Kaunas University of Technology

Faculty of Civil Engineering and Architecture

A Study on the Walkability of City and Proposals to Improve It (Klaipėda Case Study)

Master's Final Degree Project

Monika Moncevičiūtė

Project author

Prof. dr. Kęstutis Zaleckis

Supervisor

Kaunas, 2023

Kaunas University of Technology

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Architecture (6211PX026)

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Assoc. prof. dr. Indrė Gražulevičiūtė Vileniškė

Reviewer

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A Study on the Walkability of City and Proposals to Improve It (Klaipėda Case Study)

Declaration of Academic Integrity

I confirm the following:

1. I have prepared the final degree project independently and honestly without any violations of the copyrights or other rights of others, following the provisions of the Law on Copyrights and Related Rights of the Republic of Lithuania, the Regulations on the Management and Transfer of Intellectual Property of Kaunas University of Technology (hereinafter – University) and the ethical requirements stipulated by the Code of Academic Ethics of the University;

2. All the data and research results provided in the final degree project are correct and obtained legally; none of the parts of this project are plagiarised from any printed or electronic sources; all the quotations and references provided in the text of the final degree project are indicated in the list of references;

3. I have not paid anyone any monetary funds for the final degree project or the parts thereof unless required by the law;

4. I understand that in the case of any discovery of the fact of dishonesty or violation of any rights of others, the academic penalties will be imposed on me under the procedure applied at the University; I will be expelled from the University, and my final degree project can be submitted to the Office of the Ombudsperson for Academic Ethics and Procedures in the examination of a possible violation of academic ethics.

Monika Moncevičiūtė

Confirmed electronically

KAUNAS UNIVERSITY OF TECHNOLOGY
Faculty of Civil Engineering and Architecture

Topic (thematic) of the Master's Final Degree Project
A Study on the Walkability of City and Proposals to Improve It (Klaipėda Case Study)

The topic of the Master's Final Degree Project is approved by the Dean's Order
A Study on the Walkability of City and Proposals to Improve It (Klaipėda Case Study)

Master's **Final Degree Project** (study module M000M168)

T A S K

Objective of the work:

To prepare the Master's final degree project based on the previous stages of the research work.

Tasks of the work:

To connect and summarise the data from the literature sources, analytical paper, research in situ report and experimental project, and prepare the Master's thesis – to present the reasoned solutions to theoretical and practical problems.

Structure of the work:

Text. Title page, heading page, declaration of academic integrity, the task of the final degree project (FDP) (if needed), summary, content, list of figures (if needed), list of tables (if needed), list of abbreviations and terms (if needed). Main part: introduction (relevance and novelty of the work, research problem and the level of its examination, object, objective, tasks, and methodology of the FDP); augmented and summarised data of theoretical research, empirical research and experimental design; conclusions of individual chapters and the entire work. List of references, list of information sources (if needed), appendices, copies of the graphical part (reduced in size).

The volume of the text (main part) is 2 – 3 quires (1 quire is 40 000 characters with spaces), i.e. around 60 – 80 pages of printed text (recommended font is Times New Roman, size 12, line spacing multiple 1.15 (Methodological Guidelines for the Preparation of Written Works)).

Graphical part.

The graphical part of the work is presented in posters (70x100 cm). It should reflect the most important results of the analysis of theoretical material, empirical research and experimental design, as well as general conclusions and proposals. The graphical part of the work should be arranged and exhibited in a way to form a visually unified whole and reflect the content of the work. It should be attractive aesthetically. When preparing the graphical part of the work, it is necessary to exclude the non-essential information, highlight the most important research results and ideas, and unify the notes, graphical expression, and colours.

The most expressive part of the project should be the experimental project, illustrating the conceptual proposals of solutions to problems. The experimental project should make from 3/5 to 4/5 of the graphical part.

The volume of the graphical part is 10 – 16 posters, of 70 x 100 cm size – B1 (vertically oriented).

Inscriptions of the graphical part should not be smaller than 5 mm in size.

Model or virtual tour within the planned area/ designed object.

Digital copy of the text and graphical part of the final work.

Timetable of the performance of the tasks:

1. Discussion of the task	01 02 2023
2. Constitution of the writing programme of the final work and the work's structure	08 02 2023
3. Supplementation, structuring, analysis and generalisation of the present data	until 15 03 2023
4. Review and evaluation of the supplemented and generalised data	**15 03 2023**
5. Writing of the FDP text and finishing of the graphical part	until 03 05 2023
6. Review of the first edition of the FDP text	**03 05 2023**
7. Defence of the FDP at the commission of supervisors	**10 05 2023**
8. Public defence of the FDP	**31 05 2023**

Consultation time with the supervisor

Weekday	**Faculty of Civil Engineering and Architecture, Room 311, Zoom or other distance learning platform**	**Workplace**
	Time and duration *	**Time and duration ***
Monday		
Tuesday		
Wednesday	13.30 – 15.30	
Thursday		
Friday		

* - 2 hours per week

Supervisor of the final degree project Prof. dr. Kęstutis Zaleckis
(name, surname, signature)

Student Monika Moncevičiūtė
(name, surname, signature)

February 2023

Monika Moncevičiūtė. A Study on the Walkability of City and Proposals to Improve It (Klaipėda Case Study). Master's Final Degree Project / supervisor Prof. dr. Kęstutis Zaleckis; Faculty of Civil Engineering and Architecture, Kaunas University of Technology.

Study field and area (study field group): architecture.

Keywords: city, walkability, urban design.

Kaunas, 2023. 110.

Summary

Lithuania's sustainable mobility habits are just starting to form. However, the analysis regarding walkability lacks depth and structure; there is an overuse of vague terms. Even though walkability is part of a complex urban structure, deeper analysis and more precise evaluation criteria regarding walkability could lead to better urban design strategies and quality of life.

Theoretical research revealed key quantitative and objective parameters for a walkable city.

Empirical research (GIS, general and sustainable mobility plans, sociological surveys analysis, walk audit and observation) revealed what walkability issues Klaipėda faces and what urban means could improve it.

An experimental design project was created with a research-based urban design strategy and concept for Klaipėda city walkability enhancement.

Moncevičiūtė, Monika. Miesto patrauklumo vaikščiojimui tyrimas ir pasiūlymai jo didinimui (Klaipėdos atvejis). Magistro baigiamasis projektas / vadovas prof. dr. Kęstutis Zaleckis; Kauno technologijos universitetas, statybos ir architektūros fakultetas.

Studijų kryptis ir sritis (studijų krypčių grupė): architektūra.

Reikšminiai žodžiai:: miestas, darnus judumas, urbanistika.

Kaunas, 2023. 110 p..

Santrauka

Lietuvos darnaus judumo įpročiai dar tik pradeda formuotis. Tačiau vaikštomumo analizei trūksta gylio ir struktūros; yra daug neapibrėžtų sąvokų. Nors vaikštomumas yra sudėtingos miesto urbanistinės struktūros dalis, gilesnė analizė ir tikslesni vaikštomumo vertinimo kriterijai galėtų lemti geresnes miesto projektavimo strategijas ir gyvenimo kokybę.

Teoriniai tyrimai atskleidė pagrindinius kiekybinius ir objektyvius patrauklaus vaikščiojimui miesto parametrus.

Empiriniai tyrimai (GIS, bendrieji ir darnaus judumo planai, sociologinių tyrimų analizė, vaikštomumo auditas ir stebėjimas) atskleidė, su kokiais vaikštomumo iššūkiais susiduria Klaipėda ir kokios urbanistinės priemonės galėtų tai pagerinti.

Sukurtas eksperimentinis projektas su moksliniais tyrimais pagrįsta miesto projektavimo strategija ir koncepcija Klaipėdos miesto vaikštomumo didinimui.

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List of abbreviations and terms

Abbreviations:

AARP – American Association of Retired Persons;

GIS – geographical information system;

MPO – metropolitan planning organisations;

OSM – OpenStreetMap;

PEI – pedestrian environment index;

SUMP – sustainable urban mobility plan.

Terms:

GIS – a geographic information system (GIS) is a database containing geographic data (descriptions of phenomena for which location is relevant) combined with software tools for managing, analysing and visualising those data. In a broader sense, one may consider such a system to include human users and support staff, procedures and workflows, knowledge of relevant concepts and methods, and institutional organisations.

OSM – OpenStreetMap is a collaborative project to create a free editable geographic database worldwide. The geodata underlying the maps is considered the primary output of the project.

PORTIS – CIVITAS PORTIS designed, demonstrated, and evaluated innovative sustainable mobility measures in five European port cities: Aberdeen (UK), Antwerp (Belgium), Constanta (Romania), Klaipėda (Lithuania), and Trieste (Italy). The project also had a significant international 'follower' in the port city of Ningbo (China).

Introduction

Relevance and novelty of the topic

According to the United Nations Economic Commission for Europe (2020), half of the world's population currently lives in cities, which has a detrimental influence on urban energy consumption, pollution, and congestion. Despite occupying only 3% of the available land, cities are responsible for up to 75% of carbon emissions in the transportation and energy sectors (*United Nations Economic Commission for Europe*, 2020).

Studies point to the development of active mobility's beneficial effect on the urban economy. Investing in walking can prevent billions of euros worth of health and environmental damage. For example, according to Transport for London (2020), walking and cycling improvements can increase retail spend by up to 30 per cent, and physically active people take 27 per cent fewer sick days each year than their colleagues. Furthermore, a range of studies points out that physical activity is one of the critical aspects of chronic disease prevention. Hence, enabling more people to walk could improve health, decrease chronic disease incidence and reduce healthcare costs (Coffee, Howard, Paquet, Hugo & Daniel, 2013). Another benefit of active travel is that it is accessible and inclusive.

According to Dovey and Pafka (2021), the urban walkability concept connects multidisciplinary fields with urban design and brings attention to broader issues like public health, climate change, economic productivity and social equity. However, understanding how to improve pedestrian spaces has not received much attention, with only 5 per cent of walkability research studies being in the urban field (Wang, Yang, 2019).

Overall, walkability is the first step in creating sustainable transportation in an urban environment (Steutville, 2018). In addition, walking is vital to the economy, livability, and environment (*Institute for Transportation and Development Policy*, 2019). It is a complex issue requiring multiple disciplines' involvement. Right urban design and planning policies are one of the main tools for tackling sustainable mobility issues.

Research problem and the level of its examination

According to the Ministry of Transport and Communications of the Republic of Lithuania data (2017), the car is still considered the primary means of transport in most Lithuania cities, and their usage is growing - during the 25 years of independence, transport means more than doubled (*Klaipėda SUMP*, 2017). At the same time, the probability of traffic accidents, travel time and carbon emissions are increasing.

Lithuania's sustainable mobility habits are just starting to form. In less than five years, the first sustainable mobility plans guided cities' development to a more sustainable future. However, the analysis regarding walkability lacks depth and structure; there is an overuse of vague terms. Even though walkability is part of a complex urban structure, deeper analysis and more precise evaluation criteria regarding walkability could lead to better urban design strategies and quality of life.

Klaipėda, as one of the biggest Lithuania cities, is a good premise for a walkability analysis and improvement start in Lithuania, particularly since it is more challenging for linear cities.

Object of the Master's Final Degree Project:

Klaipėda city walkability improvement.

Objective of the Master's Final Degree Project:

Based on the theoretical and empirical research results, generate an urban design strategy and concept for Klaipėda city walkability enhancement.

Tasks of the Master's Final Degree Project:

1. Carry out theoretical research of walkability definition and measurement; analyse good practices, sustainable mobility guidelines for urban planning and sustainable mobility habits formation in Lithuania;

2. Based on theoretical research, develop a hypothetical Klaipėda city walkability enhancement model;

3. Carry out empirical research (GIS, general and sustainable mobility plans, sociological surveys analysis; walk audit and observation) in order to check hypothetical model statements;

4. Based on empirical research, develop a conceptual Klaipėda city walkability enhancement model;

5. Generate research-based urban design strategy and concept for Klaipėda city walkability enhancement.

Methodology of the Master's Final Degree Project:

1. Theoretical research - literature and information sources review, analysis and generalisation.

2. Empirical research:

a) GIS analysis based on F. Peiravi, S. Deribble & F. Ijaz Pedestrian Environment Index methodology; population distribution, gender, age analysis, crime distribution analysis and proximity analysis with QGIS application;

b) General and sustainable mobility plans analysis (Klaipėda master (2021) and Klaipėda sustainable mobility plans (2017));

c) Sociological surveys analysis (Klaipėda sustainable mobility plan survey, conducted in 2017 with 815 participants; PORTIS SUMP Klaipėda sustainable mobility surveys, conducted in May 2017, October 2017 and 2018 with 169, 187, and 259 participants);

d) Walk audit and observation based on Jan Gehl's observation methodology and AARP walk audit guide.

3. Experimental project – research-based urban design strategy and concept generation.

Structure of the Master's Final Degree Project

In the Master's Final Degree project, theoretical research, walkability definition and measurement, good practices, sustainable mobility guidelines for urban planning and sustainable mobility habit formation in Lithuania are being analysed. Furthermore, in the empirical research part, Klaipėda city walkability and possibilities for its enhancement are being investigated. Finally, based on theoretical and empirical research results, an experimental project is developed as an urban design strategy and concept to enhance Klaipėda city walkability.

The Master's Final Degree project includes an introduction, theoretical research, empirical research, experimental project and conclusions. In addition, 46 literature and 12 information sources are referred to; 104 figures and two tables are presented. Master's Final Degree Project volume is 98 pages of text and one appendix.

1. Literature review on walkability

1.1. Walkability definition & measurement

According to Dovey and Pafka (2021), the walkability concept ties urban planning and design to broader issues like public health, climate change, economic productivity, and social equality. The definition of walkability significantly affects how public spaces and urban mobility networks are understood and designed. However, understanding how to improve pedestrian spaces has not received much attention, with only 5 per cent of walkability research studies being in the urban field (Wang, Yang, 2019).

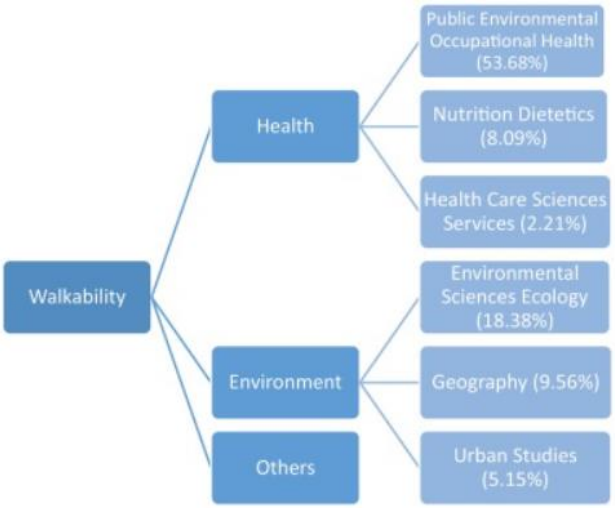

Fig. 1. Walkability research studies distribution through different fields. (Wang, Yang, 2019)

The definition of walkability includes multiple elements across various areas. From the urban field point of view, Lo (2009) considers these criteria as key factors for a walk-friendly city:

1. Presence of continuous and well-maintained sidewalks;
2. Universal access characteristics;
3. Path directness and street network connectivity;
4. Safety of at-grade crossing treatments;
5. Absence of heavy and high-speed traffic;
6. Pedestrian separation or buffering from traffic;
7. Land-use density;
8. Building and land-use diversity or mix;
9. Street trees and landscaping;
10. Visual interest and a sense of place as defined under local conditions;
11. Perceived or actual security.

After shifting from the modernism paradigm around the 1960's, the study of public space and its effect on people has become an established field of study (Gehl, Svarre, 2013). It developed into multiple studies and methodologies to better understand the city and its people, affecting the relevance of walkability as well.

Kevin Lynch's mental mapping

Kevin Lynch did pioneering work on people's cognitive maps and how people structure the image of their environment (Sulsterrs, 2005). According to Lynch (1964), the importance of city image stems from the fact that successful action and function in any given environment depend on our ability to distinguish things in that setting. Lynch concluded that people formed mental maps of their surroundings consisting of five essential elements (*paths, edges, districts, nodes, and landmarks*) (Lynch, 1964).

