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Development Patterns of Universal Design in Residential Courtyards in the Jugla Neighbourhood

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Abstract: Quality and accessible outdoor living space in the immediate vicinity of one's home is an important factor in ensuring people's well-being, safety and community belonging. Access to building entrances is one of the key conditions for people to be able to reach the outdoors and enjoy equal mobility opportunities. Thus, one of the important challenges in achieving the principles and objectives of universal design on a small scale is related to building entrance areas. The building regulations at the time when most of Riga's large-scale residential areas were built did not include requirements for environmental accessibility solutions. Most of the entrance areas of residential buildings and adjacent areas were constructed according to the construction practices of the time, using concrete steps to connect the carriageway level with the staircase doors. The study therefore includes conceptual solutions for environmental accessibility in building entrance areas - existing locations with specific environmental characteristics that would be applicable to as many building entrances as possible, regardless of the location of the buildings.

Keywords: universal design, courtyards, neighbourhood, urban environment

Introduction

The development of cities and their housing stock over the last 60 years has been rapid, not only in Latvia but globally, with the creation of large-scale housing estates, thus encouraging the migration of people from rural to urban areas. The development of urban residential areas has gone hand in hand with the development of extensive transport infrastructure, the main objective of which has been to ensure the most convenient organisation of road traffic. The housing stock and the volume and importance of roads and road transport have grown, but the role and importance of people in the urban model have diminished over the decades and the conditions under which people move around the city and in residential areas have gradually deteriorated. Although the last decade has seen a gradual change in thinking and an increasing focus on people's needs, progress has been slow.

The concept of universal design has gained recognition in Latvia with the ratification of the UN Convention on the Rights of Persons with Disabilities, but the implementation of the Convention's requirements in both planning and implementation aspects is slow and lags significantly behind the practice in the Nordic countries. Efforts to date to provide a safe and accessible external environment for all citizens have mainly been in the planning and research phase. When confronted with the real living environment and the urban outdoor space, the study finds that the urban planning decisions, building regulations, political settings and other ambitions of previous decades have left a significant imprint on the outdoor space and that a change of approach cannot happen quickly and on a large scale, and that changes to the existing urban environment require thoughtful, careful and detailed planning and implementation. Studies have been carried out nationally on the condition of public buildings and their compliance with accessibility requirements, and NGOs have carried out studies on the accessibility of buildings and facilities, but overall no comprehensive environmental assessment has been carried out, nor is it currently included in future development plans. The research process is limited to apartment blocks built during the Soviet era when universal design principles were not included.

Residential neighbourhoods and their problems are topical in various fields, it is necessary to analyse residential areas and find solutions in the context of universal design and environmental accessibility from the point of view of landscape architecture. Therefore, the aim of the study is to determine the most optimal development and use potential for the entrances of the inner courtyards of residential buildings in the Jugla neighbourhood through modular solutions.

Materials and Methods

The changes needed in the very foundations of urban planning are clearly visible at the beginning of the 21st century. Approaches and mindsets are gradually changing and people and their needs are once again becoming a priority, as is the demand for quality living environments [3]. The redevelopment of urban spaces is necessary for them to fully fulfil their function as safe,

lively, sustainable and healthy environments. Respect for people is a key reason for changing the way we think and design at the grassroots and creating environments that serve everyone.

Accessibility is an issue that affects different city scales, from the whole city down to the courtyard level. The structure of the city, neighbourhoods and districts and the functional condition of urban spaces form a cluster that characterises the quality of life and the diversity of opportunities for people to live in and make the most of their surroundings.

Research is needed at different scales to draw conclusions about environmental quality and to find solutions for improvement. Neighbourhood areas are an integral part of neighbourhoods and the city, but their scale requires detailed and individual research and solutions. This requires clearly defined scales of issues to be investigated and a framework for solutions. Therefore, the study includes several levels of aspects and solution proposals for the Jugla neighbourhood of the city of Riga, which are carried out from the neighbourhood to the courtyard scale. One of the innovations of the work is the development of modular solutions for the entrance areas of Soviet-era apartment blocks. Using the theoretical research method, the study collects historical data on the development of courtyards and, using the comparative method, develops schemes and maps for assessing the existing situation in the Jugla neighbourhood, as well as inter-comparison of the surveyed areas and mapping of environmental accessibility at the block scale. The descriptive or monographic method was used to evaluate all the findings of the study and to gather information on universal design through theoretical surveys. In the process of the research, an outdoor space quality assessment matrix was developed, which provided comprehensive information about the current situation of Jugla's residential neighbourhoods today.

