infrastructure for many years, there are still obstacles and it is not fully accessible to all service users [1]. The implementation of measures on infrastructure and vehicles, to which it is necessary to ensure adequate access, must be observed universally, with the aim of providing better service to all transport users.

This paper presents certain problems that people in wheelchairs may face when using railway traffic on reconstructed or modernized parts of railways and stations, in the Republic of Serbia.

2. LITERATURE REVIEW

Expertise, education, responsibility, development of general social awareness, along with necessary financial investments, can significantly increase the equality of persons with disabilities in all aspects of social needs, [2-3]. Solving the problem of people with disabilities in wheelchairs and access to railway stations is mainly done by physical arrangement. In order to assess the problems and needs regarding the level of accessibility to trains and the possibilities for barrier-free travel by region in the Czech Republic, an analysis was carried out, after certain interventions on the infrastructure, as well as a comparison of the situation with other countries [4]. Taking certain accessibility criteria into account, a database was created on city railway systems and their assessment by continent for people in wheelchairs [5]. With this approach, it is possible to identify and present criteria for improving the accessibility of railway systems. On the other hand, it is possible to get the most reliable observations and evaluations of transport systems from users by assessing how satisfied users are with the trip, the quality of the service provided, and availability. In the paper [6], it was determined that on the railways, as an important influence on the overall satisfaction of passengers with the trip, accessibility is ranked very high. In documents [7-8], an overview of the necessary solutions was carried out in connection with the provision of accessibility to transport and services in the station area in large and small stations.

3. FUNCTIONAL SPACE OF RAILWAY STATIONS AND STOPS

In the zones of stations or stops, it is necessary to plan safe access, easy navigation and movement in space with good connectivity and orientation that such an object requires. Passengers need to be brought and taken away in the shortest possible way, and within the vicinity of the station or stop, they need to be able to see and be given all the information about the content of the station [9-10], and the arrangement of accessibility needs to be carried out according to [11].

4. ASSESSMENT OF THE FUNCTIONAL SPACE OF THE RAILWAY STATIONS AND STOPS ON THE STARA PAZOVA – (NOVI SAD) SECTION

There are four stations on this reconstructed and modernized section.

4.1. Indija station

In the area of the station, there are parking spaces for people with disabilities, figure 1. Access to the platforms is via traffic roads to inclined fixed ramps, underpasses and moving staircase, figure 2. The platforms are set at a height of 0.55 m, through which it is possible to enter in vehicle in the level, figure 2.

Access to another platform is via underpass that further lead to stairs and moving staircase. Tickets are purchased at ticket office and ticket machines, picture 3. Station toilet is also open for people with disabilities, figure 4.



Figure 1. Parking space in front of station
(source: photo author)



Figure 2. Platform with stairs to underpass
(source: photo author)



Figure 3. Station building ticket office
(source: photo author)

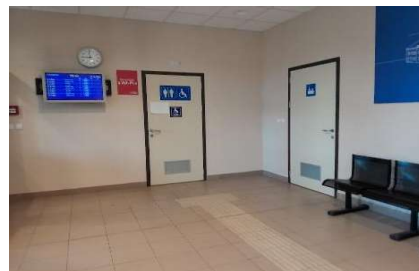


Figure 4. Station building toilets and waiting room
(source: photo author)

4.2. Beška station

In the area of the station, there are parking spaces with public city bus traffic, figure 5. Access to the platforms is via traffic roads to inclined fixed ramps (Figure 6),

underpasses and moving staircase. The platforms are set at a height of 0.55 m, through which it is possible to enter in vehicle in the level, figure 7.

Access to another platform is via underpass that further led to stairs and moving staircase. Tickets are purchased at ticket office and ticket machines, figure 8. Station toilet is also open for people with disabilities.



Figure 5. Parking space in front of station and bus station (source: photo author)



Figure 6. Station building main entrance (source: photo author)



Figure 7. Platform with stairs to underpass (source: photo author)



Figure 8. Station building ticket office (source: photo author)

4.3. Sremski Karlovci station

In the area of the station, there are parking spaces for people with disabilities, figure 9. Access to the platforms is via traffic roads to inclined fixed ramps, underpasses and moving staircase. The platforms are set at a height of 0.55 m, through which it is possible to enter in vehicle in the level, figure 10.

Access to another platform is via underpass that further lead to stairs and moving staircase. Tickets are purchased at ticket office and ticket machines, picture 11. Station toilet is also open for people with disabilities, figure 12.



Figure 9. Station building main entrance and parking space (source: photo author)



Figure 10. Platform with stairs to underpass (source: photo author)



Figure 11. Ticket office and main exit to platforms (source: photo author)

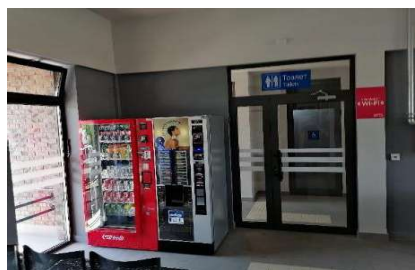


Figure 12. Station building toilets and waiting room (source: photo author)

4.4. Petrovaradin station

In the area of the station, there are parking spaces for people with disabilities, figure 13-14. Access to the platforms is via traffic roads to inclined fixed ramps, underpasses and moving staircase. The platforms are set at a height of 0.55 m, through which it is possible to enter in vehicle in the level, figure 15.