Gordons Cullen's serial vision method

According to The MUD-Lab Toolkit (2020), Gordon Cullen pioneered the visual method of urban planning known as a *serial vision* in his 1961 masterpiece Townscape. According to Cullen, urban design is the 'art of connection' between the many physical components of the urban landscape. Instead of being presented from above, it is from the perspective of a moving person. This visual representation may assess a place's use, help analyse it, develop alternatives, and offer a fresh layout (*The MUD-Lab Toolkit*, 2020).

Jan Gehl's observations

Jan Gehl is considered one of the pioneers of urban practitioners in moving from car to people cities. He rebuilt Copenhagen and made it a city for people. His methodology is based on the method of observation. Its systematic approach is based on analysis of public spaces, streets and people's behaviour in them and was used worldwide (McCann, Mahieus, 2021).

Space syntax

Space syntax is handy for forecasting human spatial activity in metropolitan settings (Karimi, 2012). It is a scientifically grounded, people-centred method for examining connections between the spatial organisation and various social, economic, and environmental issues established in the 1970's by Prof. Bill Hillier, Prof. Julienne Hanson and colleagues. The analysis includes patterns of interaction and movement; land value and use, density; socioeconomic differentiation and urban growth; safety; and the spread of crime (Hillier, Hanson, 1989). Space syntax has developed enormously, allowing to perform brief urban analyses using GIS apps and other tools.

Agent-based modelling

Agent-based modelling is an innovative modelling technique. Researchers have progressively employed agent-based models in urban and geospatial studies in recent years to establish the fundamental issues related to intricate and dynamic urban design and mobility procedures. (Chen, 2012).

Essentially all these urban studies focused on humans – pedestrians and their needs in the built environment.

1.2. Sustainable mobility guidelines for urban planning worldwide

Over time, based on these studies and research worldwide, various approaches were introduced to help urban planners, policymakers, and other field professionals make optimal decisions and solutions regarding citizens' well-being.

The New Urbanism Congress

According to Steuteville (2018), new urbanism is not only about designing for integrated, compact, connected communities but also a source of concepts that alter the environment. He claims that the movement shapes communities, and new ideas from the New Urbanism have guided the planning and development in recent decades. (Steuteville, 2018).

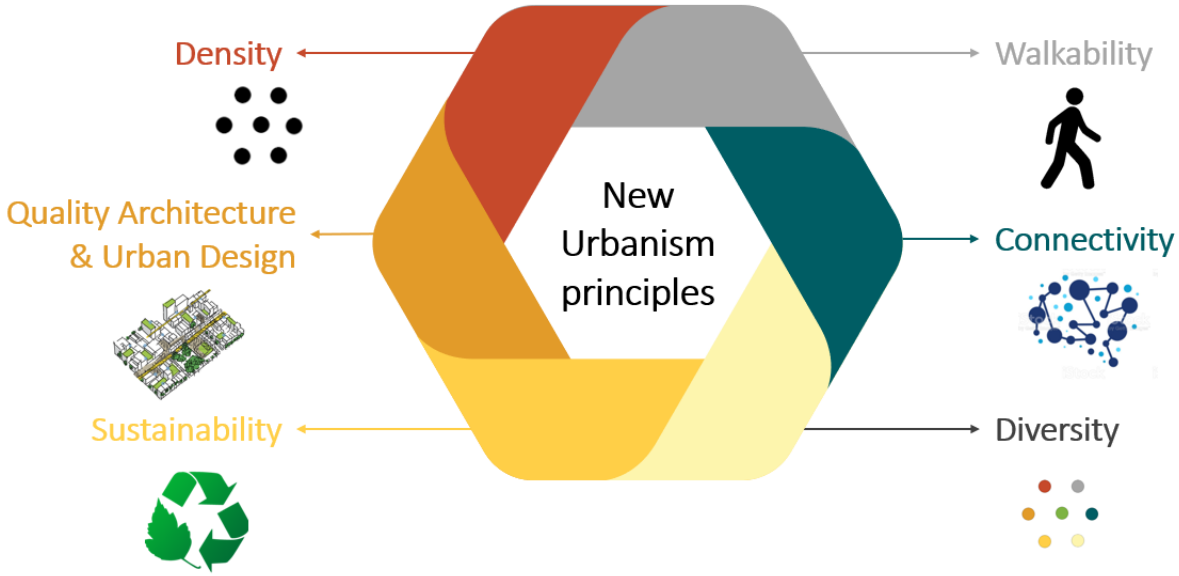

Fig. 2. Key New urbanism principles in terms of walkability. (Compiled by the author, 2022)

New urbanism brings the focus back to a medieval-style village where one could reach all necessities within walking distance and feel like a part of the community in human-scale surroundings.

Pedestrians First, Tools For a Walkable City

According to the Institute for Transportation & Development Policy, Pedestrian First is a system for recording, quantifying, and comprehending the aspects that improve city walkability. Because it can be used successfully in both high- and low-income neighbourhoods, the tool is designed for universal adoption. It includes easy-to-measure and interpret measures that may be used to compare cities, raise walkability awareness, and track the development of a walkable environment *(Pedestrians First, Tools For a Walkable City*, 2018).

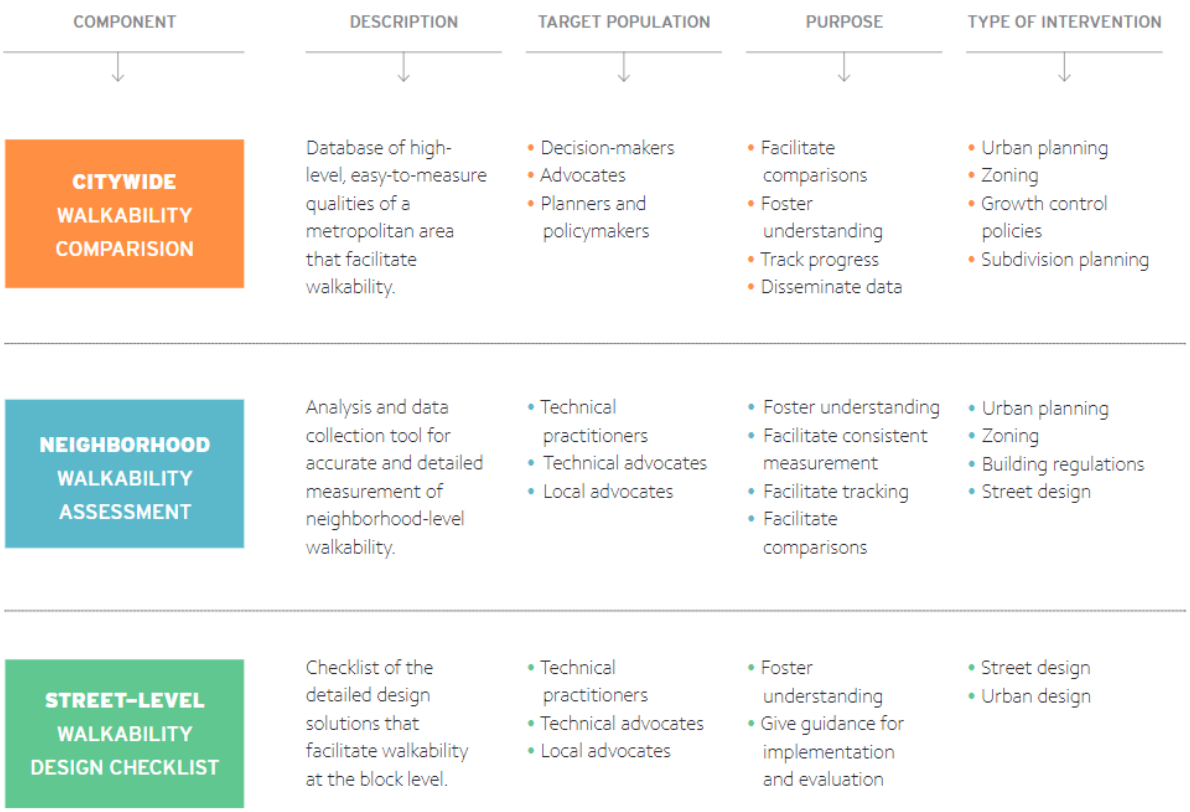

Fig. 3. A summary of the functionality of Pedestrians First. (*Pedestrians First, Tools For a Walkable City*, 2018)

The tool helps to tackle walkability issues based on the scale for different field and level experts.

Additionally, the guide proposes a walkability hierarchy of needs pyramid to understand which pedestrian needs are most crucial and should be covered first.

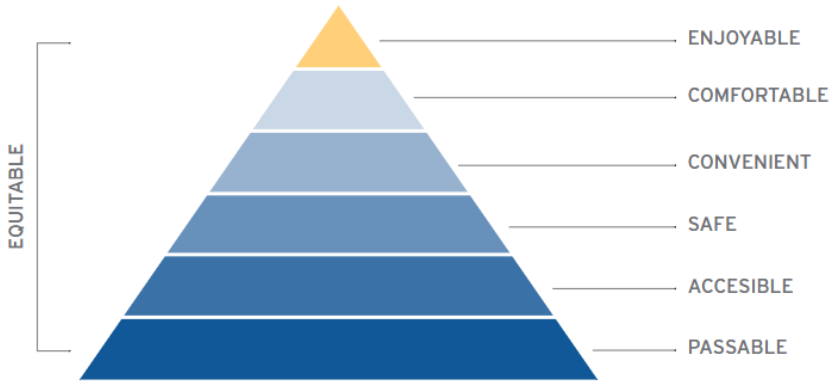

Fig. 4. Walkability Hierarchy of Needs Pyramid. (*Pedestrians First, Tools For a Walkable City*, 2018)

Starting with more tangible elements such as accessibility and safety to more abstract ones such as joy, it helps to understand and improve user experience.

The Global Street Design Guide

The Global Street Design Guide includes a deep micro-scale analysis of street design and sets a new global baseline for designing urban streets (*The Global Street Design Guide*, 2016). The manual expands the boundaries of urban street design beyond the conventional focus on automotive movement and safety to embrace access, safety, and mobility for all users while recognising that cities

are spaces for people. In addition, it promotes environmental quality, economic benefit, enhancement of place, public health, and overall better quality of life (*The Global Street Design Guide*, 2016).

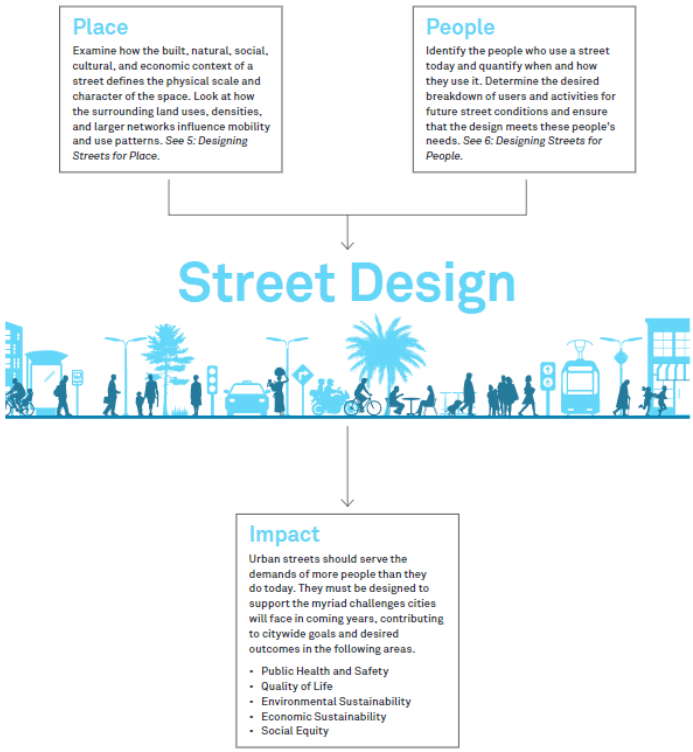

Fig. 5. A New Approach to Street Design. (*The Global Street Design Guide*, 2016)

The Global Street Design Guide considers people and places the most important elements of a successful street design equation. Identifying a place's character and its user's needs enormously impacts health and safety, environmental and economic sustainability, social equity and quality of life overall.

Global Age-friendly Cities: A Guide

Even though Klaipėda city planners are optimistic towards Klaipėda city population tendencies, the truth is that it is slightly decreasing and ageing. Therefore, the Global Age-friendly Cities Guide suggests eight related topics to help identify and remove obstacles to older people's engagement and well-being.

Fig. 6. Age-friendly city topic areas and essential elements to consider while designing an age-friendly city. (Compiled by the author, 2022)

According to the Global Age-friendly Cities Guide (2017), the environment and public structures considerably impact older people's mobility, independence, and quality of life, influencing their ability to 'age in place'. In the World Health Organization project consultation, older people and others who interact with them describe a broad range of urban landscape characteristics and built environment that contribute to age-friendliness. The recurring themes in cities worldwide are quality of life, access and safety.

Generalisation

City walkability starts from simple and tangible elements, such as accessibility and safety for all groups in society. Then it goes to more abstract and complex factors, such as creating *places* and joyful user experiences. Additionally, it starts from street-level elements, goes to the neighbourhood level and finishes as a city network fabric. All these three scale levels have to be considered for walkable city design.

1.3. Walkable cities - good practices analysis

Five European cities were chosen to understand what makes the city more walkable. They all walk towards a future where streets are livable and belong to pedestrians rather than cars. Over time, with somewhat different approaches, they have achieved excellent sustainable mobility results.

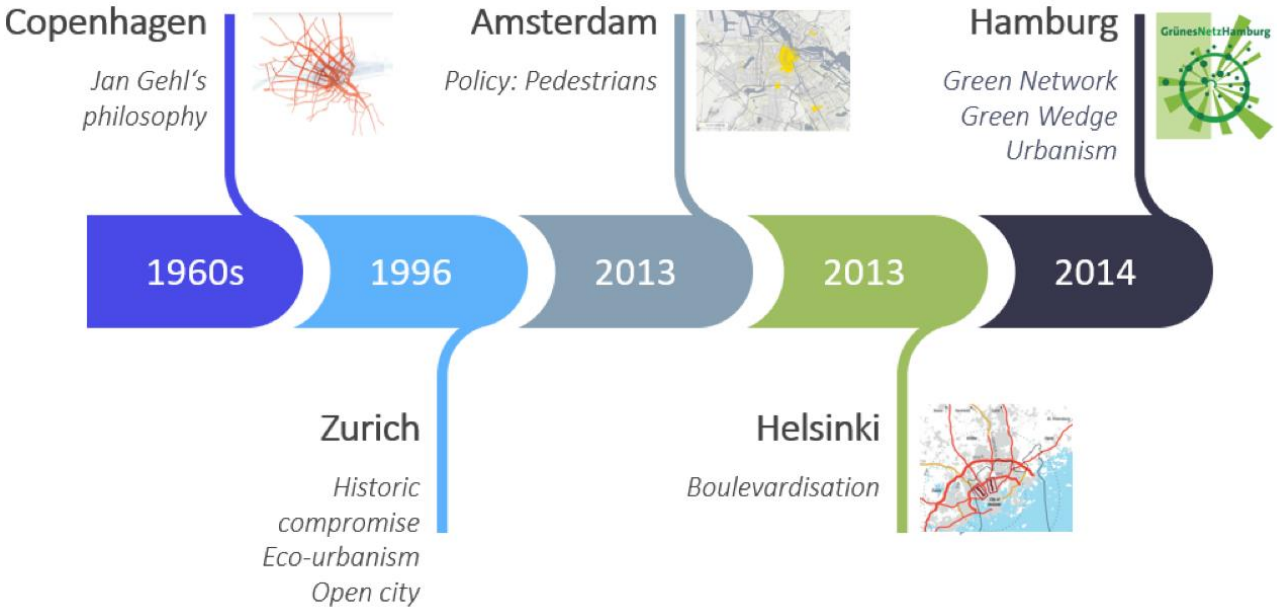

Fig. 7. Scope of good practices review. (Compiled by the author, 2022)

Copenhagen - Jan Gehl's philosophy

According to Pacheco (2015), Copenhagen pioneered the creation of pedestrian-only zones in the 1960's as part of its vision for the future of sustainable mobility. Many pedestrian areas and city ports are connected by various means of transportation, including the city's well-known bicycle network. Guided by the work of Jan Gehl (Danish urban design consultant and architect whose career has been dedicated to enhancing urban life by redesigning cities with pedestrians and cyclists in mind), The redevelopment of Copenhagen reflects a change in viewpoint, a realisation that one of the initial stages to enhancing mobility and creating a better city for people may be enhancing pedestrian routes for walking and active transportation.

