



ACCESSIBILITY OF PEDESTRIAN CROSSINGS – CASE STUDY DUBROVNIK

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Abstract

Implementation of Technical regulation on ensuring accessibility of buildings for disabled persons and persons with reduced mobility has proved to be a challenge in highly urbanised areas. This paper analyses select pedestrian crossings on arterial roads in the city of Dubrovnik and checks compliance with regulations in power. The paper consists of a preview of current technical regulation in effect, as well as the prior ones all the way to 1982. Following the legal basis overview, case study findings prove inadequate results on 93% of analysed pedestrian crossings. Objective of the paper is to give an overview on current state of pedestrian crossings across the city limits of Dubrovnik and imperfections found in Technical regulations on assuring accessibility of buildings to persons with disabilities and reduced mobility. Case study analyses select pedestrian crossings and determines their compliance with the technical regulation in effect. Main outcome of the paper is that a vast majority of pedestrian crossings are not up to the regulations in effect and a revision to the technical regulation is mandatory due to outdated design specifications.

Keywords: accessibility, regulations, pedestrians, reduced mobility persons

1 Introduction

How we treat disabled people is a key indicator of development of a society. According to British Councils Disabled people's inclusion within UK technical and vocational education and training [1] social model of disability focuses on barriers facing people with disabilities instead of concentrating on impairments and deficits of the person with a disability. In this model the person is disadvantaged by the limitations imposed on them by social, cultural, economic and environmental norms and barriers. Thus, it is the way society is organised that discriminates against people with impairments and excludes them from involvement and participation. For example, a person in a wheelchair is not disabled by their need of wheelchair use to move through pedestrian walkways, but by a pedestrian crossing which has no ramp. This article deals with accessibility elements of select existing pedestrian crossings in the City of Dubrovnik.

2 Legal basis overview

Technical parameters on accessibility of pedestrian crossings are given by Technical regulations on assuring accessibility of buildings to persons with disabilities and reduced mobility [2] which are in power since 28th of June 2025. Prior to legal basis overview, a historical overview on regulations which concerned the accessibility of pedestrian crossings. Regulation on spatial standards, urbanistic – technical terms and norms for prevention of creation of architectural – urbanistic barriers [3] was the first regulation which went into effect in 1982.

It demanded public pedestrian surfaces to be minimum 120 cm wide, and for pedestrian crossings, flush width should be at least 100 cm. Regulation on spatial standards, urbanistic – technical terms and norms for prevention of creation of architectural – urbanistic barriers [3] were in power from 1982 all the way until 30th December of 2005 when Regulation on assuring accessibility of buildings to persons with disabilities and reduced mobility [4] goes into effect. Main changes of new regulations referred to minimum public pedestrian surface which now had to be 150 cm wide, while flush width of pedestrian crossings should be 120 cm. That was the last major change to regulations considering flush widths. Also, new regulation demanded tactile surfaces to be installed on pedestrian crossings, parallel to carriageway edge, at least 15 cm away from the edge.

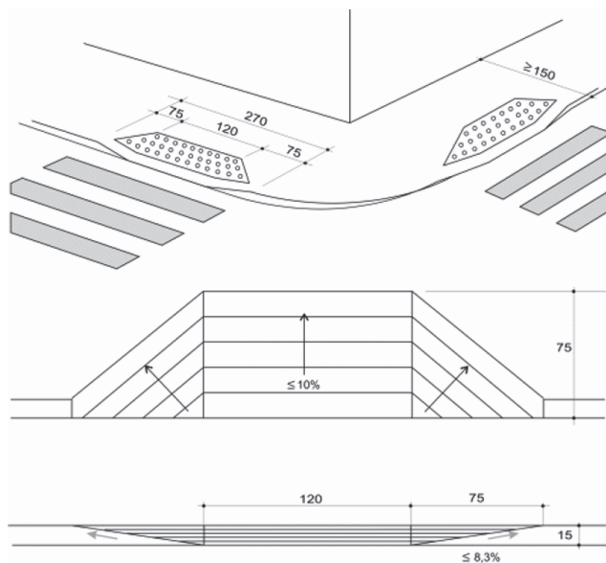


Figure 1 Pedestrian crossing in intersection

Given that a pedestrian crossing is outside of intersection area, a tactile guideline which is at least 40 cm wide, with grooves perpendicular to the carriageway, in a length of at least 110 cm must be implemented.

