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**ANALYSIS AND EVALUATION OF CHOSEN ELEMENTS
OF POZNAŃ'S PUBLIC SPACE FROM THE POINT OF VIEW
OF THEIR ADAPTATION TO THE REQUIREMENTS
OF PERSONS WITH A PRONOUNCED DEGREE
OF DISABILITY**

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The subject of this article is an analysis and evaluation of Poznań's public transport means, i.e. trams and buses, public transport stops as well as pedestrian crossings from the point of view of their adaptation to the requirements of persons with a pronounced degree of disability. Fulfilment of these requirements is a key factor in the integration of disabled persons into society. It helps their professional activation and prevents social exclusion. Analysing the above given aspects, the current state of the adaptation of city space to the requirements of disabled persons is presented, along with city plans concerning these aspects as well as solutions that may be adopted in the future to improve the comfort of public space use by disabled persons.

Keywords: disability, public space, Poznań, public transport, pedestrian crossings, buses, trams

1. INTRODUCTION

1.1. Notion of disability

The definition of disability is an interdisciplinary issue of a broad meaning. To perform an analysis, the scope of its meaning should be specified, especially in terms of statistic data interpretation.

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The notion of a “disabled person” is defined in many ways depending by whom and in what purpose it is formulated. Three groups of definitions may be met in the literature (Majewski, 1995):

- General definitions that contain criteria for recognizing a given person as disabled;
- Definitions for given purposes, containing criteria of disability consequences in a given sphere of life, for example, professional;
- Detailed definitions that concern particular groups of disabled persons and are formulated on the basis of criteria such as the kind of disability, degree of disability, period of life when disability occurred.

Disability may be defined based on many kinds of parameters, such as degree and type of disability or even education and professional ability. One of the broader classifications that covers nearly the total population of persons with a pronounced disability is the classification regarding the period of life when the disability started (Poliwczak, 2007):

- Disability since birth or early childhood – due to congenital factors, genetic or childhood diseases;
- Disability that occurred in the period of professional activity – due to disease or an accident;
- Disability of old age – due to the aging of the body.

The establishment of a universal classification system of disability is a challenge for European Union countries (Jasiak, 2009). Differences in the definition as well as in the determination of disability (they may concern, among others, disability benefits, financing of rehabilitation or a special mode of teaching) lead to a situation where a person with the status of a disabled person in one country in other country would not get such status (Wapiennik, Piotrowicz, 2002).

The organization GUS (Polish Central Statistical Office) bases its classification of disability on the definition of disability given in the Act of 27th of August, 1997 on professional and social rehabilitation as well as employment of disabled persons. This document recalls the definition of disability in the following form: “Disabled are persons whose physical, psychological or mental condition permanently or periodically hinders, limits or prevents fulfilment of social roles and especially limits ability to perform professional activity”. This definition concerns both physical disability as well as psychological and mental and addresses the issues of integration in social life and paid employment.

This Act additionally lists three degrees of disability: light, moderate and significant. Each of the degrees determines the different intensities of disability’s influence on work performance and fulfilment of social roles (Act of 27th August, 1997 on professional and social rehabilitation as well as employment of disabled persons):

- **Significant degree of disability** – is granted to persons whose impairment of the body’s fitness results in an inability to work outside sheltered employment conditions, with permanent and long term need of care and support. These are the persons that are not able to live alone and independently;

- **Moderate degree of disability** – is granted to persons whose impairment of the body's fitness results in an inability to work outside sheltered employment conditions, with a temporary or partial need for support from other persons to fulfil social roles;
- **Light degree of disability** – is granted to persons with a reduced ability to work caused by an impairment of the body's fitness. Such persons are able to fulfil social roles thanks to the support of orthopaedic equipment as well as other technical and auxiliary means and without assistance of other persons.