In Life Between Buildings (Gehl, 2011), Gehl promotes a reasonable, uncomplicated strategy for enhancing urban form: meticulously documenting urban areas, making small, incremental changes, and then documenting them again. Gehl states that we have broken all the rules to make cars happy. Instead, according to him, cities should be built around the body and senses of human beings to take advantage of our capabilities so that people can enjoy their towns to their fullest potential. In Gehl's writings, he describes how, over 40 years, small changes like these changed Copenhagen from being predominately a car city to one that prioritises pedestrians.

In Public Spaces, Public Life (Gehl, 2014), he asks, 'How can we maintain human activities?' Jan Gehl says that the human dimension is a scale adapted to human senses. He emphasises the following:

1. Human senses: people have horizontal, forward-oriented senses (they see and move predominantly forward in a horizontal plan);

2. Distance: the capacity to perceive (see, hear, feel) and to interact (communicate visually, speak, touch) increases with the decrease in distance;

3. Speed: people move with an average speed of 5km/hour; speeds higher than that impede human interaction.

Jane Jacobs, dubbed the 'grandmother of humanistic planning', is credited by Gehl in Cities for People (2010) with introducing him to the significance of human scale. 'Fifty years ago, she said – go out there, see what works and does not, and learn from reality. So look out of your windows, spend time in the streets and squares and see how people use spaces, learn from that, and use it' (*Cities for People*, 2010).

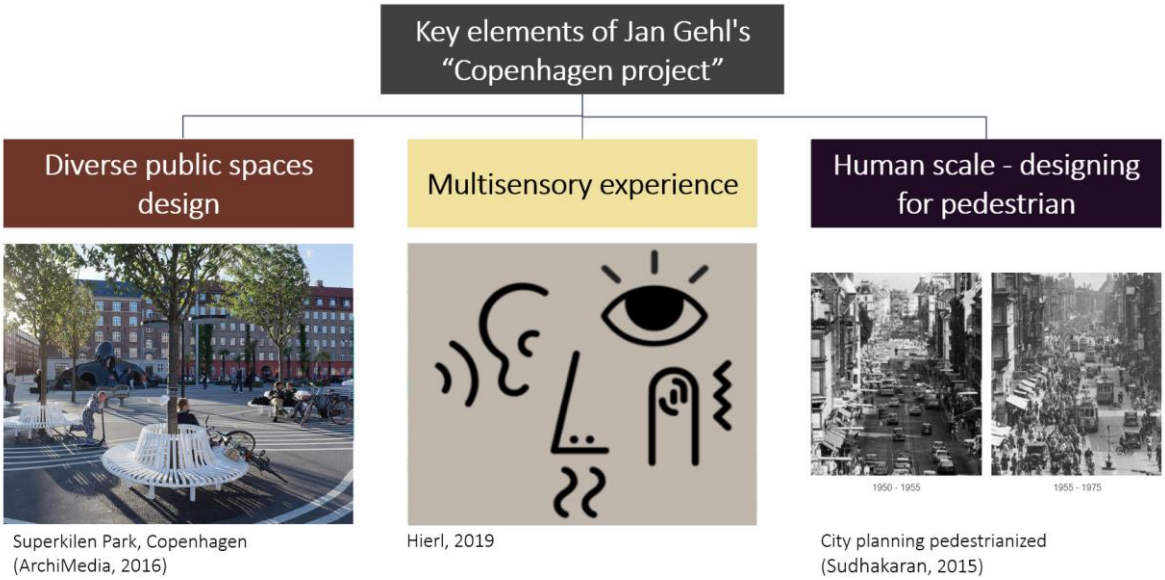

Fig. 8. Key elements of Jan Gehl's Copenhagen project. (Compiled by the author, 2022)

Thus, Gehl puts the human and its needs and senses first, encourages urban designers to think from the pedestrian perspective, humanise the environment and shift from a modernistic approach.

Zurich - open, eco-friendly city

According to Kodransky and Hermann (2011), 34% of trips are on foot or by bicycle in Zurich. One of the city's most notable accomplishments has been the provision of adequate, integrated, multimodal mobility that enables residents to get practically everywhere without a car. With the so-called Historic Compromise, plans to increase active transport were first introduced in 1996. According to the agreement, new parking spots in the municipality could only be constructed if they replaced existing ones, restricting the usage of automobiles in urban areas. Since then, most parking lots have been constructed underground while ground-level land has been set aside to develop parks, public spaces, and pedestrian-only areas. (Kodransky, Hermann, 2011).

Another concept that has been firmly established in Zurich by the world-famous urban planner and ETH professor Kees Christiaanse since the mid-1990's is Open City. Maximum social contact is possible because of the interconnected passageways and accessible public and semi-public areas. A city whose structure promotes inclusivity, with multifunctional buildings combining offices, shops and housing. A city whose inhabitants of all ages, backgrounds and social statuses live harmoniously (Christiaanse, 2019).

Another component in which Zurich takes pride is its focus on existing green areas and implementing new ones as part of its green eco-urbanism strategy. All of these areas have a high cultural and tourist value. They are primarily used for the citizen's recreation and are often used intensively. However, they also take on essential urban climatic and ecological functions, for example, by greening the districts, providing space for biodiversity or promoting the formation of cold air.

According to Zurich city municipality (2021), green areas contrast the grey, hard-access network of squares and streets. Vegetation and unsealed surfaces should shape their character. The extent and the edges of the space, such as buildings and trees, as well as structured hedges, changes of pavement and terrain levels, are coordinated. They are also deliberately kept on a pedestrian-friendly scale (*Zurich municipality*, 2021).

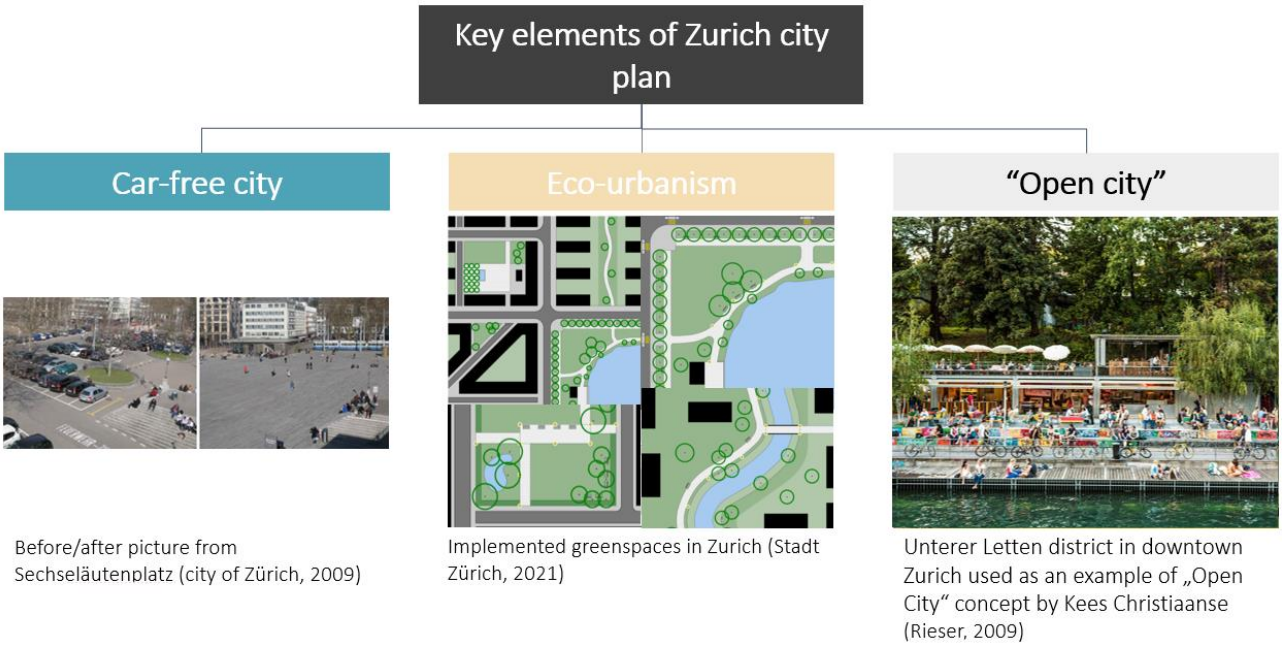

Fig. 9. Key elements of Zurich city plan. (Compiled by the author, 2022)

Overall, Zurich city municipality is strongly pushing for a car-free city with a clever strategy while considering environmental sustainability and not forgetting social factors and the importance of people engaging in and with the places.

City of Amsterdam - Policy: Pedestrians

According to Amsterdam city municipality, while Amsterdam does not have a separate pedestrian policy, pedestrians feature prominently in the city's traffic policy. For example, the city government has designated certain priority areas for pedestrians and cyclists. In addition, large parts of the city centre and major streets are updated to make them safer and more appealing to pedestrians. Comfortable pedestrian routes are also being established between central city squares (*Amsterdam municipality*, 2021).

The Mobility Implementation Plan (2021) specifies how and where modifications will be implemented. For example, pedestrians and cyclists would be given greater space in the city core, and vehicles would be permitted only as guests. The local administration also guarantees that pedestrians may stroll on the main streets securely and comfortably. Furthermore, if feasible, major pedestrian paths would be maintained and isolated from high-speed motorised traffic (*Amsterdam municipality*, 2021).

According to Amsterdam city municipality, efforts are in progress to extensively enlarge the system of interconnected paths for pedestrians in the central region of Amsterdam. In order to achieve this objective, specific zones will experience limitations or prohibitions on motorised traffic. At the same time, an increased amount of space will be assigned to sidewalks and areas designated for pedestrians. (*Amsterdam municipality*, 2021).

In crowded retail locations, more space will be available for pedestrians, enhancing the shopping experience. The city government plans to consider each neighbourhood, street, and plaza carefully. Street furniture and obstacles will be relocated to allow greater room for those using wheelchairs, wheeled walkers, and strollers. Many times, only minor adjustments are required. However, in certain areas, it may be essential to eliminate on-street parking spots or close roadways at certain times of day (*Amsterdam municipality*, 2021).

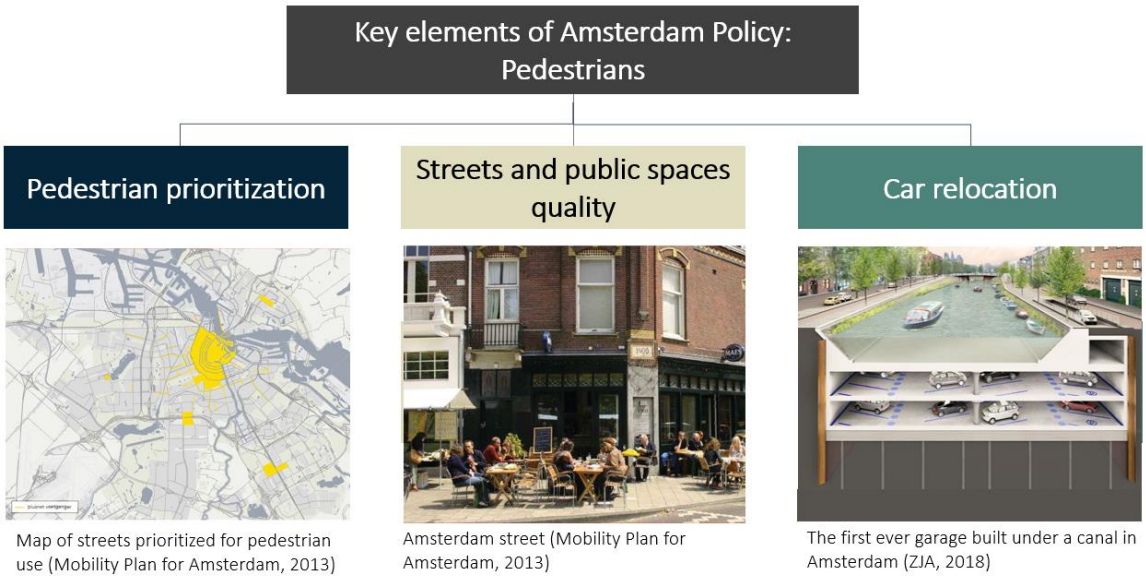

Fig. 10. Key elements of Amsterdam Policy: Pedestrians. (Compiled by the author, 2022)

Overall, while prioritising pedestrians, Amsterdam municipality is taking a careful case-by-case approach implementing small changes in the city core to achieve a comfortable and flawless experience for walking citizens.

Helsinki - Boulevardisation

According to Lecroart and Bendahan (2020), Helsinki is Finland's core urban hub and the nation's most important political, economic, and cultural centre, with a metropolitan population of about 1.7 million and 656,000 residents in the city itself. Following the Second World War, Helsinki's growth changed from urban to suburban, relying heavily on infrastructure built on automobiles and functionalist zoning ideas. Large housing suburbs were the foundation for the regional organisation starting in the 1960's. They were connected to the centre of highways and rail and were spaced apart by forest corridors (Lecroart, Bendahan, 2020).

The City of Helsinki's Masterplan (2016) promotes the development of denser, mixed-use neighbourhoods, with most urban utilities and services easily accessible by walking or cycling. People's aspirations for more dynamic ways of life and the necessity to make room for a growing population and economy are putting pressure on this low-density decentralised legacy (Lecroart, Bendahan, 2020).

According to Lecroart and Bendahan (2020), converting Helsinki's highways and expressways into urban city boulevards, also known as *boulevardization*, is an essential strategy for achieving this density-oriented development policy. In addition, municipal officials intend to use the regeneration of the areas near these road corridors to accommodate one-third of projected urban growth (Lecroart, Bendahan, 2020).

Helsinki has an extensive green network. There are a number of recreational areas, as well as the sea and leisure facilities. Parks and other public outdoor spaces are examples of excellent urban design quality and variety. The city's increasing population has also retained vast, uninterrupted green spaces. 'The green fingers', a unique feature of Helsinki, may be found throughout the city's extensive recreational grounds. Helsinki's assets are its city woodlands and cultural surroundings (Helsinki municipality, 2013).

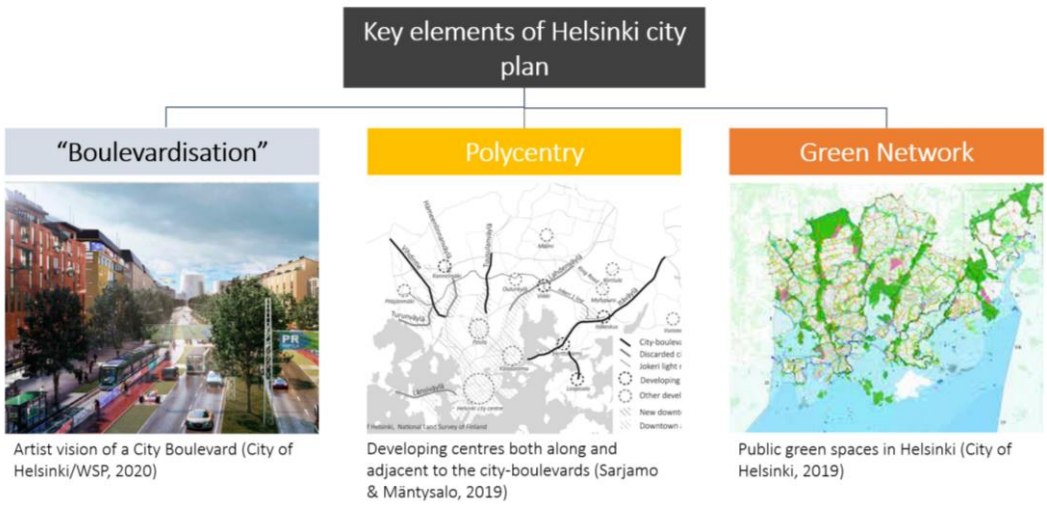

Fig. 11. Key elements of Helsinki city plan. (Compiled by the author, 2022)

Overall, Helsinki city municipality approaches modernism damage correction by creating boulevards from wide empty roads, establishing green links and creating and densifying centres throughout the city rather than having one.