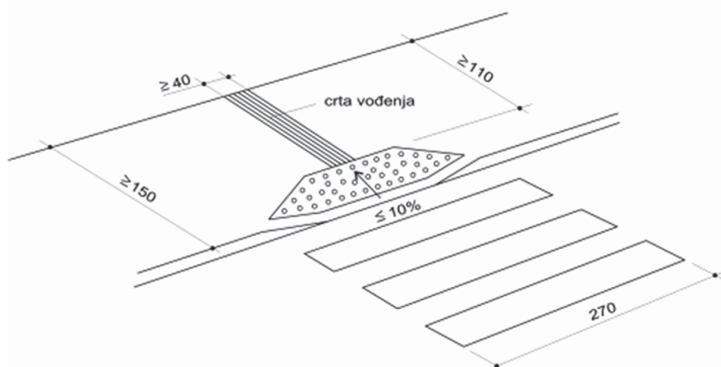


Figure 2 Pedestrian crossing outside of intersection area

Finally Technical regulations on assuring accessibility of buildings to persons with disabilities and reduced mobility [1] comes into effect on 28th of June 2025. Technical regulations fully retain all definitions and graphical illustrations from previous Regulations. Comparison of all previous Regulations with today's technical regulations show an increase in level of traffic safety for people with disabilities which legally happened in 2005. Width of total public pedestrian surface increased by 30 cm to a total of 150 cm, while flush width on pedestrian crossings increased by 20 cm for a grand total of 120 cm. Part of Technical regulations introduced an obligation to implement accessibility elements during the reconstruction of buildings.

3 Case study findings

City of Dubrovnik has approximately 113 pedestrian crossings sprawled upon approximately 15 of its arterial roads. Total length covered by these arterial roads equals to about 13.5 km. Using simple math, one pedestrian crossing is placed every 120 m'. Number and frequency of pedestrian crossings is typical for a highly urbanized area. This case study analysed 14 pedestrian crossings on arterial roads. Primary objective of the study was existence of accessibility elements and compliance with Technical regulation on assuring accessibility of buildings to persons with disabilities and reduced mobility [1]. Field research conducted showed varying results which are unfortunately mostly negative. Of all analysed crossings, just 1 had all accessibility elements required by the technical regulation in power. As seen in table 1.80% of analysed crossings have dropped kerbs with varying flush widths while on only 1 pedestrian crossing have the tactile surfaces been implemented up to code. Another issue can be seen in flush widths which are mostly wider than requested, however almost all these crossings are not really flush with the road. Dropped kerbs should preferably be flush with the road, but with a maximum 6 mm tolerance if not, provided that a rounded bullnose is provided at the change of level [5]. Figure 3 shows a pedestrian crossing with a height difference of 5 cm between the road and pedestrian walkway which is impossible for wheelchair users to overcome. Figure 4, contrary to figure 3, shows a pedestrian crossing with no dropped kerbs making it unusable for wheelchair users. Also, typical kerbs used for construction of roads in Dubrovnik have a rounded bullnose which is too sharp.

Table 1 Accessibility elements on analysed pedestrian crossings

Crossing designation	Dropped kerb [Yes/No]	Flush width [cm]	Tactile surface [Yes/No]
1	Yes	250 – 300	No
2	No	/	No
3	Yes	200	No
4	Yes	100	No
5	Yes	100	No
6	Yes	300	No
7	Yes	300	No
8	Yes	300	No
9	Yes	300	No
10	Yes	300	No
11	No	/	No
12	Yes	300	No
13	Yes / No	300 / 0	No
14	Yes	120	Yes

Another issue noticed is the slope gradient leading to dropped kerbs. As shown in figure 1, slope perpendicular to the carriageway should be less than 10%, and lateral slope should be less or equal to 8.3%. However, height difference of 15 cm on a 75 cm slope gives a slope gradient of 20% which is inadequate for wheelchair users. Assuming the wheelchair users exclusively use the perpendicular slope figure 1 again shows a slope gradient of 20%. Figure 5 shows a good practice example straight from the Technical regulation on assuring accessibility of buildings to persons with disabilities and reduced mobility [1]. Pedestrian crossing has dropped kerbs and installed tactile surfaces. However, slope gradients on these types of crossings are oftentimes too steep to use.



Figure 3 Pedestrian crossing no. 1 – bad practice example – Kerb dropped, 5 cm height difference



Figure 4 Pedestrian crossing no. 2 – bad practice example – no dropped kerbs



Figure 5 Pedestrian crossing no. 14 – good practice example

4 Conclusion

Although case study and consequent table 1 indicate less than stellar results on select pedestrian crossings, one parameter is well above current standard. Flush widths of 7 analysed crossings amount to 300 cm which is 2.5 times higher than 120 cm mandatory by technical regulations in power. Increased flush width enables people with reduced mobility to easily use pedestrian crossings without the need to aim for the 120 cm “gap”. First step in enhancing the current state of pedestrian crossings is to analyse remaining pedestrian crossings and develop a technical solution to drop all kerbs flush to the road and to instal tactile surfaces all over. Findings of this case study also showed certain imperfections in Technical regulations on assuring accessibility of buildings to persons with disabilities and reduced mobility. Imperfections namely consist of flush width required which amounts to 120 cm and slope gradient of kerb drop. Although a legal change happened, in reality most of existing pedestrian crossings do not comply with given regulations. Obligation to implement accessibility elements during the reconstruction of buildings, including roads, simply does not work as intended since roads are rarely fully reconstructed. Also, required flush width in our opinion is too small due to the minimal width of pedestrian crossings required by Regulations on traffic signs, signalization and traffic equipment [6] which is at least 300 cm, while exceptional cases allow the width to be 200 cm. In order for our society to be inclusive to all its members, we propose a modification of flush width required to be wide at least as much as the pedestrian crossing is wide. Slope length, which affects the gradient, as shown in figure 1 should be revised and extended to 200 cm at least.

References

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