Additionally GUS (Polish Central Statistical Office) uses a classification of disabled persons into those who have a pronounced disability certificate and those who notice and declare some limitations in daily life. This classification allows respondents a subjective evaluation of their own frame of mind as the person with a pronounced disability may not necessarily feel disabled and additionally persons without such a pronouncement may notice limitations in performing some specific activities (Otrębski, 1999). Consequently, the classification accepted within the 2011 census by GUS is the following (GUS, 2013):

- **Legally disabled persons** – persons with a valid pronouncement of disability;
- **Persons who are disabled biologically only** – persons not having a valid pronouncement that declares a complete or limited ability to perform basic activities, taking into consideration their age.

1.2. Disabled people in Poznań county

Based on GUS data from 2011, 30,560 disabled persons live in Poznań county, what makes them a little more than 9% of all inhabitants of the county. In this group of people, 20,814 persons are disabled persons and the remaining 9,745 persons are disabled biologically. Out of them, 5,789 inhabitants feel a limitation of their fitness to a significant degree or completely (red colour).

The newest data comes however from the County Register of Disabled Persons from December 31, 2017. This register is made annually and covers persons with a legal pronouncement of disability. In 2017 in the city of Poznań, there lived 31,491 persons with a legal pronouncement of disability and in total in the whole county as much as 49,428 persons. The County Team for the Pronouncement of Disability classified disability as light, moderate and significant. Persons with a significant limitation of their fitness are again marked with a red colour and there are as much as 10,726.

Assuming that the register of disabled persons of GUS and PRON is focused on the same territory (all of Poznań county) and that the assignment of disability to residents is based on having an actual pronouncement of disability it should be noticed that within 6 years in Poznań county the number of disabled persons with the pronouncement increased by 130% from 20,814 to 49,428.

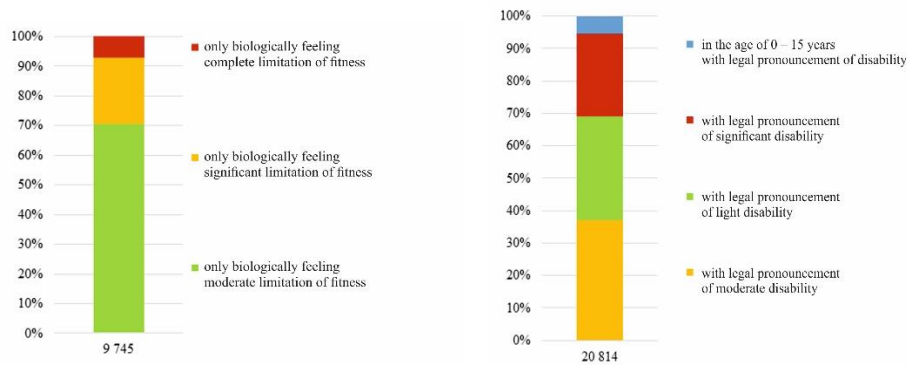


Fig. 1. Division into biological and legal disability in Poznań county according to the level of fitness limitation. Based on: GUS, 2013

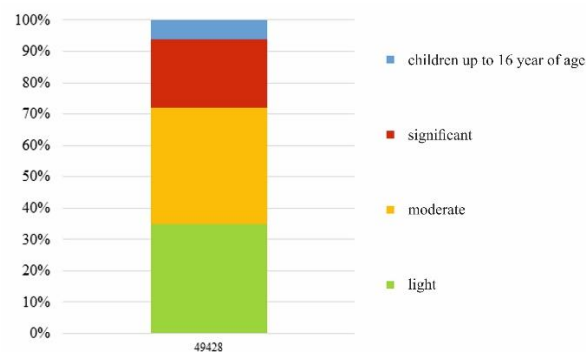


Fig. 2. Division of legal disability in Poznań county according to the level of fitness limitation. Based on: GUS, 2013

For the purpose of the analysis of public space's adaptation to the requirements of disabled persons, the target group will be particularly persons who have difficulty moving without the help of wheelchairs or other orthopaedic equipment as well as blind or visually impaired people.