Hamburg – Green Network

Based on Hamburg city municipality data (2018), in 2011, Hamburg was crowned as a European Green Capital for its integrated planning initiatives and high aims. The second biggest city in Germany (population 1.8 million) is planning to ban all cars from the city by 2034. With 40% of the city's land dedicated to green public spaces, the city's main goal is to make urban areas accessible by foot or bicycle. In order to make car-free living a reality for every citizen, the ambitious Green Network plan envisions a connected network of parks and green spaces, improved pedestrian and cycling connections, and transit. Climate change is a significant driver, as well. Therefore, Hamburg wants to achieve carbon neutrality for the entire city (*Hamburg city municipality*, 2018).

According to Hamburg city municipality (2018), Hamburg's green environment results from a nearly 100-year-long urban planning strategy. It is a comprehensive design idea that connects the urban fabric of Hamburg with conveniently accessible public green areas. Fritz Schumacher, a city planner, had a significant effect on it. In 1919, he presented the Axial Concept, which aimed to provide Hamburg citizens with various leisure possibilities and easy access to nature. His creative idea separated the city into residential axes and green interaxial areas such as parks, playgrounds, and sports fields. Green lanes were also created to connect the city to the countryside. After WWII, radial and circular green infrastructure were prioritised in the reconstruction of Hamburg — and have remained so ever since. Green, open regions radiating from the countryside towards the city centre (Landscape Axes) and circular green spaces protected for agricultural, recreational, and ecological use (Green Rings) are essential components of *GrünesNetzHamburg* (*Hamburg city municipality*, 2018).

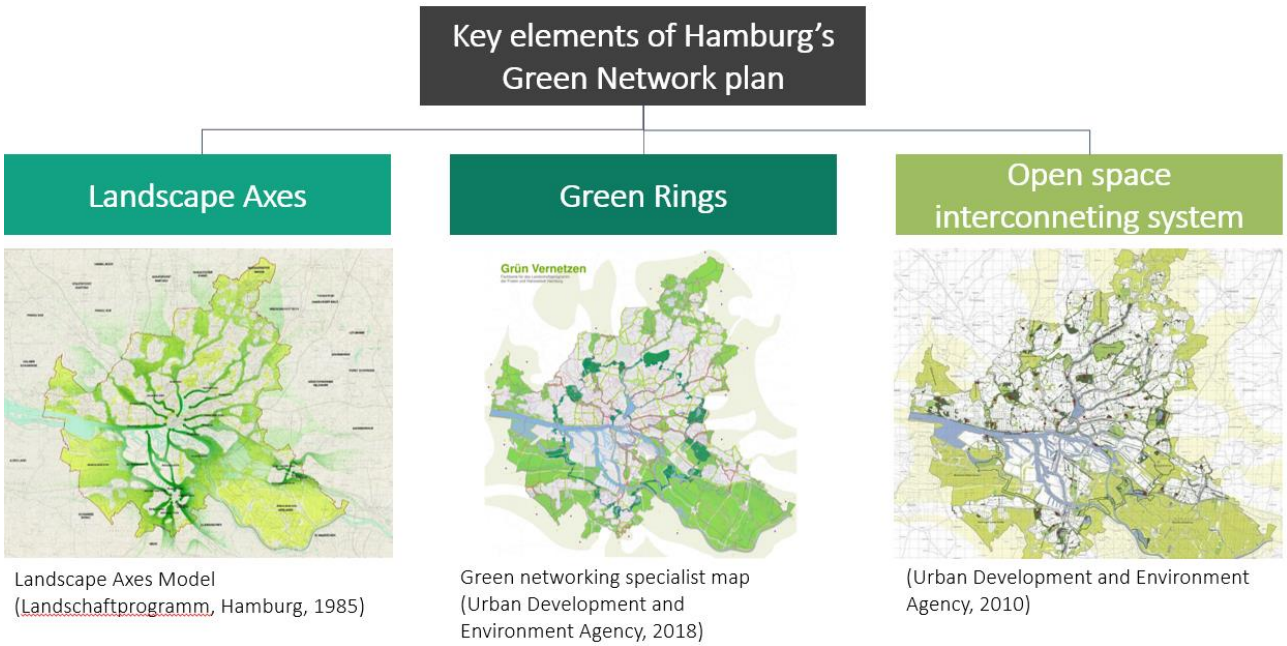

Fig. 12. Key elements of Hamburg's Green Network plan. (Compiled by the author, 2022)

Hamburg city planners emphasised environmental sustainability by proposing green rings and landscape axes within the city network, which also integrate well into the city open spaces system.

Generalisation

After good practice analysis, six key points could be taken when designing a walkable city:

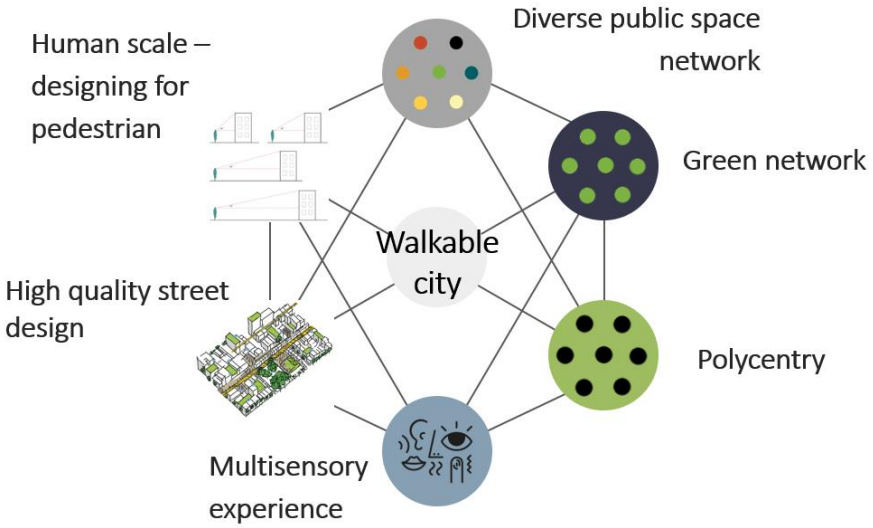

Fig. 13. Good practices – summary of walkable city elements. (Compiled by the author, 2022)

1. Human scale – designing for pedestrians. Design that is optimised for human use;

2. High-quality street design. Priority on meeting the needs of pedestrians, cyclists and public transport users. Comfortable, safe experience with visual quality and positive, diverse feelings;

3. Polycentry. Based on Moreno's 15-minute city concept (2021), by walking or cycling, city residents can accomplish most daily necessities due to the good proximity of points of interest instead of typical travelling to the main city centre;

4. Multisensory experience. According to Gehl (2014), it is designing that takes into consideration perception (seeing, hearing, feeling) and interaction (visual communication, speaking, touching);

5. Diverse public space network design. It involves building public space as a network connecting people's homes, businesses, and other activity locations, claim Paaver and Kiivet (2020). The consistency of a public area for all users assists in evaluating its quality. Additionally, a good public place strengthens communities, encourages citizen engagement, reduces segregation, and fosters tolerance;

6. Established green network design. According to Tulisi (2017), it is modelling green infrastructure as a network of natural and semi-natural regions, with linkages simulated based on specified characteristics, to produce an equitable distribution of public services for improving quality of life and a diverse variety of ecosystem services.

1.4. Sustainable mobility habits formation in Lithuania cities: Vilnius, Kaunas, Klaipėda

In most Lithuanian cities, the car is still considered as the primary means of transport, and its usage is growing. However, Lithuania's sustainable mobility habits are just starting to form. In less than five years, the first sustainable mobility plans guided cities' development to a more sustainable future.

1.4.1. Guidelines for the development of sustainable mobility plans by the Ministry of Transport and Communications of the Republic of Lithuania

According to the guidelines (2017), a sustainable urban mobility plan is a territorial strategic planning document prepared based on approved spatial planning documents and municipal strategic intends to conduct a comprehensive analysis of urban transport and mobility, ensure future sustainable transport and mobility scenarios with a focus on better quality of life in cities and their surroundings with all types of transport access. Sustainable urban mobility plans are needed to reduce the negative impact of transport on the environment by ensuring more sustainable spatial planning and planned development of the transport system that allows for a change in mobility habits.

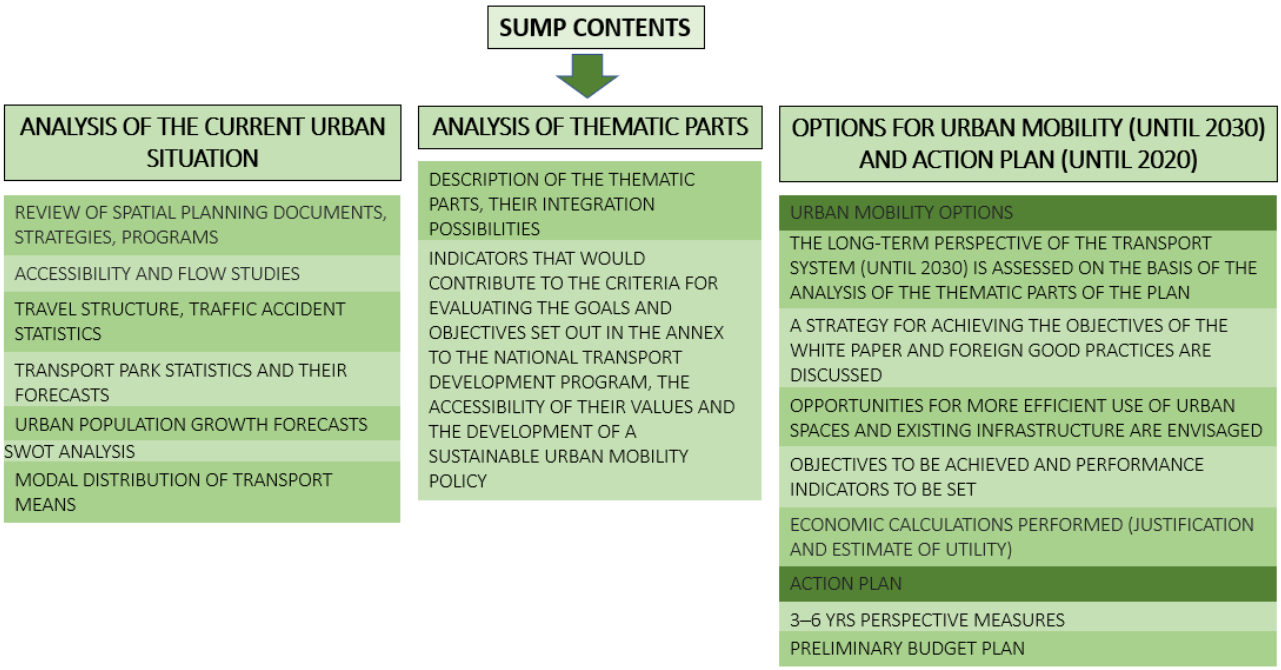

Fig. 14. SUMP contents. (Compiled by the author, 2022)

The basis for the preparation of plans for sustainable urban mobility in Lithuania was:

1. The need to implement the provisions of the White Paper (2011), the Green Paper on Urban Mobility (2007) and its Action Plan (2009), the Intelligent Transport Systems Directive 2010/40 in the fields of urban transport development, ITS and sustainable mobility;

2. Preparation for implementing the Urban Transport Package (future legislation City Logistics, CO2 reduction, Smart Cities, Urban ITS, SUMP recommendations) with appropriate measures related to ITS, traffic safety, SUMP preparation, and cycle path development;

3. Negotiations with the European Commission on eligible urban transport activities for 2014-2020;

4. European Commission Communication no. 18136/13. Creating a competitive urban mobility system based on resource efficiency.

Fig. 15. Analysis of SUMP thematic parts. (Compiled by the author, 2022)

From a walkability perspective, the essential elements of SUMP are pedestrian safety improvement, universal design, accessibility and active mobility integration into the current transport system.

1.4.2. Vilnius territorial documents

Vilnius masterplan (2021)

In the Vilnius master plan (2021), there are no particular policies in terms of walkability. However, in 2017, 24.5 per cent of citizens chose walking as a primary means of transport (*Vilnius City Municipality Sustainable Mobility Plan*, 2018). City planners project a 4.5 per cent increase in 2030 and propose measures to solve Vilnius city urban problems, enhancing walkability. Leading suggestions could be divided into four parts:

1. Urban structure development. Further city centre development forming composite functional structure and dense development is proposed. As well as a secondary use (conversion, reuse) of abandoned, inefficiently used land, renovation and modernisation of the districts of Soviet-era apartment buildings, modernisation and development of unfinished quarters, and so, the formation of complete, high-quality building structures and public spaces;

2. Green connections improvement. Greenery will be strengthened by managing 'green connections'. They would enhance continuity and ecological and recreational-connection potential;

3. Social and economic infrastructure development. That it would be evenly developed according to area population and density;

4. Transport infrastructure development. There is a proposal to reduce parking spaces in the city centre and old town, reduce streets for cars, and enhance pedestrian paths overall.

Ten rules of Vilnius urban planning and architecture (2020)

Aside master plan Vilnius City Municipality created the ten rules of Vilnius urban planning and architecture - the principles formulated by the city administration in recent years, observing the needs of modern society, assessing the expectations for the city's development, and discussing with specialists. Applying these rules is significant in creating the image of the city of the future and the

quality of life in it - planning changes in the city's public spaces, streets, and residential areas continuing the conversion of industrial areas and creating new green spaces in public spaces.

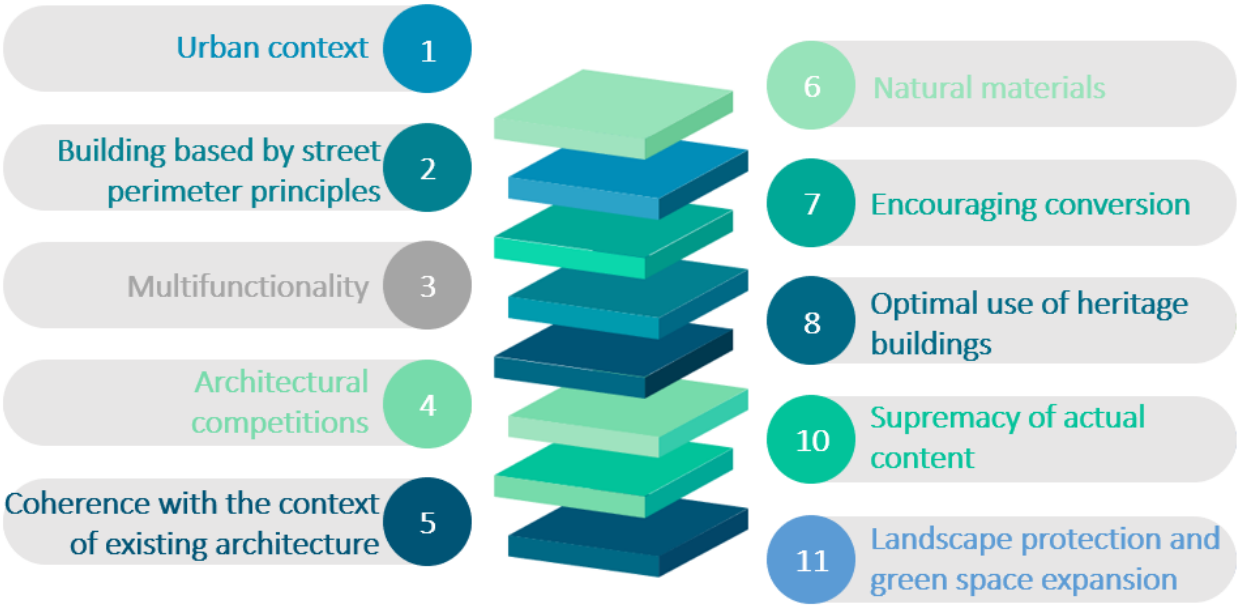

Fig. 16. Ten rules of Vilnius urban planning and architecture. (*Vilnius City Municipality*, 2020)

All these rules started to be incorporated in Vilnius municipality planning procedures, already creating positive results regarding the quality of urbanism.