Results and Discussion

At European level, the Nordic countries are seen as leading societies in the context of inclusion and universal design, where issues of inclusion and environmental accessibility have been topical for decades. As in other parts of the world, the Nordic universal design performance is focused on social inclusion and sustainability [7] and relates todesign both as a product and as a design process from an inclusive perspective. The collaborative work of five Nordic professional groups, incorporating both practical and theoretical knowledge, has resulted in the Nordic Charter initiative, which aims to provide a rationale for a successful contribution to universal design and its understanding in society. The Charter is part of a Nordic strategy to introduce and increase awareness and knowledge of universal design in society. Although Nordic initiatives on universal design have been similar, national practices and experiences are not equivalent [7]. Despite the fact that the concept of universal design is welcomed-nationally and efforts are made to establish common frameworks, the Nordic region has not been able to find common approaches and solutions in urban planning and design. The main shortcomings in the implementation of common approaches are the coordination between national and local institutions, the integrated approach and the definition of institutional responsibilities. However, the greatest challenges are in the urban planning and design sector, which is governed by regulations, layouts, and standards, within which achieving a solution that is attractive to everyone is a complex task.

In 2016, the Association of Persons with Disabilities and Their Friends "Apeirons", with financial support from the European Economic Area Financial Mechanism and the Latvian state, prepared "Methodological material for ensuring environmental accessibility in public buildings and external environments according to universal design principles", and in 2018, the Association of Persons with Disabilities and Their Friends "Apeirons" prepared "Methodological material for ensuring environmental accessibility in public buildings and external environments according to universal design principles", with financial support from the European Economic Area Financial Mechanism and the Latvian state. In 2018, the Latvian organisation SUSTENTO, on behalf of the Ministry of Welfare, produced "Guidelines for environmental accessibility in public buildings and spaces and public outdoor space" [2]. Since the ratification of the UN Convention, various plans and reports have been developed, but the overall situation of environmental accessibility in the country lags behind the requirements of the Convention. Referring to the "Plan for Creating an Accessible Environment in Latvia 2019-2021 (Plan..., 2019), it is pointed out that no comprehensive and permanent analytical studies on environmental accessibility in Latvia have been carried out. However, various reports from the Latvian Ombudsman's Office (Latvian..., 2021) and other instances are compiled with indications of insufficient accessibility of the environment and information. The Ombudsman's report includes complaints received by the Ombudsman's Office from citizens about insufficient adaptation of the environment and housing for people with

disabilities. The accessibility status of apartment buildings is highlighted as an important shortcoming in terms of accessibility. The Ombudsman points out that this is based on the norms of the Law on Apartment Property, which are contrary to the Constitution. The provisions of the Apartment Law state that if a ramp or a lift is to be installed in an apartment building, but the general meeting of the apartment owners votes against it, people living in such buildings are dependent on the goodwill of their neighbours, which is contrary to the UN Convention and the Constitution 91 and 97 [8; 5; 10].

Non-governmental organisations make an important contribution to the study of the situation. For several years, the Association of People with Disabilities and their Friends "Apeirons" has been carrying out independent research on environmental accessibility issues. "In 2016, Apeirons reported (Plan..., 2019) that in a survey of 40,000 sites, around 80 % of new and renovated buildings were not adapted for people with disabilities and only 2% of all buildings were fully accessible. A major finding on the reasons for non-compliance of facilities cited mainly a lack of knowledge or understanding of environmental accessibility criteria. Consequently, the Jugla neighbourhood of Riga was selected for the study. The neighbourhood was chosen as one of the first neighbourhoods in Riga where the construction of large-scale residential blocks began in the mid-20th century, which now marks an important spatial structure of the neighbourhood and reflects a typical part of the city of Riga that was mainly developed during the Soviet Union.

At the scale of the quarters, residential quarters are identified architectural types of buildings are grouped, and quantitative information on the number and types of buildings in each quarter is collected.

Jugla is located 10 km from the centre of Riga in the eastern part of the Vidzeme suburb of Riga. Jugla is the second largest neighbourhood and has a complex spatial structure. Jugla covers an area of 1409.9 ha and has approximately 26,000 inhabitants. Although it is easy to identify the Jugla area in nature, however, its spatial unity in the northern part is undermined by the transit routes of the Vidzeme highway and the Sigulda railway line, which cross the territory and functionally separate the northern part of the neighbourhood. The largest part of the built-up area is occupied by