1.3. Initiatives of the city of Poznań

Poznań is a city of intensive development and a part of cities' development is their adaptation to the needs of their residents. Poznań's authorities strive to the greatest extent to facilitate the integration of disabled persons into society as well as to improve the quality of their lives through, among others, levelling and elimi-

nation of infrastructural barriers. The city's initiatives directed towards persons with disabilities are based mainly on two documents accepted by the City Council:

- Directions of actions and tasks of the City of Poznań for social integration of disabled persons for the years 2012–2020;
- Poznań Programme of Integration and Professional Activation of Persons with Disabilities for the years 2016–2020.

The following matters are included, among others, in the scope of planned activities: preventing the creation of architectural barriers already at the design stage as well as in already existing facilities, equipping schools with equipment supporting the teaching of disabled persons, providing services of individual transportation for disabled people, increasing the number of parking places for the disabled as well as development and adaptation of city information for the needs of disabled persons (Rada Miasta Poznania, 2012).

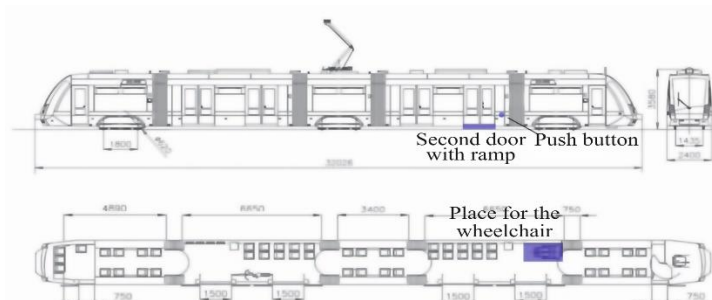


Fig. 3. Scheme of Poznań low-floor tram Tramino 105p.

Source: https://www.solarisbus.com/public/assets/content/pojazdy/katalog/Tramino_PL.pdf (15.03.2018)

Most important for the purposes of this publication is however the plan of public transport development in terms of accessibility for disabled persons. It covers the introduction of low-floor vehicles to the public communication fleet as well as the adaptation of tram and bus stops to the requirements of disabled persons. There are also plans for introducing a passenger information system which should be directed to the blind and visually impaired people. Additionally the city is putting an emphasis on training carriers and drivers about the rights of disabled persons and helping them. Units responsible for the implementation are Public Transport Authority (ZTM) and Municipal Roads Authority (ZDM). Results will be measured among others by client satisfaction surveys.

As part of the implementation of the objectives, ZDM has undertaken, among others, the renovation of bus bays, lowering of curbs, construction of slipways, painting yellow warning strips and introducing warning textures. The number of low-floor trams on ZTM's communication fleet as per the end of 2018 covers 46

trams by Solaris Tramino, 44 trams by Moderus Beta MF 02 and MF 20, 14 trams by Siemens Combino and 14 trams by Tatra RT6-MF 06 AC-14. The share of low-floor trams to the total number of trams was 53.4%. Additionally ZTM may be proud that the share of low-floor buses in their fleet is one hundred percent. ZTM is also busy with the construction of Vienna stops and modernization of stops' surface, including the use of warning tiles for blind people. Additionally a clearer voice message of a better quality was introduced in the vehicles and some stops as well as legible electronic boards inside vehicles for visually impaired people (Rada Miasta Poznania. *Raporty roczne*).