Vilnius sustainable mobility plan (2018)

The vision of Vilnius sustainable mobility plan (2018) is to create fun, safe and comfortable travels for its citizens. To do that, three main goals were created. Firstly to improve the quality of travelling, reduce travelling time and make the trip a pleasant experience. As well as to reduce the negative environmental impact of travelling and the amount of travelling by car. Regarding walkability enhancement, critical points of Vilnius sustainable mobility plan are explained below:

1. Transport greening & traffic organisation improvement. Improving sustainable urban street infrastructure through sustainable mobility principles;

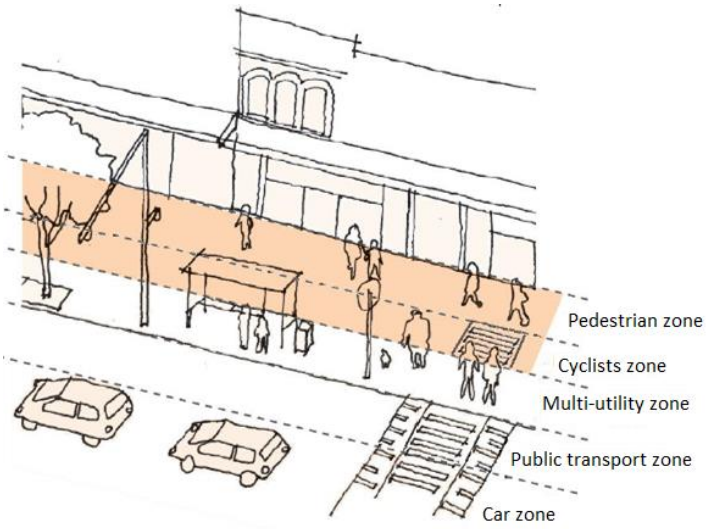

Fig. 17. Distribution of functional zones. (*Vilnius sustainable mobility plan*, 2018)

2. Environment humanisation. Development of public spaces by humanising street spaces and adapting them to healthy mobility;

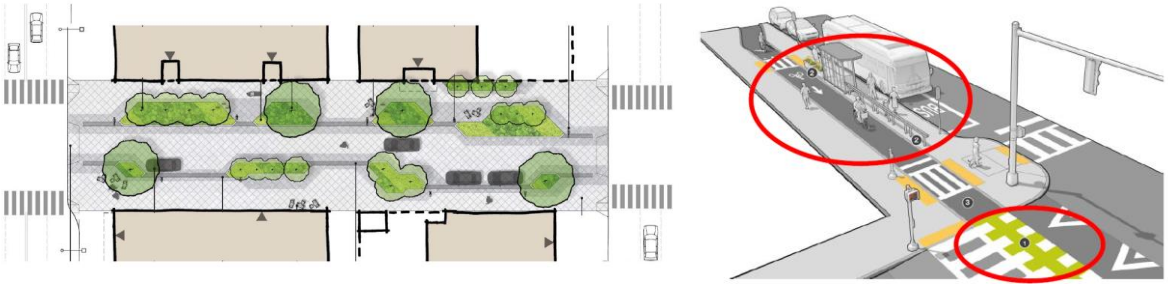

Fig. 18. Shared space concept; an example of organisation and separation of cycling and pedestrian traffic, marking of crossings. (*Vilnius sustainable mobility plan*, 2018)

3. Adaptation of transport infrastructure for people with special needs;

Fig. 19. Stands with Braille and sensory information are installed in foreign cities; handrails with Braille; are an excellent example for installing sideboards. (*Vilnius sustainable mobility plan*, 2018)

4. Development of pedestrian infrastructure (sidewalks, footpaths), increasing pedestrians' comfort;

Fig. 20. Example of pedestrian-friendly intersection installation. (*Vilnius sustainable mobility plan*, 2018)

5. Adaptation of open public areas for active recreation for different age groups' needs;

Fig. 21. The section of the street for priority pedestrian and bicycle traffic is proposed to be developed as a space for recreational activities of various kinds; children's play areas are adapted for people with special needs. (*Vilnius sustainable mobility plan*, 2018)

6. Creating socially safe communication spaces in the living environment;

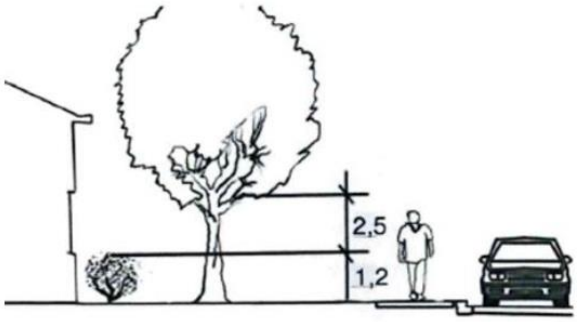

Fig. 22. The principle of landscaping, opening more space for environmental observation. (*Vilnius sustainable mobility plan*, 2018)

7. Implementation of traffic safety and security measures.

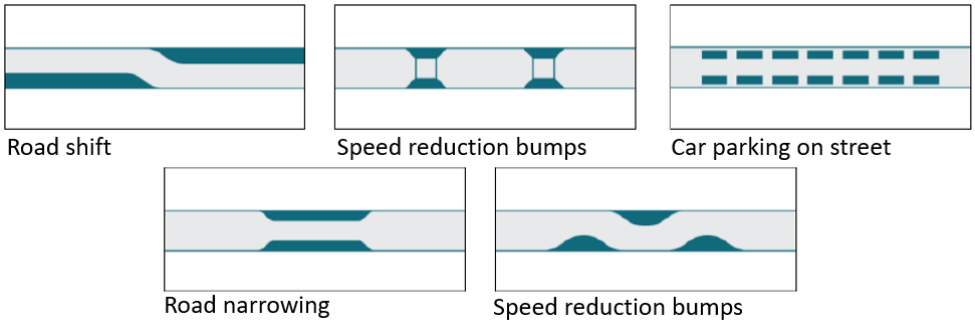

Fig. 23. Speed reduction measures to prevent vehicles from accelerating the safety of pedestrians and cyclists. (*Vilnius sustainable mobility plan*, 2018)

Overall, Vilnius has one of the most explicit visions and action plans to make the city more walkable compared to other countries' towns.

1.4.3. Kaunas territorial documents

Kaunas masterplan (2003)

Kaunas citizens are least walking compared to Vilnius and Klaipėda – only ten per cent, according to the 2018 year data. Planners' ambitions were to increase it to 14 per cent in 2023 (in the sustainable mobility plan, no increase is projected up to 2030). Key elements of the Kaunas city plan (2003) vision that would improve walkability are:

1. Developing Kaunas as a multifunctional city with a precise and optimal structure, which combines an attractive living environment with business, social, and recreational areas and developed social infrastructure;

2. Urban changes would be done by redeveloping the city's inner territories, modernising them and converting them as needed with no territorial expansion;

3. Optimally developed system of greenery - forests, parks, slopes, and green connections, which improve the state of the environment and are suitable for recreation;

4. The city opened to rivers and green areas with public spaces - squares, streets, and embankments with no wasteland or undeveloped areas;

5. Clear and comfortable structure of the city streets with well-organised traffic. Public transport, free-motor transport and pedestrian traffic would be prioritised in many public and residential areas.

Kaunas sustainable mobility plan (2018)

In order to improve Kaunas city walkability, the focus in the plan was given to:

1. Use and improvement of Kaunas city public spaces and existing infrastructure since safe and attractive public spaces encourage more outdoor activity;

2. Adaptation of urban infrastructure for people with special needs since the ability to move comfortably and harmoniously in the city is one of the most significant factors determining the smooth integration of vulnerable groups into public life;

3. Safety and development of transport infrastructure;

4. Either local or micro centres (depending on chosen option):

a) Local centres - places in the city with a high concentration of attractions. They would be the destination of everyday travel, so it would be essential to create conditions to move around on foot, by bicycle, and by the rapidly growing popularity of portable electric mobility devices. In local centres, ensuring traffic safety and improving lights would be essential. However, creating an attractive environment and promoting diversity and function conversion would also be necessary. These measures would encourage people to travel less frequently to the city centre and get the same services closer to home, jobs, and simultaneously closer to high-speed public transport. The result would be a reduction in car travel to the city centre;

b) Micro-centres - relatively small areas of public space in densely populated or job-dense areas at the intersection of different modes of transport. The aim would be to improve public spaces' quality and install/ upgrade related infrastructure in these places: lighting, small architecture, bicycle storages and stands, bicycle sharing programs and public transport pavilions.

1.4.4. Klaipėda territorial documents

Klaipėda masterplan (2021)

There is no particular emphasis on pedestrians in the Klaipėda master plan (2021), apart from the old town territory, but many urban measures are taken that would increase walkability overall. According

to the plan, in 2017, 30 per cent of citizens chose walking on foot as the primary means of transport, and planners plan to increase it to 33 per cent by 2030. The main goals which would help to enhance Klaipėda city walkability were:

1. To determine the system of functional centres (service and job concentration nodes), ensuring the viability of the city structure;

2. To form a network of continuous open public spaces (squares, quays), green areas of general use (squares, parks), and recreational and natural sites suitable for recreation;

3. To improve environment quality and security. When creating a general system for improving the city's urban structure, emphasis is placed on a mixed general model for developing both linear and polycentric structures;

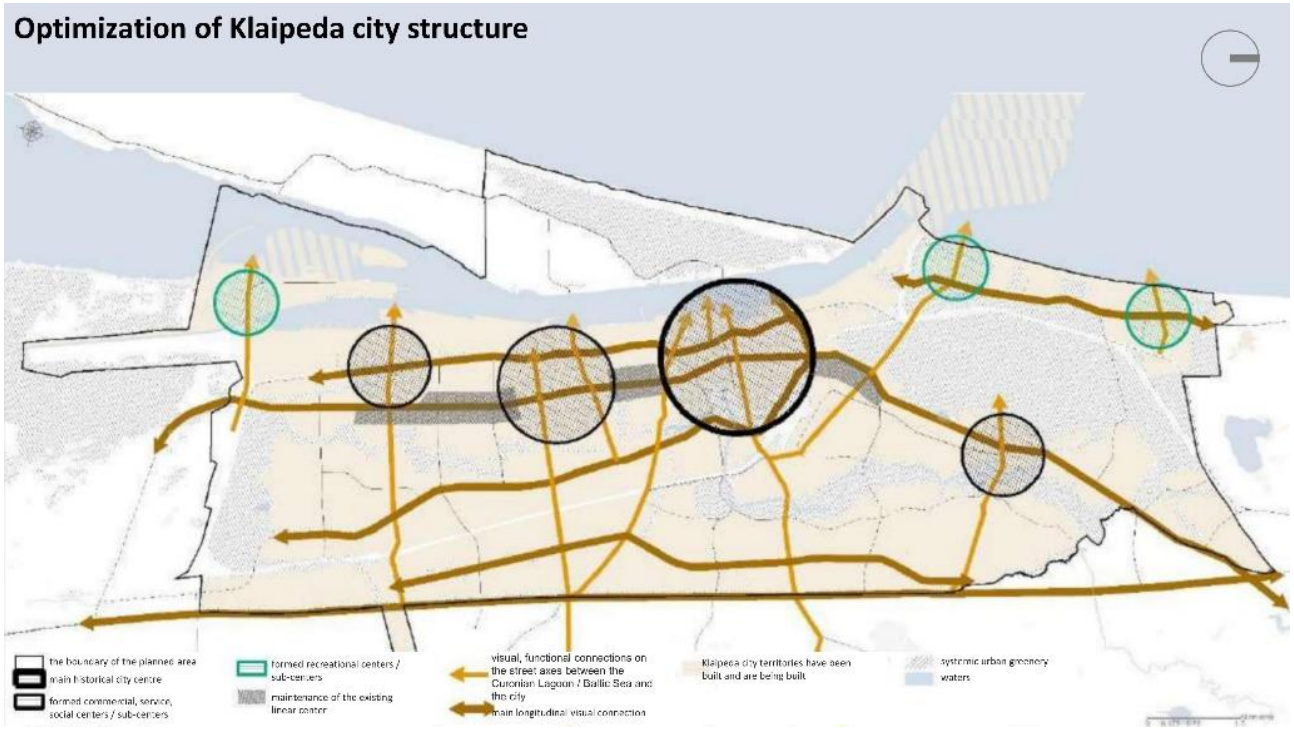

Fig. 24. Klaipėda city masterplan conceptual model. (*Klaipėda city masterplan*, 2021)

4. To determine the territorial structure of the economic activities forming the economic and social well-being of the city, its development needs, perspectives, and principles, emphasising the reduction of daily mobility needs;

5. To create conditions for forming and functioning an efficient, sustainable transport system. Carefully planned pedestrian areas would be integral to the transport infrastructure network.

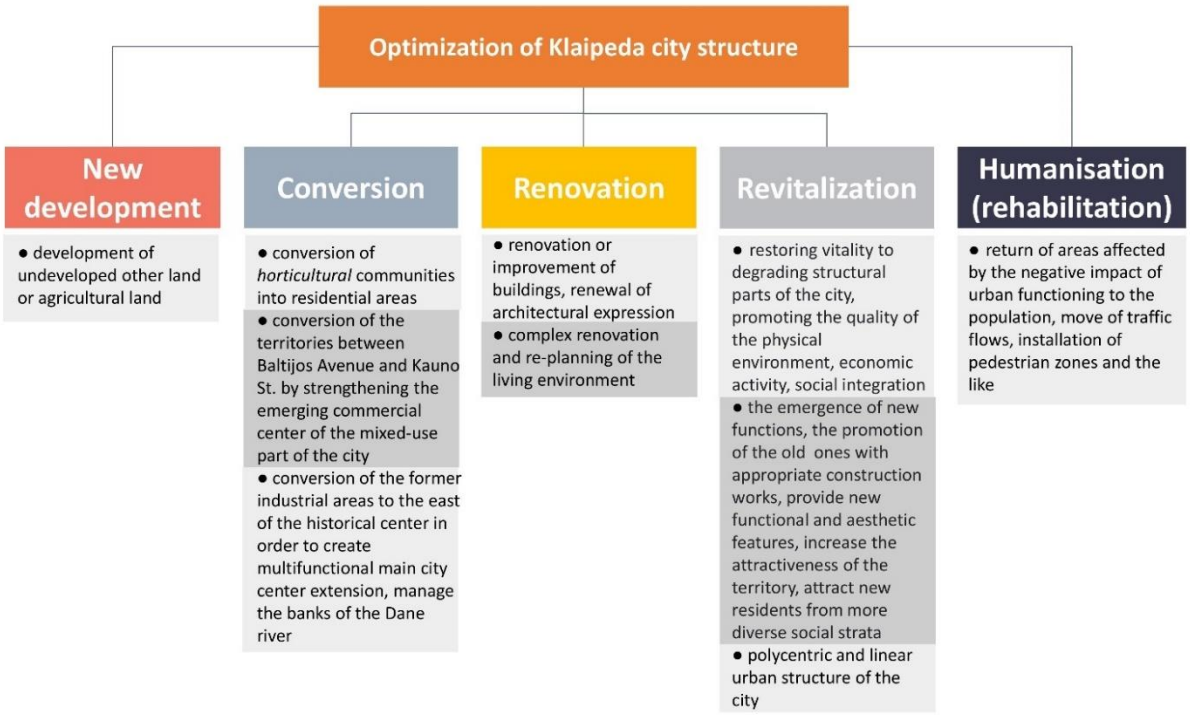

Fig. 25. Optimization of Klaipėda city structure according to Klaipėda city masterplan (2021). (Compiled by the author, 2022)

Klaipėda city strategy could be divided into five segments. City planners suggest humanisation, revitalisation, renovation, conversion and new development to optimise city structure.