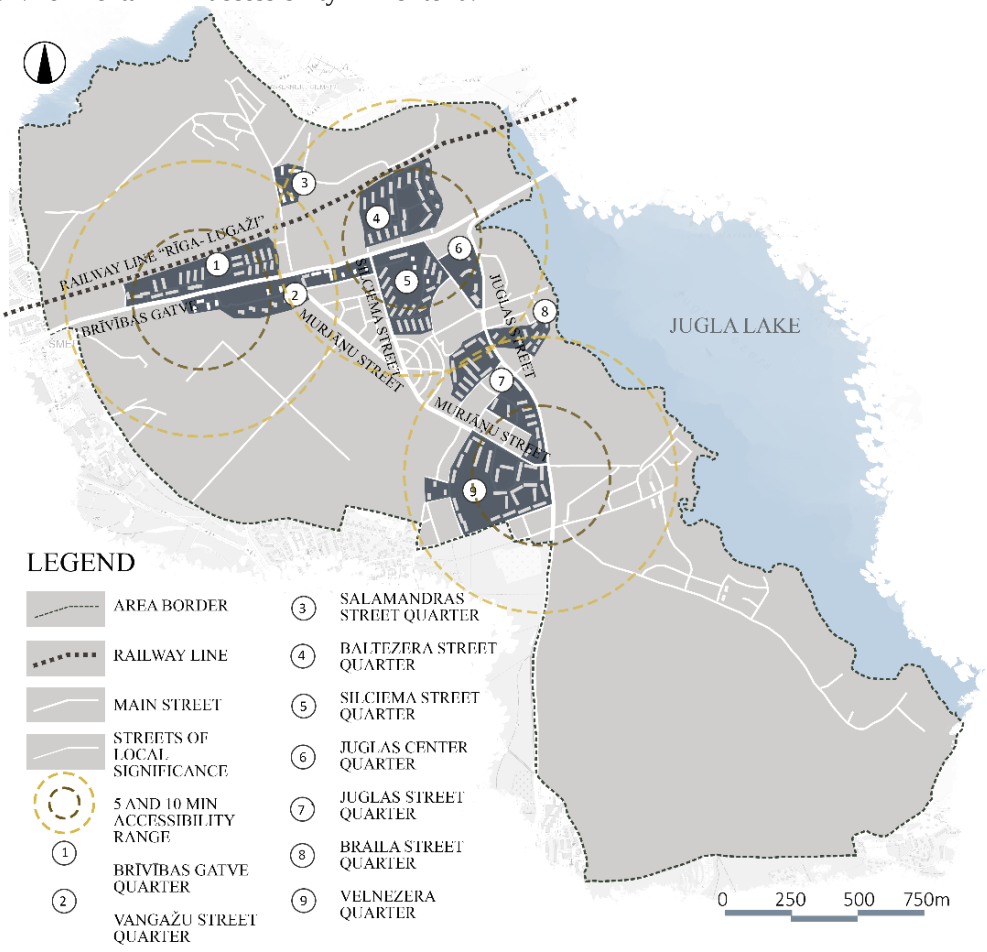

Fig. 1. Jugla residential districts [Bergmane, 2021]

residential areas – 9 %, where the dominant buildings are five-storey houses from the 1960-70s with a network of access roads, courtyards and inner courtyard green areas. There are also a number of isolated areas of 9 and 12-storey dwellings in the vicinity of the Jugla Canal and Schmerlis Forest.

The residential areas surrounding Juglas Street are divided into five blocks. The area between Juglas Street in the east, Umurgas Street in the north, Lilastes and Svīteres Streets in the west, Murjāņu Street in the south -Juglas Street Quarter. The area between Brīvības gatve in the north and Juglas Street in the east and west, is penetrated by Upesciema Street – Juglas centre quarter. The area between Juglas Street in the west and Braila Street in the east – Braila Street Quarter. The areas are between Juglas Street in the east, Murjāņu Street in the north, Veldre Street in the west and Maliena Street in the south - Velnezers Quarter.

In the Jugla neighbourhood, large-scale residential blocks began to be built in the 1960s at the same time as the construction of Āgenskalns and Ķengarags. The quarters are characterised by the spatial organisation of residential buildings typical of Soviet-era construction in the 20th century, with buildings interspersed with green spaces and a distinct network of access roads, which include driveway widths insufficient for modern traffic loads and a lack of parking spaces.

The buildings in the blocks are monotonously spaced, and parallel to each other. The spatial organisation of the inner courtyards and the arrangement of the outdoor elements in the blocks follow the principles of spatial organisation put forward by the Soviet Union, which are arranged [4; 10] at certain angles to the streets – 30, 45, 90, 120 and 180 degrees. Several types of development are characteristic of the quarters: perimeter, terraced, combined and group development [1], where each type of spatial development has its own characteristic architectural structures for buildings, road infrastructure, green areas and the arrangement of outdoor elements. The field study summarised the housing stock of the neighbourhood by building typology. A total of 9 different types of Soviet-era architectural buildings and two types of 21st-century apartment building projects were identified in the neighbourhood. The survey was carried out for the whole Jugla neighbourhood and for each residential quarter separately. In the whole Jugla neighbourhood, 163 apartment buildings with 4097 apartments were found. Based on the number of apartments, an estimate of the population was also made, assuming an average occupancy of 2.5 persons per apartment, giving a total of 10,003 inhabitants. According to

Fig. 2. Series 1-316 - Brivibas gatves quarter example [Bergmann, 2021]

Fig. 3. 1-464 series building - Silciema street block example [Bergmann, 2021]

Fig. 4. Czech type project, type 1 - Vangažu Street example [Bergmann, 2021]

Fig. 5. 9 storey project Silciema Street [Bergmane, 2021]

Fig. 6. Stalin-type building Brīvības gatves quarter [Bergmane, 2021

Fig. 6. Small families project Brīvības gatves quarter [Bergmane, 2021]

the above-mentioned summary, the two most characteristic and predominant types of typical building design in the neighbourhood are the buildings divided into series 1-316 and 1-464 according to the Soviet-era architectural standard. This type of building in Jugla accounts for 81 % of the total Soviet-era apartment buildings, but only 64% of the total number of apartments, which is explained by the number of storeys.