Access to another platform is via underpass that further lead to stairs and moving staircase. Tickets are purchased at ticket office and ticket machines, figure 16. Station toilet is also open for people with disabilities.



Figure 13. Station building main entrance (source: photo author)



Figure 14. Parking space in front of station (source: photo author)



Figure 15. Platform with stairs to underpass (source: photo author)



Figure 16. Station building main entrance (source: photo author)

5. CONCLUSION

Some reconstructed and modernized sections, despite a great effort to improve accessibility, did not meet all the criteria for providing access to all facilities and platforms for people in wheelchairs [12]. The results of the research on the section Stara Pazova - (Novi Sad) indicate that a great advance has been made in the arrangement of accessibility for all users, especially for people in wheelchairs. In order to ensure smooth movement and complete accessibility for people in wheelchairs smaller corrections, i.e. additions, can be carried out in the stations in connection with the arrangement of curbs on the approaches, from main square and parking places, in the stations. In all stations, it is necessary to consider the possibility of installing elevator structures for communication with all platforms. The main problem is the use of moving staircase, for people in wheelchairs, and so far it has proven that they are not easy to use, the sensors that should recognize the user on the equipment do not work well enough and in most cases it is not possible to move. As an additional aggravating circumstance, it is necessary to have additional personnel to handle it as an operator because this equipment is not regularly in operation. The next step should be in the direction of a larger survey of users in order to collect more information and monitor the state of the infrastructure [13-14], as well about the service provided for people in wheelchairs, as well as other people with disabilities. It is considered that the partial observation and solution of railway lines or stations cannot bring significant results and improvements, but it must be observed on the entire railway network and expanded in interaction with other modes of traffic. Also, the problem of the need to support associations of people with disabilities, from the wider and professional public, to solve individual problems in the execution of works and the education of supervisory bodies at construction sites should be emphasized.

REFERENCES

- [1] "Improving Transport for the People with Mobility Handicaps," European Conference of Ministers of Transport, 1999.

- [2] "The Disability Concept of The Austrian Federal Government", Federal Ministry for Labor and Social Affairs, Section IV, 1998
- [3] P. Atanasković., D. Đorđević, D. Sajtfert, Analysis of requirements and necessary investments in the railway station adjustment program for persons with special needs *Industrija* br. 2, page 191-199, 2012
- [4] J. Mataruška, "Railway system accessibility evaluation for wheelchair users: case study in the Czech Republic", *Transport*, Volume 32 (1): pp 32–43, 2017.
- [5] A. F. Ferreira, A. D. Leite, L. F. Pereira, J.M. J. Neves, M. G. O. Pinheiro, S.K. J. Chang, „Wheelchair accessibility of urban rail systems: Some preliminary findings of a global overview“, *IATSS Research*, <https://doi.org/10.1016/j.iatssr.2021.01.003>
- [6] M. Brons, M.Givoni, P. Rietveld "Access to railway stations and its potential in increasing rail use", *Transportation Research Part A*, 43(2), 136-149.,2009
- [7] T. Arreeras, S. Chongutsah, T.Asada, M. Arimura, "Factors Affecting Mode Choice in Accessing Railway Station Study in Nakhon Ratchasima, *Transportation Research Procedia*", Volume 48, 2020, Pages 3457-3468, 2020
- [8] D. Trninić, D. Đorđević, S. Marić, "Opsluživanje lica sa posebnim potrebama – primer železničke stanice Beograd centar", *Naučno stručni skup Saobraćajnice i optimizacija transporta*, pp 169 – 174, Doboj 22 i 23., Novembar 2012
- [9] D. Đorđević, "Opremanje malih željezničkih stanica i stajališta za putnike sa posebnim potrebama na pruzi Valjevo-Lipnica", *Drugi BIH kongres o željeznicama*, 26.-27 Septembar 2013
- [10] UIC 10181 (User information in Railway Stations), <https://uic.org/passenger/passenger-railway-stations/>
- [11] UIC 140 (Eurostations - accessibility to stations in Europe), <https://uic.org/passenger/passenger-railway-stations/>
- [12] COMMISSION REGULATION (EU) No 1300/2014 on the technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility
- [13] D. Đorđević, M. Pajević, "Overview of elements of accessibility of railway transport facilities after the performed works from aspects of persons in wheelchairs", 8th International conference „Towards a human city“ New mobility challenges, page 379-385, November 2021
- [14] D. Đorđević and G. Stojić, "Mobility patterns of people with disabilities in public transport: A case study in Serbia," *J. Urban Dev. Manag.*, vol. 2, no. 1, pp. 47-56, 2023