Klaipėda sustainable mobility plan (2018) and SUMP in Klaipėda - new mobility governance for port (2020)

Planners envision that in 2030, 33 per cent of citizens will choose walking as the main means of primary transport, which would be a 2 per cent increase from the current situation (*Klaipėda city masterplan*, 2021). Klaipėda city's sustainable mobility plan's vision is to create a healthy and environmentally friendly urban environment and ensure fast and convenient movement for citizens. This is achieved by implementing the selected generalised version of the Klaipėda mobility plan for 2030, which combines the advantages of three different options: Klaipėda aims to promote public transport, cycling and walking; to create a high-speed public transport axis, improving non-motorized transport infrastructure in local centres and the historic part of the city.

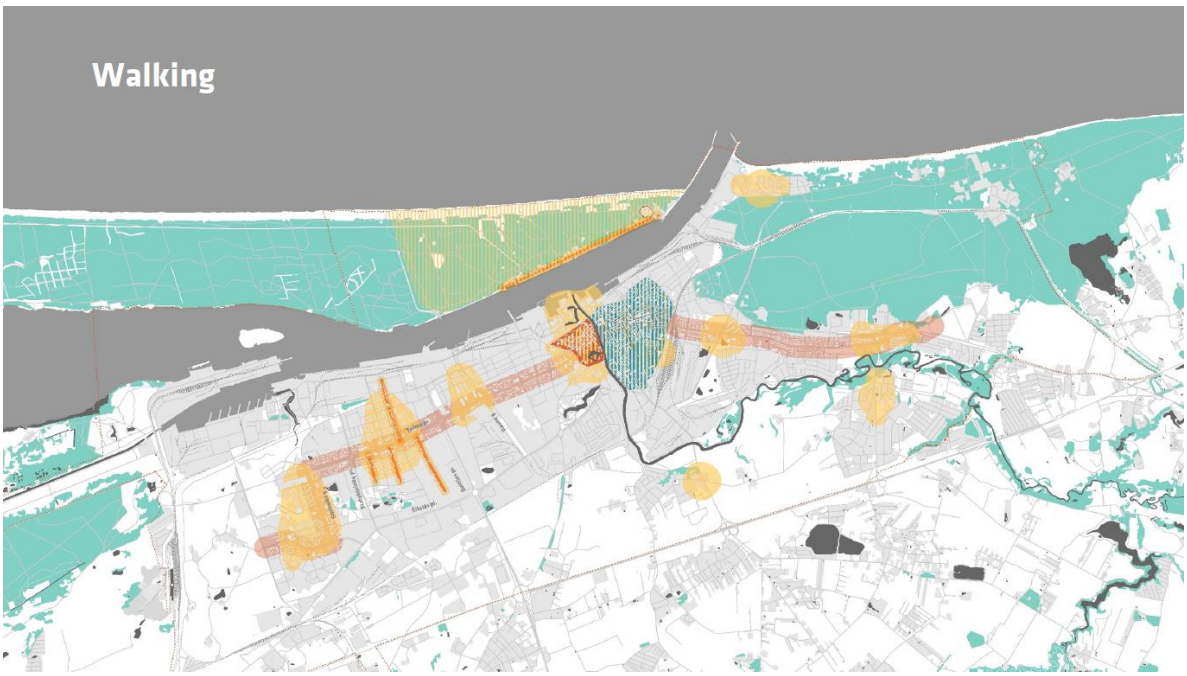

Fig. 26. Vision for sustainable mobility in Klaipėda regarding walking (proposed improvement areas marked in orange, red and green). (*Klaipėda sustainable mobility plan*, 2018)

The main focus is on public transport and cycling infrastructure. As for pedestrians, there is a vision to improve pedestrian mobility in local centres and make a part of the old town – a pedestrian zone, improve movement conditions for people with disabilities, restrict traffic in the old town and improve road safety.

Generalisation

Common themes repeat throughout Lithuania city's general plans and SUMPs and are shown below.

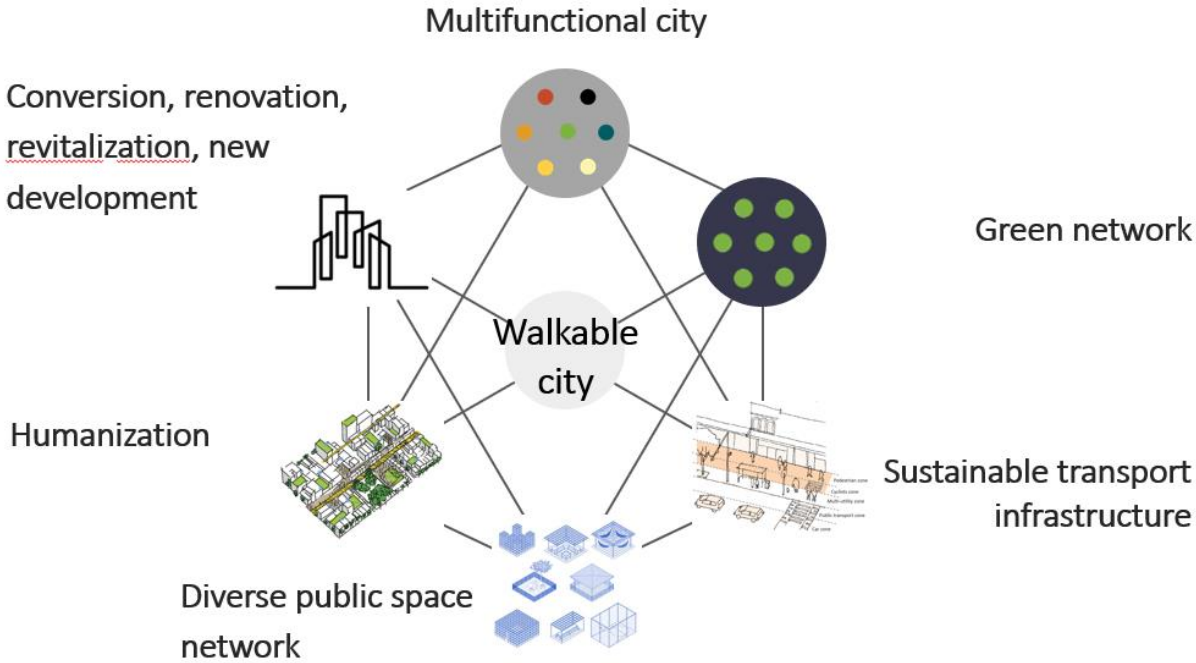

Fig. 27. Key elements from Lithuania plans that would enhance walkability in Lithuania cities based on territorial documents. (Compiled by the author, 2022)

Overall Lithuania is moving towards the right direction regarding urban planning tendencies. However, there could be more clear action plan and strategy. The key focus is on the public transport system. In addition, a deeper analysis could be introduced regarding walkability elements.

1.5. Hypothetical model and generalisation

1. Although the walkability research field is vast, some gaps remain (directing research to practitioners' specific needs, considering more elements affecting walkability).
2. Numerious analysis is done on specific or combination criteria, but there is still a gap for more general evaluation and measurement, including multiple factors altogether.
3. Master plans, especially sustainable mobility plans for Lithuania cities, lack of structure, and general objective evaluation criteria. There is an overuse of vague, universal terms. Even though walkability is part of a complex urban structure, there must be more depth in the analysis and criteria for walkability and pedestrian policies. As well as, some urban proposals need more explanation.

After analysis, key quantitative and objective parameters for a walkable city were proposed for further investigation and enhancement.

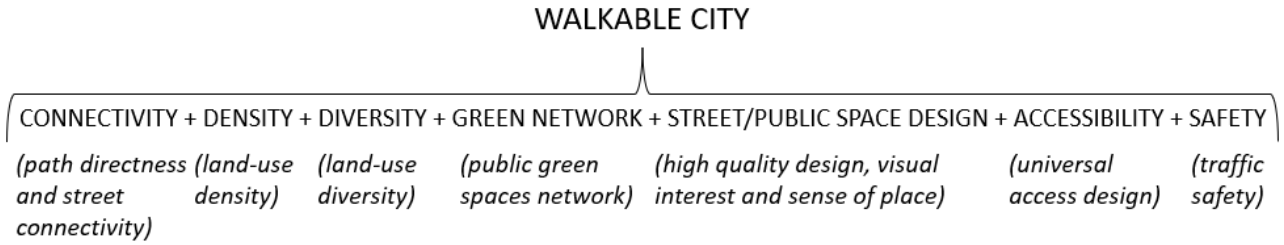

Fig. 28. Walkable city hypothetical model. (Compiled by the author, 2022)

Factors shown above that create a walkable city explanation:

1. Connectivity – how well one can orient and flawlessly move around the city (factors such as street connectivity, path directness and junctions are considered);
2. Density – the denser land use is, the less travel distance and time is created for the user;
3. Diversity – all services nearby reduce the need for vehicle travel;
4. Green network – the natural environment significantly impacts human health overall. Additionally, green surroundings increase one's will to walk around the area;
5. Streets and public spaces design – quality and intentional design can significantly impact users' flows;
6. Accessibility – an environment designed to be comfortably used by all groups of society;
7. Safety – a design that reduces traffic accidents and crime risks.

2. Klaipėda city walkability empirical research

2.1. Research working hypothesis

Different walkability aspects were analysed based on a hypothesis developed after theoretical research, according to which city walkability could be enhanced:

1. Walkable city has good connectivity. There is path directness and a well-established street network;

2. Walkable city has high land use and population density;

3. Walkable city has high land-use diversity;

4. Walkable city has both public areas and streets with quality design. As a result, there is multisensory interest and a sense of place as defined under local conditions;

5. Walkable city is safe. Pedestrians feel safe in city areas and are protected from traffic or other accidents;

6. Walkable city is based on universal design principles. It is accessible to everyone, regardless of age, disability or other factors;

7. Walkable city has established a well-maintained green network;

8. Citizens can quickly reach their point of interest within 15 minutes walking radius.

Klaipėda city walkability empirical research was conducted using four tools: GIS (geographic information system) analysis, observation and walk audits, sociological surveys analysis and existing general plans and SUMP (sustainable mobility plans) analysis.

A conceptual model was created for Klaipėda city walkability enhancement, and generalisations were made.

2.2. Research programme and methods

Research programme

A detailed analysis of each hypothesis with the research methods and objects applied to it is presented in Table 1.

Table 1. Research programme.

Hypothesis	Research method	Research object
The walkable city has good connectivity. There is path directness and a well-established street network.	GIS analysis, sociological survey analysis.	Pedestrian street network connectivity and density.

Hypothesis	Research method	Research object
A walkable city has high land use and population density.	GIS analysis.	Land-use density; population density, distribution.
A walkable city has high land-use diversity.	GIS analysis.	Land-use diversity.
A walkable city has both public areas and streets with quality design. As a result, there is multisensory interest and a sense of place as defined under local conditions.	Walk-audit, observation, SUMP and general plan analysis.	Public spaces and street design quality.
A walkable city is safe. Pedestrians feel safe in city areas and are protected from traffic or other accidents.	GIS analysis, SUMP and general plan analysis, walk-audit, and observation.	Public spaces and street design quality, crime rates, traffic incidents.
A walkable city is based on universal design principles. It is accessible to everyone regardless of age, disability or other factors.	Walk-audit, observation.	Public spaces and street design quality, accessibility.
The walkable city has an established and well-maintained green network.	GIS analysis.	Green network establishment.
Citizens can quickly reach their point of interest within 15 minutes walking radius.	GIS analysis.	Pedestrian points of interest reachability within 15 minutes radius.

Research methods

GIS analysis

GIS analysis was conducted to analyse Klaipėda city connectivity, land-use and population density, land-use diversity, green network, reachability, and criminogenic situation.

The PEI (Pedestrian Environment Index) concept was used as a basis for GIS analysis. It was established in 2014 by Farid Peiravi to develop new metrics that capture essential properties of urban systems, concentrating on walking. The pedestrian environment index is based on four essential zone-based characteristics: land-use diversity, population density, commercial density, and intersection density. In addition, it was altered to include a green network as well.

Additionally, the city's criminogenic situation and population distribution were analysed separately.

Data was gathered from official governmental and Klaipėda city sources and OSM (OpenStreetMap).

General and sustainable mobility plans analysis

Both the Klaipėda master plan and sustainable mobility plans were analysed for a deeper insight into the city's current urban and walkability situation and challenges with a focus on safety and urban design.

Sociological surveys analysis

Four sociological surveys were chosen to analyse various walkability aspects, particularly connectivity:

- Klaipėda sustainable mobility plan survey, conducted in 2017 with 815 participants;
- PORTIS SUMP Klaipėda sustainable mobility surveys, conducted in May 2017, October 2017 and 2018 with 169, 187, and 259 participants.

Walk audit and observation

Walk audits and observations were conducted mainly to analyse public spaces, street design quality and accessibility since it is a complex system with multiple elements. Two neighbourhoods were chosen based on GIS empirical research results (least and most walkable). Observations and walk audits were based on Jan Gehl's methodology, which, according to McCann and Mahieus (2021), is a systematic approach based on analysis of public spaces, streets and people's behaviour in them and is used worldwide. AARP (American Association of Retired Persons) walk audit guide was also used. The AARP Walk Audit Worksheets were made in 2022 to create livable and pedestrian-friendly communities for people of all ages and social groups.

Analysis criteria by Jan Gehl's observation methodology and AARP walk audit guide were:

Protection:

- Protection against traffic and accidents – feeling safe (safe streets, sidewalks and crossings, protection for pedestrians, eliminating fear of traffic);
- Protection against crime and violence – feeling secure (lively public realm, allows for passive surveillance, diversity of functions 24/7/365, well lit/ lightning in human scale);

- Protection against unpleasant sensory experiences (wind/draft, rain/snow, cold/heat, pollution, dust, noise, glare.

Comfort:

- Opportunities to walk (room for walking, attractive facades, no obstacles, suitable surfaces, accessibility for everyone);

- Opportunities to stop and stay (attractive and functional edges, defined spots for staying, objects to lean against or stand next to, facades with good details that invite staying);

- Opportunities to sit (defined seating zones, pleasant views, people watching, good public and cafe seating mix, resting/ waiting opportunities);

- Opportunities to see (reasonable viewing distances, unhindered views, exciting views, easy orientation, lightning (when dark);

- Opportunities to talk and listen (low noise levels, public seating arrangements conducive to communicating, 'talk scapes');

- Opportunities for play and exercise (allow for physical activity, exercise, play and street entertainment, temporary activities (markets, festivals, exhibitions, etc.), by day and night, in summer and winter).

Enjoyment:

- Dimensioned at human scale (dimensions of buildings and spaces in observance of the essential human dimension about senses, movements, size and behaviour);

- Opportunities to enjoy the positive aspects of climate (sun/shade, heat/coolness, shelter from wind/breeze);

- Aesthetic qualities and positive sensory experience (good design and detailing, suitable materials, fine views/vistas, rich sensory experiences: trees, plants, water).

2.3. Research process and results

2.3.1. GIS analysis

According to the development and application of the Pedestrian Environment Index (PEI) paper authors, PEI was developed as an easily computable measure of pedestrian friendliness for urban neighbourhoods that best uses the available data (Peiravian, Derrible, Ijaz, 2014).

According to index authors, the Pedestrian Environment Index (PEI) comprises four components: 'land-use diversity (based on entropy), population density, commercial density, and intersection density. The final PEI is between 0 and 1 and uses data typically available for planners and metropolitan planning organisations. The results of this method are region-specific; they are comparable only between the zones within the given study area' (Peiravian, Derrible, Ijaz, 2014).

Some elements have been altered (for example, points were calculated instead of the area due to data limitations or instead of just commercial functions, non-commercial areas of residents' interest were included as well. Nevertheless, it did not affect the main concept). Additionally, a fifth component was introduced – green network density since, in theoretical research, the importance of green recreation areas for increased walkability has been established.