In the buildings of Vangažu Street, Baltezera Street and Velnezera Quarter there are also buildings of the Czech type, which are characterised by 12 storeys, they are built of brick and the construction of the buildings was mainly carried out in the 20th century. The building was built in the 1970s. In the Vangažu and Silciema Street quarter, 9-storey brick buildings with one staircase are also found.

In the vicinity of the Brīvības Street corridor you can find several Stalin-type residential buildings built in the 20th century after World War II and low-family project 5-storey buildings built in the 20th century. 1980s.

Although the scale of the study does not foresee an in-depth study of environmental accessibility in projects built in the 21st century, the context of the blocks also requires mentioning the newly built development. In Jugla, there are only a few new apartment projects, which should be characterised more as the construction of individual apartment buildings.

In order to create a transparent assessment of the residential outdoor space and its compliance with environmental accessibility requirements, one residential neighbourhood was selected for the study -Velnezers neighbourhood – where environmental accessibility was assessed at both the neighbourhood and the courtyard level. For this phase of the study, the main categories of outdoor elements were selected and evaluation criteria were developed. Using this set of criteria, the compliance of courtyard areas and elements with the accessibility criteria was assessed and conclusions were drawn on the current situation. The following stages of the study can be identified: block scale – development of a typology of architectural types of residential buildings and entrance areas. The study found that one of the most important indicators of environmental accessibility in residential neighbourhoods is the entrance areas of residential buildings. For the purpose of the study, building entrance areas have been grouped according to two parameters in order to establish accessibility evaluation criteria:

- Horizontal and vertical dimensions of the building entrance platform.
- Horizontal dimensions of building entrance forecourts.

Based on these two indicators, the study develops building entrance platforms and forecourt types, which can lead to solutions for accessibility of entrance areas.

Assessment of building entrance areas

The survey of Soviet-era apartment buildings in the Jugla neighbourhood gathered information about the different types of building entrance areas in the form of photo-recordings. As mentioned above, 9 different types of buildings were found throughout the neighbourhood, each characterised not only by the architectural structure of the building, but also by the style of organisation of the adjacent outdoor space.

The assessment of the environmental accessibility contact of the building entrance areas shows that some of the building entrance areas are level with the pavement level of the driveway, however, most of the building entrance platforms are located on several steps, without levelling devices and are not accessible for people with reduced mobility. Thus, all the building entrances surveyed were aggregated and entrance platform types were created, grouped according to the vertical dimensions of the entrance platforms up to the level of the entrance door. As existing access solutions for entrance areas are mainly grouped according to the number of platform steps, this was also the basis for the creation of platform categories, graded according to the average height of one step – 15 cm. This resulted in 5 groups of entrance platforms.

Another important aspect of building entrances is the size of the forecourt space, as this influences pedestrian movement patterns and the quality of accessibility. The organisation of the forecourts at the entrances of buildings is characterised by certain features for each category of building, mainly in the horizontal plane. They are characterised by two parameters: the width of the entrance platform and the length of the entrance forecourt to the carriageway. This has led to the creation of 4 categories of entrance forecourts, as shown in the table below.

TABLE1

Categories of building entrance platforms
[created by authors]

Type	Description	Number of steps	Ramp length required for environmental accessibility, m
1	Building entrance platform flush with pavement	None	Not necessary
2	Building entrance platform level difference up to 15cm with pavement	1	Up to 3m
3	Building entrance platform level difference 15–30cm with pavement	2	3–6 metres
4	Building entrance platform level difference 31–45cm with pavement	3	6–9 metres
5	Building entrance platform level difference over 45cm	More than 3	Over 9 m

Types of entrance platforms found in the Jugla area:

Fig. 7. Entrance platform – Type 1 [Bergmane, 2021]

Fig. 8. Entrance platform – Type 2 [Bergmane, 2021]

Fig. 9. Entrance platform – Type 3 [Bergmane, 2021]

Fig. 10. Entrance platform - Type 4 [Bergmane, 2021]

Fig. 11. Entrance platform - Type 5 [Bergmane, 2021]

TABLE2

Categories of building entrance forecourts
[created by authors]

Type	Description
A	Width of building entrance platform: >2 m; entrance forecourt extends to the building facade
B	Width of building entrance platform: >2 m; length of entrance forecourt to carriageway: <3 m
C	Length of building entrance platform: >2 m; length of entrance forecourt to carriageway: >3 m
D	Length of building entrance platform: >5 m; entrance forecourt extends to the building facade

Fig. 12. Entrance forecourt – type A [Bergmane, 2021]

Fig. 13. Entrance forecourt – type B [Bergmane, 2021]

Fig. 14. Entrance forecourt – type C [Bergmane, 2021]

Fig. 15. Entrance forecourt – type D [Bergmane, 2021]

The entrance area layout of the Khrushchev type 1-316 series buildings is characterised by 2 different types of forecourt organisation: 1) the forecourt area extends directly along the building facade; 2) the building entrances are located several metres away from the carriageway and are separated by green areas.