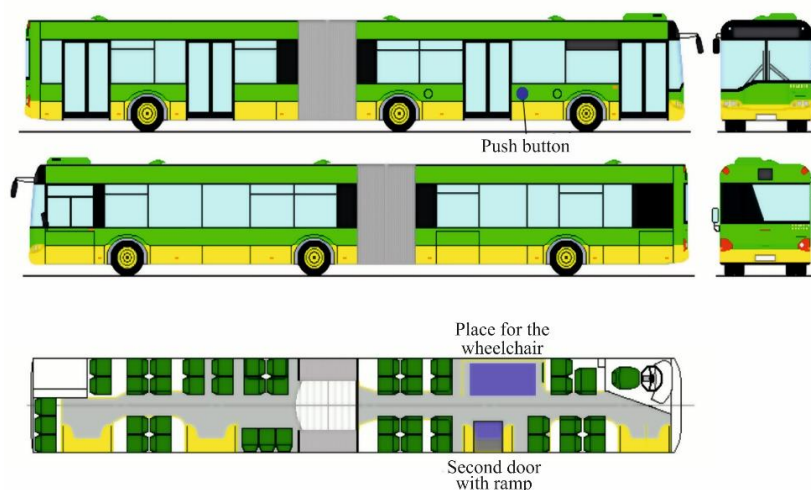


Fig. 4. Scheme of low-floor buses Urbino 18. Source: http://galeria.solaris-club.com/details.php?image_id=1327&sessionid=ca2a73a88860524e3d3adcf0a533d0e0 (15.03.2018)

All reports on the activities undertaken for disabled persons since 2013 may be found on Poznań's web site. These are the documents on the diagnosis of actions and initiatives taken for this social group by departments, the organizational units of Poznań City Hall as well as other public authorities collaborating with City Hall and carrying out projects to better the environment of less able people.

Among the institutions and organizations of support for disabled people it is worth mentioning the State Fund for the Rehabilitation of the Disabled (PFRON), which deals with, among others: the adaptation of public facilities, financial support for necessary renovations and obtaining rehabilitation equipment, as well as professional activation of disabled persons. The plenipotentiary for the President of the City of Poznań for Persons with Disabilities is Dorota Pocijko. The duty of the plenipotentiary is collaboration with organizations and institutions as well as initiating, elaborating and coordinating projects concerning the improvement of the living conditions of disabled people.

The project "Map of barriers" is also instituted in Poznań. It was created by the students of the Academic Scientific Circle of Spatial Management (AKNGP) from Adam Mickiewicz University in Poznań. The effect of this project will be a map showing places that are barriers for disabled people as well as for persons who have everyday difficulties with moving around the city such as elderly people or mothers with children. The idea of the project is creating a map that will signal in which regions barriers occur and with what intensity. The map should serve mainly all residents but officials may also benefit from it as the map will provide excellent material for analysis and a clear indication of areas with an immediate need for modification. Only in the area of the Old Town nearly 350 barriers have been identified. Their average density is 133 barriers per square kilometre. Examples of the kind of barriers include: uneven pavements, unadapted pedestrian crossings, high curbs, obstacles in the users way (signposts, lamps or hydrants) as well as unadapted public transport stops and stairs (Urbnews, 2015).

It is worth mentioning that all undertakings concerning public transport modernization should include an evaluation of their influence on safety and accessibility for persons with a pronounced degree of disability and elderly people. The duty of the city is to provide comfortable, possibly independent, movement of the people in the city space and should include in the projects not only the adaptation of transport means to their needs but also an adequate distance of stops from the places of living of the disabled, their places of work, learning or administration buildings (Jasiak, 2009).

2. ANALYSIS OF BARRIERS LIMITING THE MOVEMENT OF PEOPLE WITH A PRONOUNCED DEGREE OF DISABILITY IN THE CITY SPACE OF POZNAŃ

2.1. Examples of barriers

Nowadays it is commonly accepted that the weak preparation of society and social spaces is the reason for the negative influence of disability on a human being and not his/her individual limitations. The social space should have been adapted to the requirements of all participants of social life. To fulfil social roles it is necessary to adapt both the architecture of apartments and buildings as well as the public space and transport means so that they provide equal chances to everybody in displacement and moving about in the city (Zrałek, 1999).