Boundary lines (2022) for Klaipėda city have been gathered from the Klaipėda municipality maps portal, and a 100 m X 100 m grid has been chosen for a more precise situation depiction.

Land-use diversity index (LDI)

'The LDI measures land-use homogeneity or heterogeneity (i.e., a mix of residential, commercial, and other uses). It shows how diverse the land use is in a given zone.' (Peiravian, Derrible, Ijaz, 2014). Authors state, 'a version of this index was first used in a classic mode choice study'. (as cited in Frank & Pivo, 1994). 'It was found that walking, biking, and transit trips positively related to land-use diversity' (as cited in Manaugh & Kreider, 2013).

According to the index authors, mathematically, entropy is defined as:

$$E_i = \begin{cases} -\frac{\sum_{j-1}^{k}(p_j * \ln(p_j))}{\ln(k_i)}, & \text{for } k_i > 1 \\ = 0, & k_i = 1 \end{cases}$$

Fig. 29. Land-use diversity index formula. (Peiravian, Derrible, Ijaz, 2014)

'Where pj is the ratio of the surface area of land-use type j over the total area of the study zone i, and ki is the total number of different land-use types within the study zone i' (Peiravian, Derrible, Ijaz, 2014).

According to the index authors, 'the LDI of zone i is calculated as the entropy of that zone, Ei, divided by the maximum entropy found in all the zones in the studied area.' As a result:

$$\mathrm{LDI}_i = \frac{E_i}{\max(E_i)}, \quad 0 \leq \mathrm{LDI}_i \leq 1$$

Fig. 30. Land-use diversity index formula. (Peiravian, Derrible, Ijaz, 2014)

'The numerator in the second equation is maximised when all land-use types in the study zone have equal proportions' (Peiravian, Derrible, Ijaz, 2014).

'This process allows the sub-index to be region-specific, making it more convenient for citywide comparative analyses' (Peiravian, Derrible, Ijaz, 2014).

'Higher values mean more diverse land use, which makes daily activities easier to perform by walking' (Peiravian, Derrible, Ijaz, 2014).

Instead of metric area, points were chosen as a measurement due to available data. However, calculation principles remained the same.

Points of interest data have been gathered from OpenStreetMap (2022) portal. Additionally, it was manually revised to increase data accuracy with the help of Google Maps.

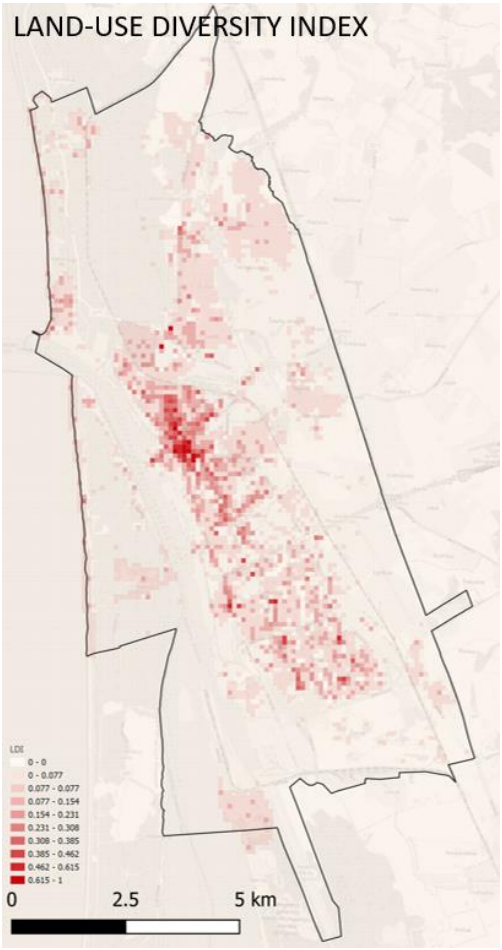

Fig. 31. Klaipėda land-use diversity index. (Compiled by the author, 2022)

Land-use density index is highest in the city centre. As well as, smaller centres can be seen emerging in modernistic neighbourhoods, mainly in the form of shopping malls. Single-family house developments almost rely entirely on trips to the city centre.

Population density index (PDI)

'The PDI represents population density in a given zone. It measures the community environment, encouraging people to travel by walking' (Peiravian, Derrible, Ijaz, 2014). According to the index authors, mathematically, the PDI is defined as:

$$PDI_i = \frac{\left(\frac{Pop_i}{A_i}\right)}{\max\left(\frac{Pop_i}{A_i}\right)}, \quad 0 \leq PDI_i \leq 1$$

Fig. 32. Population density index formula. (Peiravian, Derrible, Ijaz, 2014)

'Where Popi is the total population in the study zone i, and Ai is the area of study zone i' (Peiravian, Derrible, Ijaz, 2014).

'The PDI index has also been normalised (i.e., keeping its value between 0 and 1)' (Peiravian, Derrible, Ijaz, 2014).

Population data (2021) for Klaipėda city have been gathered from the Klaipėda municipality maps portal.

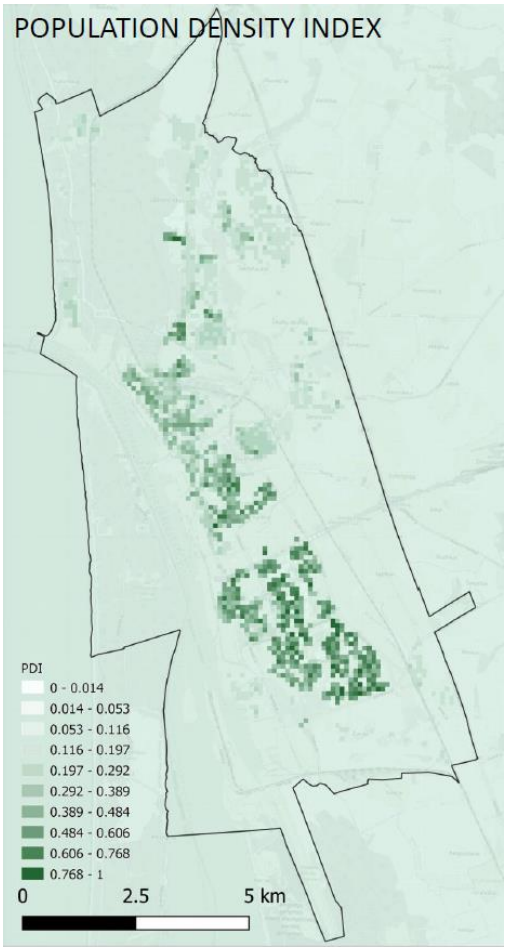

Fig. 33. Klaipėda population density index. (Compiled by the author, 2022)

According to the index authors, a 'higher PDI means more people reside in the neighbourhood.' Peiravian, Derrible & Ijaz (2014) state, 'The rationale for denser areas goes back to Jacobs' (as cited in Jacobs, 1961) 'conditions for diversity since more 'eyes on the street' should provide a safer and more secure environment in which to walk. Moreover, dense populations make social services accessible within walking distance for low-mobility groups' (as cited in Loo & Chow, 2006)'.

Clear population division can be observed where the city is divided into two zones where the population is less dense in the historical old town and city centre and increased in modernistic neighbourhood areas and lowest in single-family houses developments opposite to the paper authors' observation that high PDI values primarily observed in city centres where walking distances are expectedly shorter.

Commercial density index (CDI)

'Commercial establishments act as destinations for work-, shopping-, entertainment-, and service-related trips. Therefore, the higher the commercial density, the more people's needs can be satisfied within a small area, encouraging them to walk rather than drive to distant places' (Peiravian, Derrible, Ijaz, 2014).

According to the paper authors, mathematically, the CDI is defined as:

$$CDI_i = \frac{\left(\frac{GFA_i}{A_i}\right)}{\max\left(\frac{GFA_i}{A_i}\right)}, \quad 0 \leq CDI_i \leq 1$$

Fig. 34. Commercial density index formula. (Peiravian, Derrible, Ijaz, 2014)

'GFAi is the total Gross Floor Area of commercial establishments in study zone i, and Ai is the area of study zone i' (Peiravian, Derrible, Ijaz, 2014).

Instead of metric area, points of interest were chosen as a measurement due to available data. Calculation principles remained the same. As well as non-commercial entertainment, services and other facilities were included (such as sports stadiums, churches, etc.). Therefore index was renamed to POIDI. The denominator in the POIDI is used as a normalising measure. The higher value suggests closer and more diverse points of interest in an area which would encourage people to walk.

Points of interest data have been gathered from OpenStreetMap (2022) portal. Additionally, it was manually revised to increase data accuracy with the help of Google Maps.

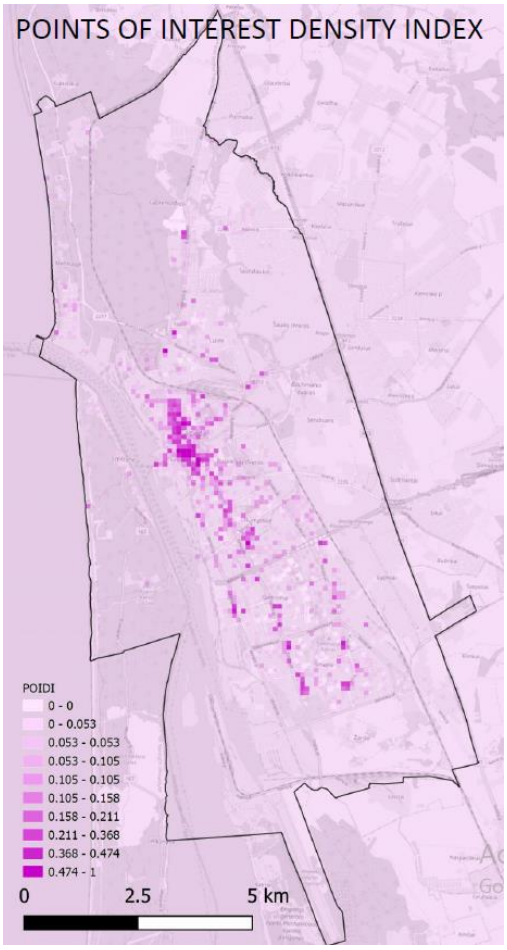

Fig. 35. Klaipėda points of interest density index. (Compiled by the author, 2022)

Opposite to population distribution, points of interest density are highest in the city centre. As well as, smaller centres can be seen emerging in modernistic neighbourhoods, mainly in the form of shopping malls. Single-family houses developments are almost entirely reliant on trips to the city centre. Apparent issues of residential and commercial functions distribution and separation in the city

can be seen, which might cause one to rely on other mobility means instead of walking mainly due to high distances between functions.

Intersection density index (IDI)

'The IDI measures an area's density of intersections (i.e., street crossings)' (Peiravian, Derrible, Ijaz, 2014). It is defined as:

$$\mathrm{IDI}_i = \frac{\left(\frac{\sum_j n_{ij}}{A_i}\right)}{\max\left(\frac{\sum_j n_{ij}}{A_i}\right)}, \quad 0 \leq \mathrm{IDI}_i \leq 1$$

Fig. 36. Intersection density index formula. (Peiravian, Derrible, Ijaz, 2014)

'Where nij is the intersection equivalency factor for intersection j in zone i, i.e. several links meeting at node j, ∑jnij is the sum of intersection equivalency factors in zone i, and Ai is the area of zone i' (Peiravian, Derrible, Ijaz, 2014).

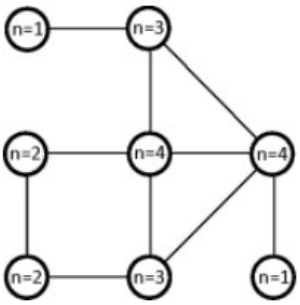

Fig. 37. Examples of intersection equivalency factor values. (Peiravian, Derrible, Ijaz, 2014)

'In practice, a higher IDI suggests smaller block sizes. Indeed, smaller block sizes tend to provide a more pleasant environment for pedestrians, offering more route choices and the option to change course more quickly' (Peiravian, Derrible, Ijaz, 2014).

Intersection data has been gathered from OpenStreetMap (2022) portal. Additionally, it was manually revised to increase data accuracy. Intersections created only for vehicles were excluded.

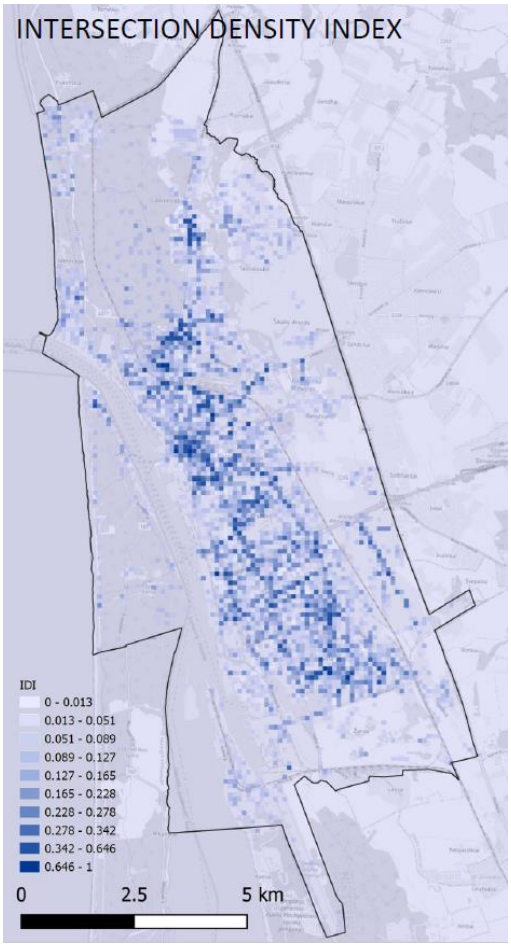

Fig. 38. Klaipėda intersection density index. (Compiled by author, 2022)

Klaipėda street network has been established throughout the city with the highest cluster in the city centre. The lowest index values be seen see again in single-family house developments.

Pedestrian Environment Index (PEI)

'PEI combines the four LDI, PDI, CDI, and IDI sub-indices, each capturing an essential neighbourhood characteristic' (Peiravian, Derrible, Ijaz, 2014). According to the authors, the final PEI for a given zone i is defined as:

$$\mathrm{PEI}_i = \frac{1}{16}[(1+\mathrm{LDI}_i)\times(1+\mathrm{PDI}_i)\times(1+\mathrm{CDI}_i)\times(1+\mathrm{IDI}_i)], \quad 0 < \mathrm{PEI}_i \leq 1$$

Fig. 39. Pedestrian environment index formula. (Peiravian, Derrible, Ijaz, 2014)

'LDIi is the land-use diversity index, PDIi, the population density index is CDIi is the commercial density index, and IDIi is the intersection density index, all for the same zone i' (Peiravian, Derrible, Ijaz, 2014).

Additionally, a fifth component was introduced – green network density since, in theoretical research, the importance of green recreation areas for increased walkability has been established. Calculations have been done based on the same PEI calculation principles.