Typology of building entrance areas

The typical vertical and horizontal parameters of the entrance areas of each serial building can be deduced from the data of the buildings in the neighbourhood. The entrance areas of each building are thus grouped according to the criteria established above and presented in the table below.

TABLE 2

Correlation of categories of entrance areas with building types [created by authors]

Building type	Description of building type	Entrance platform category	Entrance forecourt category
1	"Khrushchev" type building – Series 1-464	1, 2, 3, 4	B, C
2	"Khrushchev" type building – Series 1-316	1, 2, 3, 4	A, B, C
3	Czech project – 12-storey building; type 1	2, 3	D
4	Czech project – 12-storey building; type 2	4	D
5	Spec project – 12-storey building	5	D
6	9-storey buildings	4	A
7	Single-family building; type 1	4	A
8	Single-family building; type 2	1	C
9	"Stalin" type buildings	4	A

Characterising the groups of entrance zones in different layouts, it can be concluded that all the entrance zones found in the residential areas of Jugla can be divided into.

By combining the categories of building entrances and forecourts created above, a combined typology of entrance areas has been created, as shown in the table below.

From the summary, it can be concluded that there are 15 different types of residential entrance areas in the neighbourhoods. As the entrance platform type 1 includes a single-level access area to the front door of the buildings, this category is considered to meet the environmental accessibility requirements for the purpose of the study and no further conceptual solutions to the problem are sought. As the study has identified a certain number of parameters related to entrance areas, it is necessary to assess the development of standardised accessibility platform-type models that provide convenient, adaptable, visually high quality and accessible access to building entrances.

TABLE 3

Typology of building entrance areas and its application in the Jugla neighbourhood [created by authors]

Building entrance platform/ Building entrance area	Building an entrance platform on one level with the pavement	Step height up to 15 cm	Step height 15–30 cm	Step height 30–45 cm	Step height over 45 cm
Width of the building entrance platform: ->2 m; the entrance forecourt extends to the front of the building	–	2A	3A	4A	–
Width of the building entrance platform: >2 m; length of entrance forecourt to carriageway: <3 m	1B	2B	3B	4B	–
Length of building entrance platform: >2m; length of entrance forecourt to carriageway: >3m	1C	2C	3C	4C	–
Length of building entrance platform: >5 m; the entrance forecourt extends to the front of the building	–	2D	3D	4D	5D

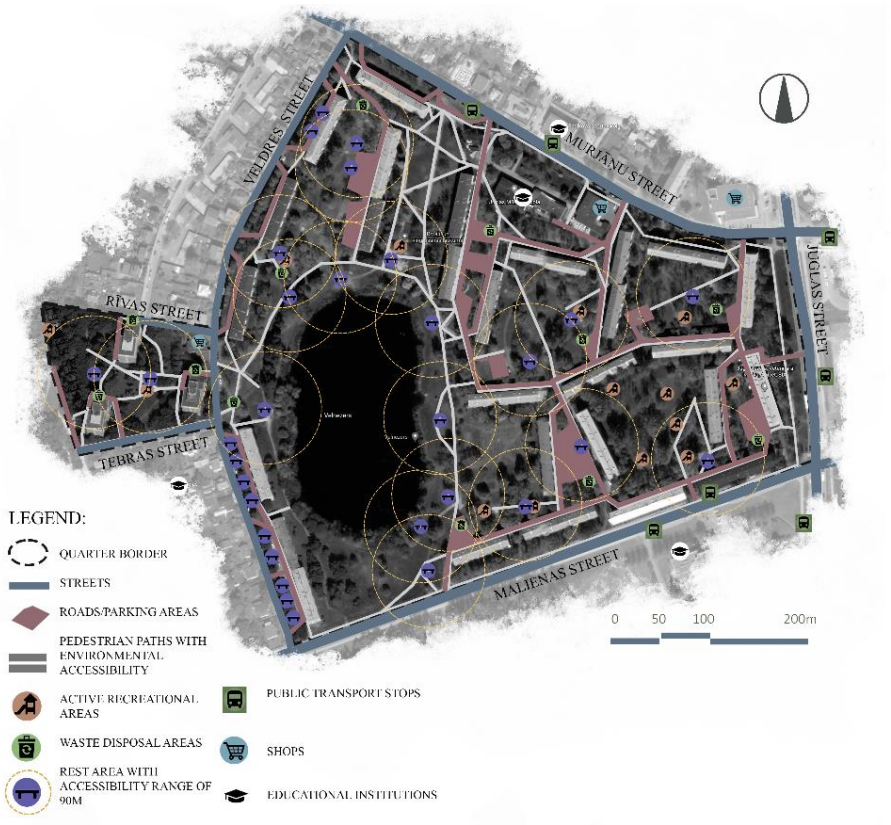

Fig. 16. Accessibility map of the Velnezers quarter [diagram by the authors, using www.google.com/maps]

Summarising the results of the study of the existing situation of the blocks in the context of accessibility, it can be concluded that improvements are needed for each group of elements to ensure the environmental accessibility of the residential areas, but improvements are needed for the whole block. One of the main reasons for the lack of accessibility is the outdated and degraded state of the road surfaces, and the lack of lighting, which limit the use and accessibility of the zones.

