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ACCESSIBLE RAILWAY PLATFORMS – CZECH AND SERBIAN DESIGN EXPERIENCE AND RECOMMENDATIONS

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Abstract *– Accessible railway platforms are an important part of modern railway infrastructure. Accessibility for all passenger categories, including people with reduced mobility (PRM), is one of basic and mandatory requirements for new and reconstructed European railway infrastructure. According to the results of the research conducted within the framework of the Visegrád Group (cultural and political alliance of four Central European nations – Czech Republic, Hungary, Poland and Slovakia, that are members of the European Union) in 2015, the existing railway platforms and passenger information systems represent serious barriers for PRM passengers (especially for people in wheelchair, with crutches, with baby prams, as well as for blind and visually impaired passengers). This paper deals with design requirements for railway platforms from the aspect of accessibility, tactile walking surface indicators and acoustic information for blind and visually impaired passengers. Paper analyses legal framework and shows examples of practical application of accessibility standards in Czech Republic and the Republic of Serbia. Furthermore, it provides concrete recommendations for barrier-free design of railway platforms.*

Keywords – accessibility, railway, platform, design, persons with reduced mobility.

1. INTRODUCTION

Mobility is an essential need and a legal right in modern European society. According to PRM TSI [1], the functional and technical requirements for the infrastructure subsystem related to accessibility for persons with disabilities and persons with reduced mobility are: platform width, edges of platforms, end of platforms, and boarding aids stored on platforms.

In addition, necessary conditions for a comfortable and safe access for all passenger categories to the railway platforms (Figure 1) are: parking facilities, obstacle-free routes, doors, entrances and floor surfaces, highlighting of transparent obstacles, toilet facilities, furniture and free-standing devices, ticketing, information desks and assistance points, lighting, visual (printed or dynamic) information, spoken information, and level track crossings. Railway infrastructure, which is adapted to the needs of passengers with disabilities and reduced mobility, accelerates the flow and increases the safety of all passenger categories.

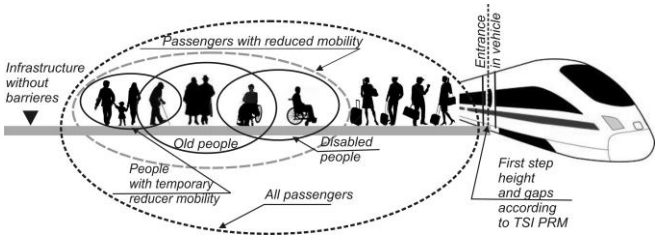

Fig.1. Structure of passenger flow on the platform

This paper deals with design requirements, which are a legal obligation, experience and recommendations for: a) accessible railway platforms, b) tactile walking surface indicators, and c) acoustic information for blind and visually impaired passengers in Czech Republic and the Republic of Serbia.

2. LEGISLATIVE FRAMEWORK

In the Czech Republic, the first Decree defining mandatory requirements for accessible environment for wheelchair users and visually impaired people entered

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into force in 1994 [2] indicating parameters for civil facilities, and also traffic structures (railway platforms, public transport stops, etc.). It was the first time the definition of a person with reduced mobility and orientation appeared. Its two amendments [3, 4] gradually specified requirements and completed necessary parameters. To design particular modifications of traffic structures, the Decree [4] refers to relevant national standards ČSN, e.g. [5, 6], or other relevant regulations.

The legal right of all passengers to unobstructed access to transportation in the Republic of Serbia is stated in the Prevention of Discrimination of People with Disabilities Act (passed by the National Parliament on April 17th 2006). Nevertheless, this Act was preceded by Regulations on conditions for planning and the design of buildings for unobstructed access of children, the elderly, the handicapped and the disabled in 1997, which defined technical conditions for planning and designing pavements, footpaths, pedestrian crossings, parking places, public transport stops and access to buildings.

The Planning and Construction Act passed in 2006 [7] introduced new standards of accessibility in the form of mandatory technical measures, standards and conditions of design, planning and construction, which ensure unobstructed movement for people with disabilities, children and the elderly.

The technical regulation [8] prescribes in more detail the standards that define the obligatory technical measures and conditions for the planning, design and construction of facilities, which ensure the smooth movement and access for persons with disabilities, children and the elderly.

2.1 Railway platforms in the Czech Republic - Regulations and design

Nowadays the requirements for accessible platforms in the Czech Republic are laid down in the following regulations:

- Decree 398/2009 which defines general requirements for railway platform accessibility for visually impaired and wheelchair users,
- ČSN 73 4959 is a technical standard specifying design parameters of platforms: height of the platform edge (preferably 550 mm above the rail head surface), tactile modification of paved surfaces and minimum safe distance for obstacles from the edge of the platform;
- Internal regulation SŽDC Ž 8.7 of the infrastructure manager (SŽDC) defines detailed modifications of platforms (using schemes), which applies especially for visually impaired people. This regulation, reflecting TSI PRM requirements, is most frequently used by designers for platform shaping;
- TSI PRM – is a legal obligation in Czech Republic as an EU member country. It adjusts parameters of railway infrastructure (platforms, departure halls and access paths), information systems and carriages. Design parameters of platforms for wheelchair users are mostly identical to those in the previously stated national regulations. Tactile ground surface indicators on platforms are rather different;
- Graphic user manual of the information system, which serves as the internal regulation of the infrastructure manager SŽDC, specifies e.g. some parameters of information systems for passengers including their modifications for visually impaired passengers [9].