The development of the environment is recognised as the field where the discrimination of disabled people is seen best. Among the barriers existing in the city's space there can be distinguished:

- Physical barriers which influence free movement and limit possibilities of using supporting equipment such as wheelchairs or walkers. Physical barriers most often include high curbs, narrow walkways between the street and buildings but also uneven surfaces;
- Barriers in the architecture of the buildings which influence the free movement of people who cannot use stairs or open doors by hand;
- Barriers in public and private means of transport which are often designed for non-disabled people, such as trams, buses, trains and taxis;
- Barriers in public communication and information which are created for people without visual or hearing impairment such as signs, traffic lights as well as pedestrian crossings.

The map of barriers created by the Academic Scientific Circle of Spatial Management¹ distinguishes the following categories of barriers in Poznań:

- Obstacles on the road – in this category all objects occurring in the city's space are included that limit or totally eliminate the movement of disabled people;
- Objects in the city's infrastructure such as lamps, hydrants, road signs that are placed in inappropriate places, and also fencing around roadworks that limit the space between buildings and the street;
- Uneven surface – in this category are both inconsistent surfaces of pavement and its damage as well as lack of its continuity;



Fig. 5. Posts on Bernardyński Square. Example of obstacles on the road which may limit the free movement of persons on wheelchairs (2018). Own elaboration

¹ The goal of the project “Map of Barriers” created by the Academic Scientific Circle of Spatial Management is to create a complete and publicly accessible map showing limitations in the city space of Poznań which may constitute problems for persons moving on wheelchairs or using other orthopaedic equipment. The project is under realization and as per 2018 covers the area of the first communication frame and a part of the second.

- Unadapted stairs – stairs which do not have a handrail, ramp to enter with a wheelchair as well as that their surface makes it difficult to make ergonomic use of them;
- Unsuitable footbridge – these are all ramps with an uneven surface, wrong slope angle and without a handrail for easy use;
- Unadapted pedestrian crossing – crossings with higher curbs, uneven surface, lack of sound signalization as well as warning texture;
- Unadapted stop – stop with unsuitable marked edges;
- Other – this category covers rarely occurring architectural mistakes, for example lack of a pedestrian crossing, high curbs, lack of pavement, single steps in the buildings or parking places not adjusted for disabled people.



Fig. 6. Tram stop at Bernardyński Square. Yellow warning paint is nearly totally invisible and warning texture is worn out (2018). Own elaboration

Number of barriers in each category is shown in Table 1. In summary 5,122 barriers have been counted. It should be kept in mind however that the project “Map of barriers” covers in its analysis only some of Poznań’s districts (excluded from the analysis are, among others, areas east of Rataje, Wilda as well as Junikowo).

Table 1. Number of barriers in Poznań

Unadapted pedestrian crossing	944
Uneven surface	601
Obstacles on the road	340
Unadapted stairs	214
Unadapted stop	123
Unsuitable footbridge	16
Other	192

Based on: Urbanews, 2015.

2.2. Stops and the city's communication means

In the category of unadapted stops, the most common problem is a lack of warning tabs at the edge of the curb. Analysing the distribution of those barriers on the map of Poznań it may be noticed that the district of Old Town is nearly without the problem of unadapted stops. A problematic stop is however the bus stop at Bernardyński Square where not only tabs are missing but also cars are parked which make it difficult to access the stop for persons on wheelchairs and disabled people². Additionally the marking of the stop is not clear about its range. The next stop in the city centre which has not been mentioned in the Map of Barriers is the stop Gwarna from the east side. On the west side Gwarna has a Vienna stop but on the other side passengers have to be ready to jump from the tram, even from those with a low floor, as the floor is 35 cm above the ground (Solaris, 2017). Other problematic groups of stops are those surrounding the New Zoo, the eastern side of the Main Railway Station as well as those on Małe Garbary. Among the present problems the following were distinguished: lack of tabs, too narrow stops as well as an uneven surface. These stops are also not adapted for low-floor trams. During the construction of the Zeylanda stop at Zwierzyniecka Street over two meters of pavement behind the stop was not used and a relatively narrow Vienna stop was created, which caused a difference in height between the platform and the rest of the pavement. For safety reasons the city placed railings in this place. The shed at the stop is placed too near to the stop edge (about 1 m), so it divides the platform into two halves. A person on a wheelchair or a person with limited movement fitness has no possibility to cross from one side of the stop to the other in a straight line.