Concept

The principles of spatial organisation of the typical Soviet-era large-scale housing blocks and courtyards allow for the creation of typical environmental accessibility solutions, thus ensuring the introduction of a unified design concept in the entrance areas of the buildings. This can be achieved through a uniform choice of forms, materials, colours elements and modular solutions. The concept is based on the idea of a modular entrance node solution, similar to the one used in the 'parklet' zones, creating a small seating and green area as a public amenity on or adjacent to the pavement. Parklet ideas are currently mostly implemented in urban areas in car parking zones, where standardised-sized seating platforms are placed. Similarly to parklets, the concept is to turn building entrance areas into attractive and multifunctional seating areas with different configurations. The modular solutions are intended to incorporate a set of elements tailored to the specific characteristics of the respective entrance areas. The mix of elements can be changed according to the preferences of the residents.

Typical modular solutions

According to the typology of entrance areas developed in the study, 12 typical entrance area solutions have been developed, corresponding to each of the entrance area categories:

TABLE 4

Summary of building entrance zone types [created by authors]

Building entrance platform/ Building entrance area	Step height up to 15cm	Step height 15–30cm	Step height 30–45cm
Width of building entrance platform: <2 m; entrance forecourt extending to building facade	A2	A3	A4
Width of building entrance platform: >2 m; distance of entrance forecourt to carriageway: <3 m	B2	B3	B4
Length of building entrance platform: >2m; distance of entrance forecourt to carriageway: >3m	C2	C3	C4
Building entrance platform length: >5 m; the entrance forecourt extends to the front of the building-	D2	D3	D4

The existing concept does not foresee the creation of a 5th entrance platform type solution, as the vertical level difference of the entrance platform is above 45 cm, to provide access to buildings with a level difference, it is recommended to create environmental accessibility by means of a mechanical device. The use of mechanical lifting devices is not included in the concept and should be addressed in another study. Each of the 12 standard solutions is designed as a module and includes the above-mentioned landscaping elements -ramp, flower boxes, boundary walls, benches, litter bins and, in some modules, bicycle racks. For each of the 12 types, 2 modular variants have been developed.

3D examples of typical models

Typical modular solutions are visualised according to the concept idea. As mentioned above, the ramp design takes into account the regulatory requirement of 5% longitudinal drops, so that access to buildings can be made by one individual without the participation of others. The ramps are designed in lengths of 3, 6 and 9 m, depending on the number of steps.

A-type

The developed solutions of A-type 2, 3, 4 models are suitable for the buildings of the "Khrushchev" project series 1-316, where the building entrance areas are narrower than 2m and the hard pavements of the carriageway are adjacent to the building facades and the entrance platforms are projecting from the building facades. A4 models are also suitable for the Stalin project, 9-storey buildings and Small Family Type 1 buildings.

B-type

The developed B-type model solution is suitable for both the 1-316 and 1-464 series buildings of the "Khrushchev" project, for which the entrance to the buildings is more than 2 m wide and the distance from the entrance to the carriageway is up to 3 m.

C-type

The C-type model solution is suitable for the largest number of building project types. It is applicable to both the Khrushchev 1-316 and 1-464 series, as well as to the entrances of the Small Family buildings, where the entrance plazas are wider than 2m and the distance of the entrance to the carriageway is greater than 3m.

D-type

The D-type model solution is mainly suitable for the 12-storey buildings surveyed in the Jugla neighbourhood, where the entrance areas are wider than 5 m and the entrance forecourts are adjacent to the building façade.

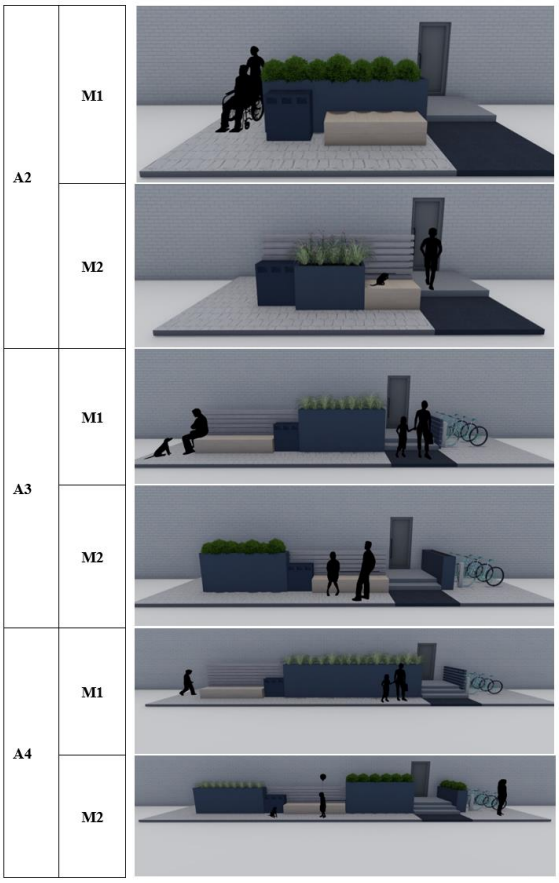

Fig. 17. Solutions for A-type entrance areas [created by authors]