On the Czech railway network, there are three types of platforms (Table 1):

- 200 - 250 mm above the rail head surface. These are so-called earth-filled embankments, which represent platforms without solid edges. They appear in small stations on regional railway lines;
- 380 mm above the rail head surface. These are platforms with solid edges, which are introduced in 2009 according to TSI PR. This height is allowed only under specified conditions, thus is rarely found on Czech railway network;
- 550 mm above the rail head surface. These are island platforms, with the access across the tracks and also side platforms. The platform height corresponds to the floor level in low-floor railway coaches (550 ± 20 mm).

Tab. 1. Railway platforms on CZ railway network

Type of platform	Edge height [mm]	Railway line category	Share [%]
Earth filled	200-250	regional	42
Raised platform	380	regional	3
Island platform	550	national or regional	55

Tactile adjustments for visually impaired can be used only on island platforms, platforms with the access across the rails and also side platforms where it is possible to lead the visually impaired person within safe distance from the platform edge. SUDOP panels used for island platforms or side platforms are 1450 mm or 2300 mm wide. Figure 2 (left) shows position of SUDOP panels on supporting structures (U 65, U 85, U 95, height corresponds to platform edge up to 300 mm, 500 and 550 mm).

Figure 2 (right) demonstrates tactile adjustment for visually impaired people – tactile ground surface indicator (with the turn to the stairs), which is laid 800

mm from the platform edge with carved grooves and total width 400 mm, accompanied by 150 mm wide yellow signal line. The grooves, which are cut into the paved surface of the platform, enable smooth use for visually impaired people with a white stick. They do not represent an obstacle for other passengers (small children, people with walking difficulties, etc.). At the point of the turn (e.g. to the stairs) the tactile ground surface indicator is interrupted in the length of 400 mm with the link to the signal line (800 mm wide with dots). Tactile ground surface indicator leads the visually impaired people to the wall and then along the wall to the stairs.

Fig.2. SUDOP type platform (left) and tactile ground surface (right)

Recently, the SUDOP platform edge has been often replaced by the H type construction (Figure 3) consisting of prefabricated parts with standard height (550 mm), without the side lap to the rail yard (unlike SUDOP panels – Figure 1a). Its disadvantage is that it is necessary to pave all the area of the platform and put together tactile elements (tactile ground surface indicator, signal lines, etc.).

Fig.3. H type platform

2.1 Railway platforms in the Republic of Serbia - Regulations and design

According to INF TSI, designed height of the platforms is 550 mm on new and reconstructed railway stations on Corridor X through the Republic of Serbia, as well as in the Belgrade railway junction.

Unfortunately, on the existing infrastructure (including the Belgrade Railway junction), the most platforms do not comply with the prescribed accessibility requirements (Figure 4 shows gap of 40 cm). On the other hand, Figure 5 shows good compliance of the platform height and vehicle floor level in Belgrade Center station. Unfortunately, the platform surface is slippery and there is no surface guiding for blind and visually impaired passengers.

Fig.4. The unsafe gap in the Vukov Spomenik railway station in downtown Belgrade

Fig.5. Comfortable and safe access to the platform (platform height 550 mm) from the vehicle

3. ACOUSTIC INFORMATION FOR VISUALLY IMPAIRED

The Czech Republic is one of the European countries, which introduced acoustic information system. System TYFLOSET® was developed between 1993 and 1994, enabling orientation of visually impaired people on boards of transport means and public buildings (station halls of Prague underground railway, departure halls of railway stations, etc.). This system consists of a command transmitter (radio set), command receiver with antenna and voice software. These acoustic devices for visually impaired passengers are placed on railway platforms and in departure halls. They inform these people about their position or other details. The system is based on transmitted signal (requirement) from the passenger's radio. For example, the device above the entrance in the departure hall in Pardubice Main Station transmits following information: initial sound * (informs about the level entrance) followed by voice information 'Pardubice Main Station'. On the platform, the system informs about the number of platform, name of the station and the way from the platform to the departure/arrival hall: initial sound ** (informs passengers about stairs in their direction) followed by audio information 'towards the departure hall - down the stairs then to the right'. The same system is used to inform the passenger how to get to the platform from the departure hall.

For blind and visually impaired passengers, the Serbian Railways print the timetables and installs the timetable panels with Braille tactile writing system.

4. CONCLUSION AND RECOMMENDATIONS

Based on surveys conducted in member countries of Visegrád Group, accessibility of railway platforms is one of the crucial aspects when deciding whether to use railway transport [10]. Information itself and information systems proved to be of key importance for visually impaired people [11]. The authors recommend that a similar survey should be carried out in Balkan countries and based on results focus on systematic modifications of the core elements of railway infrastructure (platform halls, access paths) and information systems.

In 2012, the survey about requirements of long-distance passengers was conducted in the Republic of Serbia [12-14]. The results clearly indicate an uncompetitiveness of rail transport in this area, which is the result of lacks in infrastructure and related services for passengers with reduced mobility in Serbia (Figure 6).

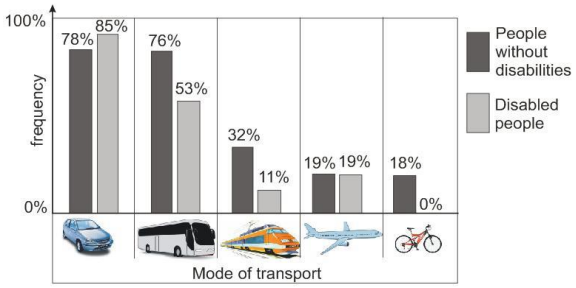

Fig.6. Frequency of travels by different modes of transport regarding the mobility of passengers

The authors also recommend improvements in accessibility of railway platforms and other parts of public transport for visually impaired passengers by installing acoustic information systems. Higher electivity of installation and utilisation of acoustic systems is necessary. Many years of Czech experience can serve and help this purpose.

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