Each bus as well as low-floor tram is equipped with a platform facilitating the entrance of a wheelchair to the vehicle. It is always placed in the second door of the vehicle. Part of the fleet of low-floor vehicles has an automatic platform controlled from the driver's cabin and part has flaps that are detached manually. A passenger needing support should signalize the need for using the platform by pressing a special push button placed on the tram's door or inside at the place designed for persons moving on wheelchairs. Additionally in the trams from the Combino category this push button automatically blocks the closing of the doors what allows undisturbed and stress free leaving of the vehicle by a passenger. Inside the buses and low-floor trams there is a special place for safe "parking" of the wheelchair often with a soft back, armrest as well as safety belts. In Poznań, in contrary to other cities, there is a limitation in buses and trams to one person on a wheelchair because the design predicts that many disabled persons on the vehi-

² The city tried to eliminate problems with stop accessibility which was claimed by many residents and placed posts around the stop but after the intervention of the marketplace vendors the posts were removed already the next day and the problem remained (Kisiel, 2017).

cles (Róžański, 2016). Low-floor buses are also equipped with the kneeling function thanks to which the driver is in a position to lower the right side of the bus by few centimetres, reducing the difference in level between entry threshold and a curb.



Fig. 7. Stop Bernardyński Square is maladjusted to the needs of the elderly and disabled persons due to: an uneven surface, lack of marking the stop with paint and a warning texture, not adjusted stop height to low-floor buses. Nearby parked cars are additional obstacles on the road (2018). Own elaboration



Fig. 8. Places marked for disabled persons on the bus (left) and low-floor tram (right). Push buttons for persons needing support during exit, safety belts as well as cushions are seen on the photos. Own elaboration



Fig. 9. Board with the time table at the stop Rondo Kaponiera. Push button, after pressing of which the time table is read aloud, is located at a height suitable for the requirements of disabled people; in front of the table a yellow warning texture is located and to the table itself blind people may be directed by the directing texture in the form of convex stripes on the ground (2018). Own elaboration



Fig. 10. East side of Gwarna street. Stop is maladjusted to the requirements of the user; lack of markings of the edge with yellow paint, lack of warming tabs for blind people, lack of elevation enabling ergonomic use of low-floor trams as well as the use of them by people on wheelchairs (2018). Own elaboration

2.3. Pedestrian crossings

Design guidelines for pedestrian crossings recommend the use of sound signalization which clearly distinguishes itself from the environment and is characterized by a different kind of sound depending on whether the light is red or green. The purpose of it is to facilitate the finding of the crossing and the light control button by blind people. It is also recommended to use pedestrian crossing diagrams informing blind people of its layout. Warning textures should be used on the whole length of the crossing what quite often is neglected. Crossing should also have lowered curbs creating small ramps (Kowalski, 2008).



Fig. 11. Example of maladjusted pedestrian crossing in the public space in Poznań. Warning texture was not applied on the whole width of the crossing introducing a risk for blind people (2018). Own elaboration



Fig. 12. Examples of warning textures in the public space of Poznań. Lower photo shows worn texture which should be replaced by a new one (2018). Own elaboration

It is difficult to clearly define the condition of pedestrian crossings in Poznań as most of them at least in theory are adjusted for disabled persons however in many cases uneven curbs, worn warning tiles or warning tiles only on a part of the crossing may be seen. The new policy of the development of the city centre also led to the removal of many pedestrian crossing traffic lights so at the same time also the removal of sound signalization necessary for the safety of blind people³. Especially the area around St. Martin street, one of the main streets of Poznań, is without sound signalization. According to the data from the report of City Council annually the city is reconstructing around 25 pedestrian crossings. These activities concern mainly the lowering of curbs, introducing markings with the warning tiles as well as painting curbs in a yellow colour.