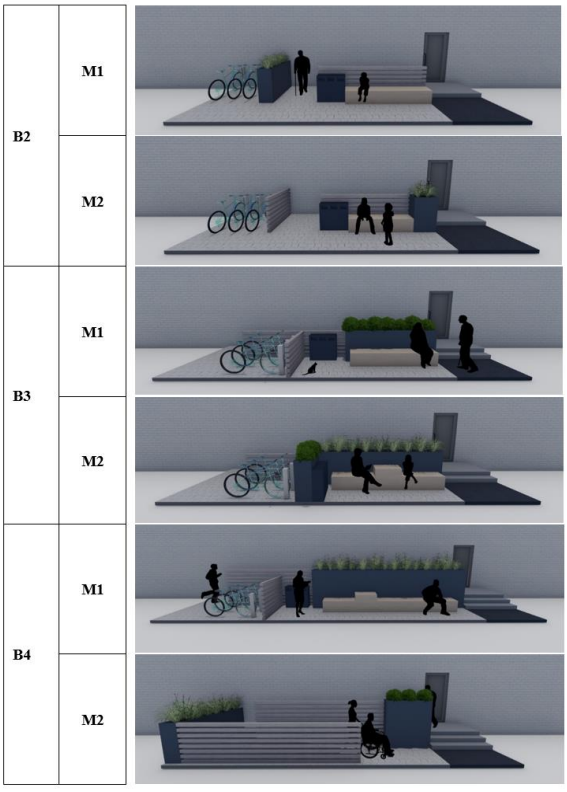

Fig. 18. B-type entrance area solutions [created by authors]

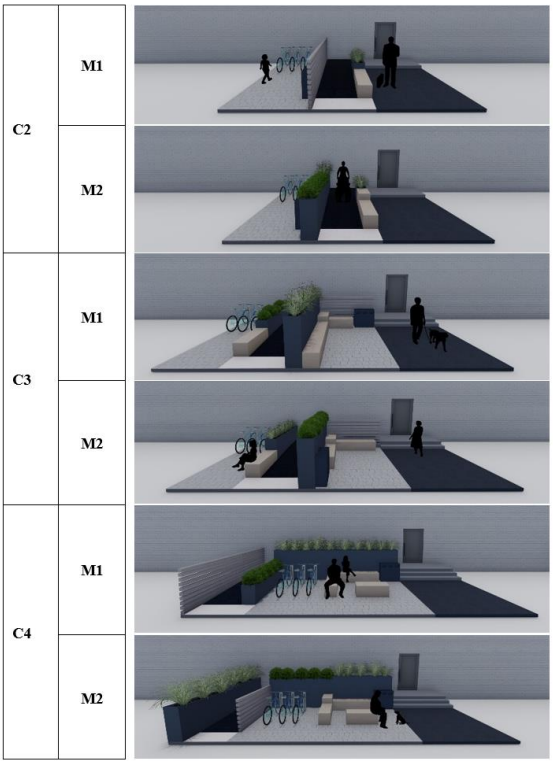

Fig. 19. C-type entrance area solutions [created by authors]

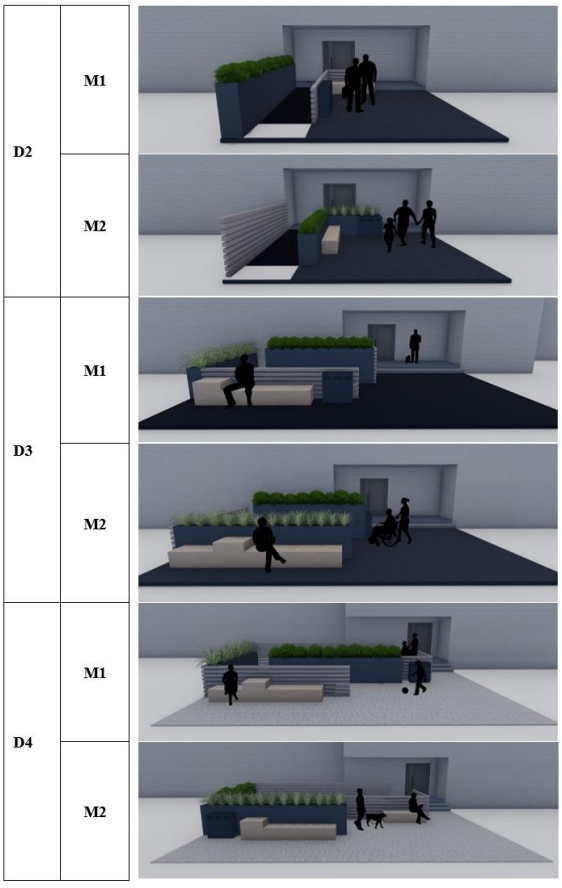

Fig. 20. D-type entrance area solutions [created by authors]

Modular entrance areas offer a high degree of customisation and modification, as the connectivity of the elements allows the flexible design of different types of modules according to user preferences and can be implemented on a staircase or house scale.

Conclusions

1. For decades, people and their needs have been subordinated to the development focus of urban transport infrastructures, where the urban environment no longer serves its main purpose - to be a healthy and sustainable place where people meet, live, talk and where the environment is subordinated to people as a priority. Today, a built and accessible environment for people is becoming a priority.
2. Applying the principles of universal design at the level of design concepts can incorporate and respond to the specific needs of groups of individuals, and create harmonious solutions that are equally beneficial and suitable for all citizens.
3. Public education and involvement are needed to raise public awareness of universal design. Actions that raise awareness among users encourage rapid adoption of ideas and principles. Education among the design professions and academics is a priority. Successful solutions require compatibility with many good practices.
4. In Latvia, the progress made so far on the UN Convention on the Rights of Persons with Disabilities is very different from that in the Nordic countries, but planning and conceptualisation are underway, as are studies on environmental accessibility in public buildings and public open spaces, but there is a lack of research on the state of the housing stock to identify. However, data on accessibility issues are collected, both by representatives of non-governmental organisations surveying various facilities in Latvia and by the Ombudsman, who collects complaints from citizens about the lack of accessibility.
5. Problems can also be seen in the context of the regulatory framework, which is mainly related to the complex area of property rights and has a direct impact on the opportunities and pace of development of territories. In the context of accessibility, the regulatory issues are most acute in the large-scale housing stock, which is 20th century 1950s.
6. The results reflect the problems of residential neighbourhoods, which are not only related to accessibility issues but also to the quality of the environment in general. The pattern of problems identified can be applied to any residential area where improvements to the landscaping and surrounding areas have not

been made for a long time. The environmental situation in the neighbourhoods is significantly worsened by the increase in the number of vehicles in the context of limited space.

7. Improvements to existing residential neighbourhoods are a complex and multifaceted task, involving the assessment of road infrastructure, green infrastructure and amenities, and the search for harmonious solutions. Initiatives to transform existing infrastructure are subject to technological, legal and physical challenges, where the implementation of successful solutions depends on a balanced interaction of options.

8. In the context of accessibility improvements, the work includes a proposal of small-scale solutions developed and typologies of building entrance areas created in the study. At a conceptual level, modular environmental accessibility solutions for entrance nodes are proposed. The concept of modular solutions is based on the idea of attractive and multifunctional seating areas with different configuration possibilities and consisting of a set of elements adapted to the specific characteristics of the respective entrance areas and whose composition can be changed according to the needs.

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Kopsavilkums. Kvalitatīva un pieejama dzīvojamā ārtelpa savas dzīvesvietas tuvākajā apkārtnē ir svarīgs faktors cilvēku labsajūtas, drošības un kopienas piederības nodrošināšanai. Piekļuve ēku ieejām ir viens no galvenajiem nosacījumiem iedzīvotāju spējai sasniegt ārtelpu un baudīt līdzvērtīgas pārvietošanās iespējas. Tādejādi viens no svarīgiem uzdevumiem universālā dizaina principu un mērķu sasniegšanā mazā mērogā ir saistīts ar ēku ieeju zonām. Būvniecības normatīvais regulējums laikā, kad tika būvētas lielākā daļa no Rīgas lielmēroga dzīvojamiem rajoniem, neietvēra prasības par vides pieejamības risinājumiem. Lielākā daļa dzīvojamo ēku ieeju zonu un pieguļošo teritoriju ir izbūvētas atbilstoši tā laika būvniecības praksei, izmantojot betonētus pakāpienus, lai savienotu brauktuves līmeni ar kāpņutelpu durvīm. Līdz ar to pētījums ietver konceptuālus risinājumus vides pieejamības nodrošināšanai ēku ieejas zonās – esošās vietās ar specifiskiem vides rādītājiem, kas būtu piemērojami pēc iespējas vairākām ēku ieejām, neatkarīgi no ēku atrašanās vietas.

Pētījuma procesā nosakot izmantošanas potenciālu Juglas apkaimes dzīvojamai ārtelpai, ir sniegti inovatīvi un ilgtspējīgi moduļveida risinājumi Padomju laiku lielmēroga dzīvojamo kvartālu ieejām, kurus būtu nepieciešams attīstīt un izstrādāt detalizētākus risinājumus, ieviešot pakāpeniski dzīvojamās ārtelpas konfigurācijās.