3. CONCLUSIONS

3.1. Poznań compared to other cities

Making a comparison with other cities in Poland and Europe is rather a difficult task. Cities differ with each other due to the number of residents, stops, vehicles and, what is most important, their budgets for the modernization of city space are different. Poznań as the only Polish city stood on the podium of the European competition Access City Award in 2014. This prize highlights European cities which undertake the adaptation of the city space to the needs of persons with a pronounced disability and elderly people. Poznań then came in at third place directly after French city of Grenoble and Swedish city of Gothenburg. Most of Polish cities' fleets of buses, and also in Poznań, are one hundred percent low-floor. In Warsaw approximately 60% of trams are adapted to the transportation of disabled people, in Wrocław approximately 40% and in Kraków approximately 41%. Poznań, with 47% low-floor trams, presents itself rather well against other cities.

3.2. Development plans of city authorities

The above analysis concerns mainly stops, public transport sources and pedestrian crossings in the centre of Poznań. It is worth noticing that for a full analysis of the city's development and its adaptation to the needs of disabled people the architecture of the whole infrastructure of Poznań should be considered as well as the architecture inside the buildings and apartments used by disabled people.

After the analysis of the above aspects of public space with respect to the requirements of disabled people, it is possible to get the impression that there is still a lot of work in front of the city's authorities. The only completely adapted aspect

³ The purpose of this was to obtain the smooth traffic of cars and increase drivers' culture.

is the fleet of city buses as all of them are low-floor, while low-floor trams constitute only 47% of all such vehicles in the fleet. The city is however planning to systematically introduce to the fleet trams adapted to the requirements of disabled people. Stops are also a problem: their most common nuisance is an uneven surface, lack of warning tiles as well as maladjustment to the proper utilization of low-floor communication means. In spite of the fact that most of the stops in Old Town district underwent a modernization during the last few years, still many stops may be met that are obviously maladjusted for disabled people and even pose a risk to all users. The city tries to modernize about 25 pedestrian crossings every year. Taking into account that old crossings are subject to wear (the surface is destroyed, warning tiles are being wiped, the paint is coming off) to renovate all of them more than 35 years would be needed. Additionally, the direction of city centre modernization is assuming the removal of traffic lights (often with sound signalization also) what creates a great problem for disabled people. A similar situation applies to tram and bus stops. More than 120 stops do not meet the safety requirements for disabled people. Renovating at a rate of about 10 per year, modernization of all will take 12 years. The above analyses show that despite efforts, the city of Poznań will still need much time to become fully friendly to disabled people.

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ANALIZA I OCENA WYBRANYCH ELEMENTÓW POZNAŃSKIEJ PRZESTRZENI PUBLICZNEJ Z PUNKTU WIDZENIA ICH DOSTOSOWANIA DO WYMAGAŃ OSÓB O WYSOKIM STOPNIU NIEPEŁNOSPRAWNOŚCI

Streszczenie

Przedmiotem artykułu jest analiza i ocena środków komunikacji miejskiej w Poznaniu (tj. tramwajów i autobusów, przystanków komunikacji miejskiej oraz przejść dla pieszych) z punktu widzenia ich dostosowania do wymagań osób o wysokim stopniu niepełnosprawności. Spełnienie tych wymagań jest kluczowym czynnikiem integracji osób niepełnosprawnych ze społeczeństwem. Pomaga w ich aktywizacji zawodowej i zapobiega wykluczeniu społecznemu. Analizując powyższe aspekty, wskazano obecny stan adaptacji przestrzeni miejskiej do wymagań osób niepełnosprawnych, plany miasta dotyczące tych aspektów, a także rozwiązania, które mogą zostać przyjęte w przyszłości w celu poprawy komfortu korzystania z przestrzeni publicznej przez osoby niepełnosprawne.