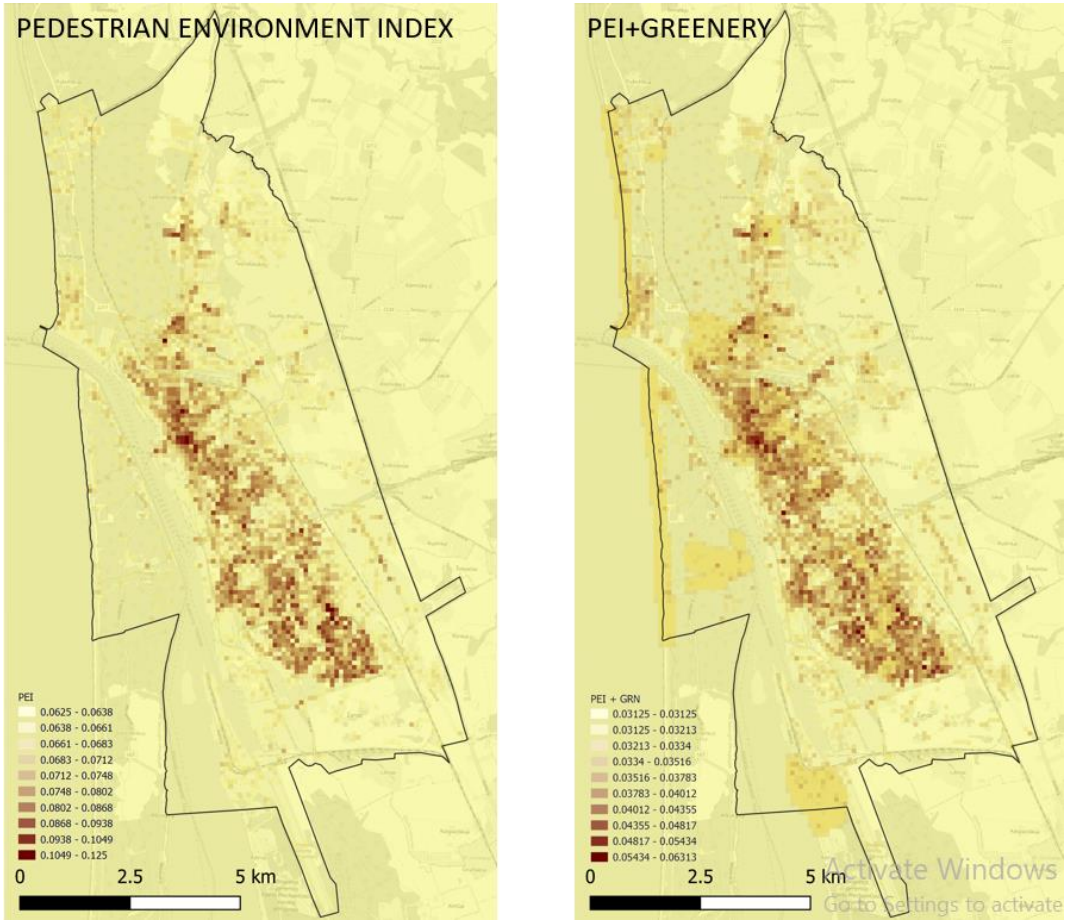

Fig. 40. Klaipėda pedestrian environment index and Klaipėda pedestrian environment index combined with greenery. (Compiled by author, 2022).

According to index authors, values near one indicate that the neighbourhood environment is more suited to pedestrian activity. On the other hand, a PEI number near zero implies that the people within the area have to rely on cars for daily activities because of the unfriendly walking environment (Peiravian, Derrible, Ijaz, 2014).

Unsurprisingly, PEI values are highest in the city centre area. Some small centres are forming in the modernistic neighbourhoods and the lowest in a few single-family house developments.

Similarly, crime rates and their types were also analysed based on a 2022 year criminal registry data map.

There were more crime clusters in the form of thefts at the shopping malls. Additionally, a higher crime rate could be noticed in Gėlių and Rumšiškės dvaro districts, and crimes against human life and health are mainly equally distributed around south Klaipėda modernistic neighbourhoods with the more significant cluster in Rumšiškės dvaro district.

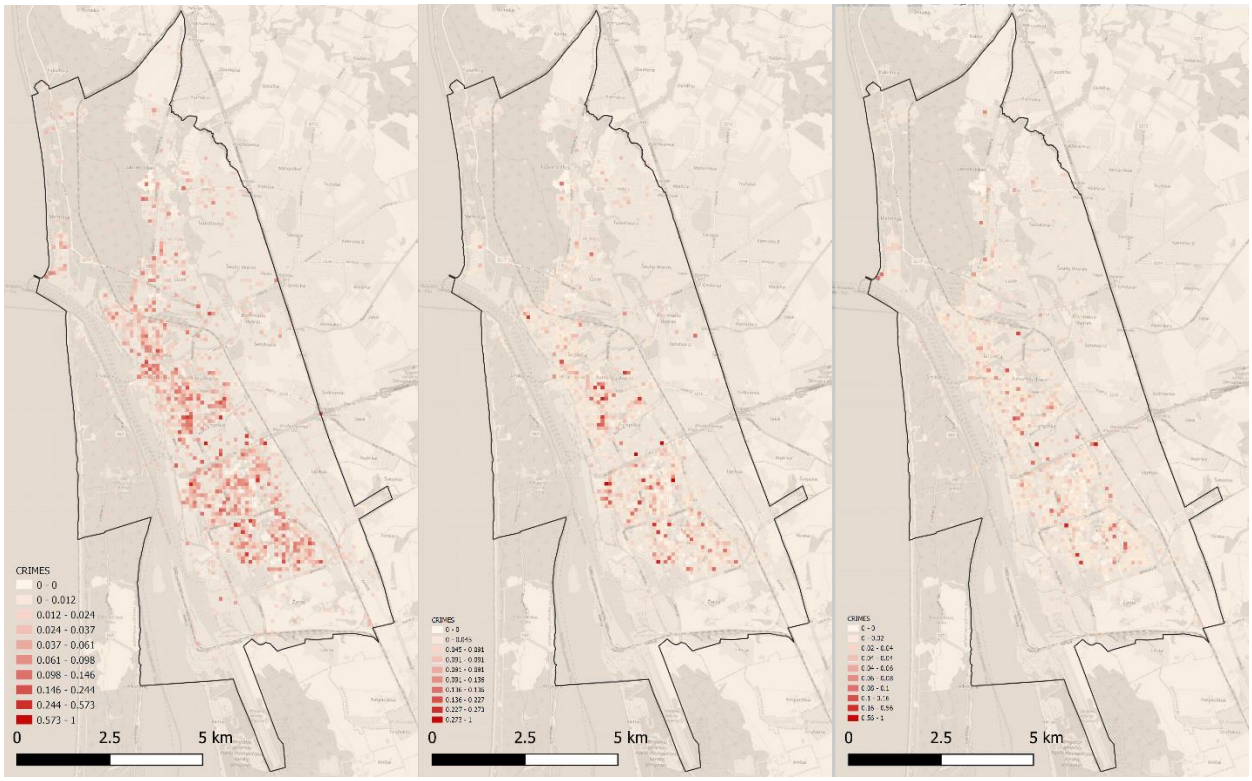

Fig. 41. Klaipėda crime, crime against human life and health and thefts distribution map with normalised values from 0 to 1. (Compiled by author, 2022).

Moreover, the Klaipėda citizen population was analysed, including citizens' gender and mean age distribution.

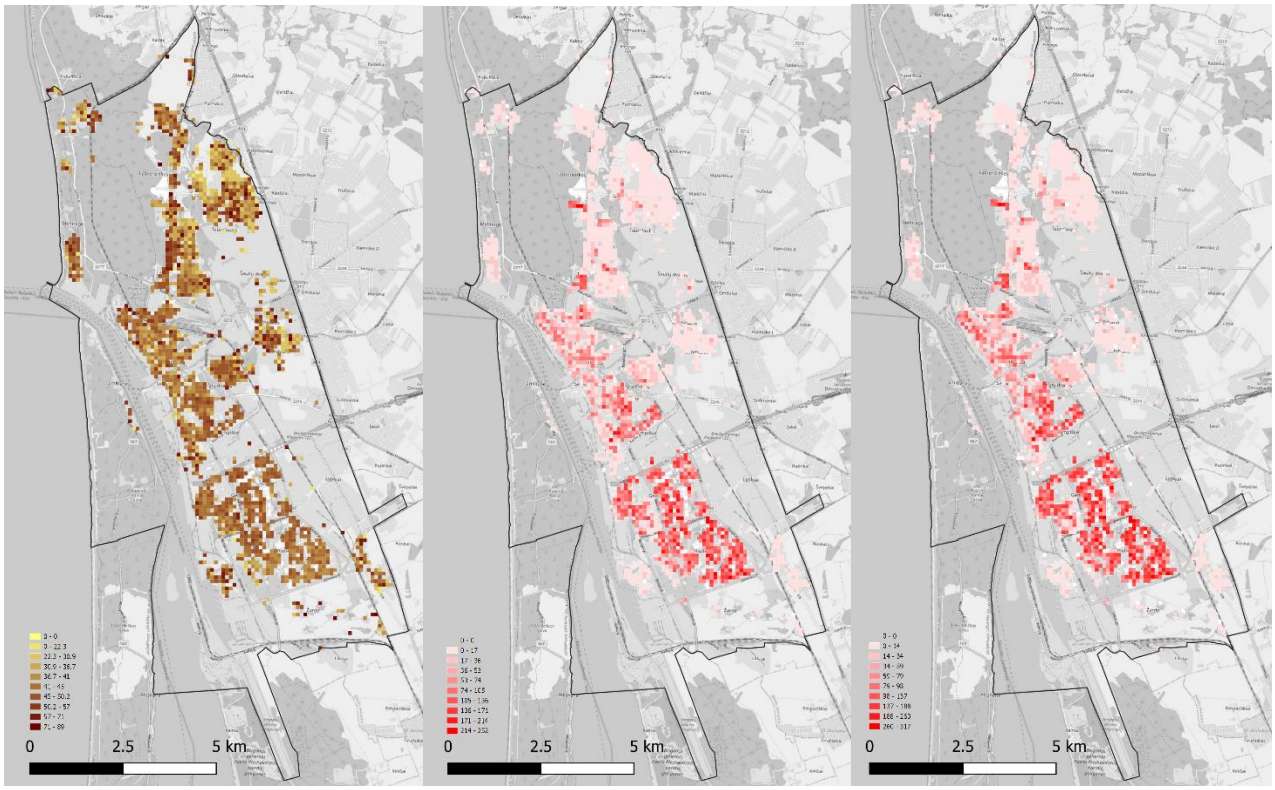

Fig. 42. Klaipėda mean age, female and male distribution map. (Compiled by author, 2022).

Regards gender type, the population is distributed equally. There are no significant age discrepancies as well.

Overall, clear division can be seen within the city, with the city centre containing most of the points of interest and intersections. At the same time, the population lives on the other side of the town. This creates a necessity for the vehicle, even though smaller centres can be seen emerging, mainly in the commercial (super malls) form.

2.3.2. General and sustainable mobility plans analysis

Both the Klaipėda master plan and sustainable mobility plans were analysed for a deeper insight into the city's current urban and walkability situation and challenges with a focus on safety and urban design.

One of the important aspects of city walkability is its' compactness. According to Klaipėda SUMP (2017) authors, the concept of a compact city is the spatial planning of a city described by reachability. For example, supporters of a compact city concept argue that the residents in such a city have jobs or attractions reachable by walking or cycling in the shortest possible time.

According to Klaipėda SUMP (2017) authors, the compactness of Klaipėda city was evaluated by summing the attraction created by each building. Then, it was calculated by multiplying the weights of adjacent buildings and dividing them by the distance factor.

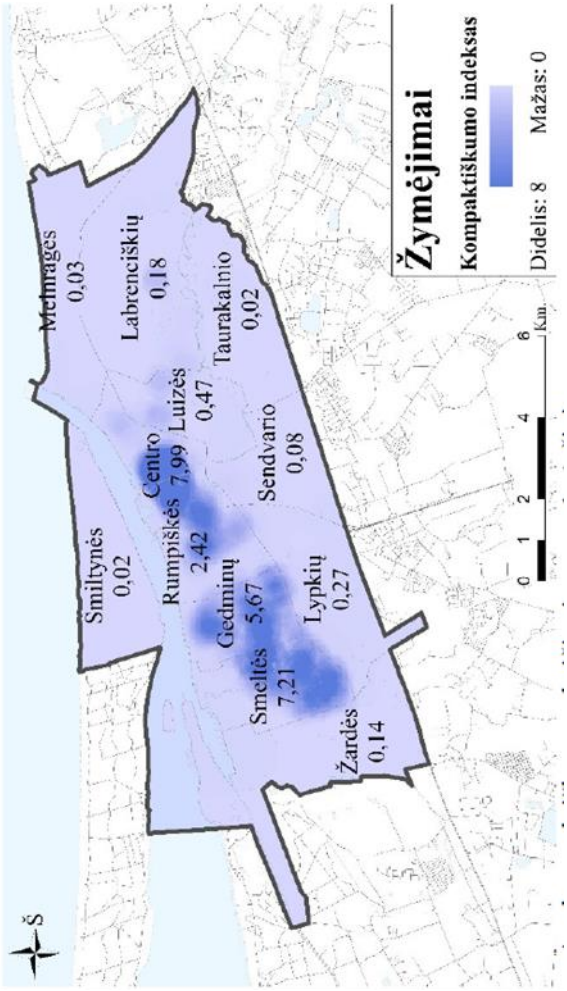

Fig. 43. Klaipėda city compacity. (*Klaipėda sustainable mobility plan*, 2017)

In a sense, the results were similar to PEI, confirming PEI's liability and results.

Plans gave insight into traffic safety situations and challenges as well. Millions of people are injured in traffic accidents. It affects not only the social environment of the people but also the economy. Therefore, road safety should be important to everyone. In Lithuania, the number of vehicles is increasing every year, and at the same time, the probability of traffic accidents is increasing. During the 25 years of independence, transport means more than doubled (*Klaipėda SUMP*, 2017). Unfortunately, Lithuania's road network has not been adapted for such flows. This situation has affected road safety (*Klaipėda SUMP*, 2017).

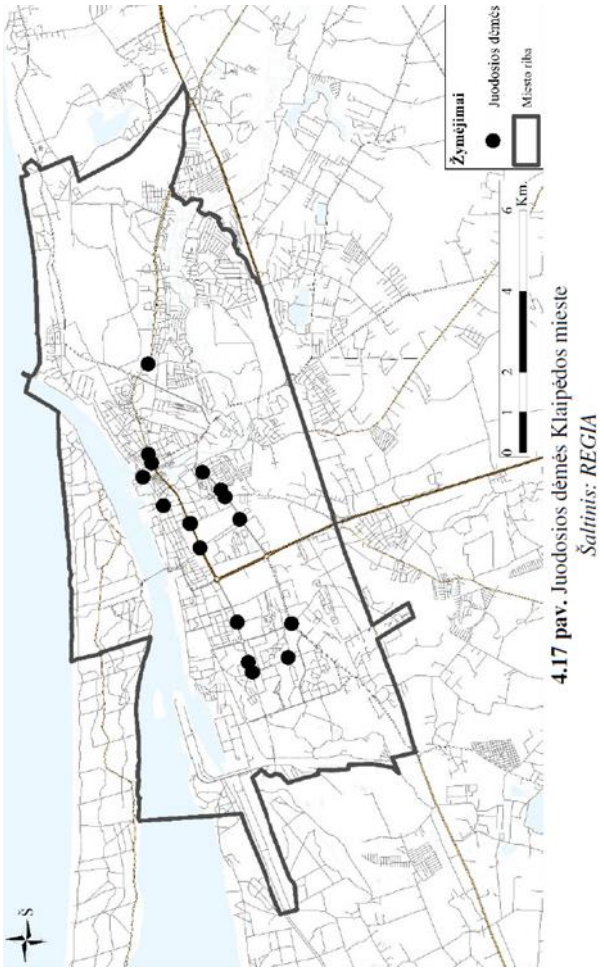

Fig. 44. Dark spots in Klaipėda city. (*Klaipėda sustainable mobility plan*, 2017)

Traffic safety in Klaipėda is not enhancing. Therefore, various urban design measures should be implemented to reduce the number of accidents in unsafe places in the city street network. These tools should be designed to separate or reduce flows for pedestrians and other transport means (*Klaipėda SUMP*, 2017).

2.3.3. Sociological survey analysis

Klaipėda sustainable mobility plan survey

To determine the modal travel distribution of Klaipėda city and suburban residents, the results of the Klaipėda SUMP sociological survey were used. The survey was conducted in 2017, May – June, with 815 participants. The questionnaires were available on the websites of Klaipėda city schools. In addition, a direct population survey was conducted to obtain more accurate results. The age

distribution of respondents corresponded to the demographic of Klaipėda city population age distribution. Most respondents were between 26 and 45 years old and under 18. Travelling habits, reasons for the choice of transport, and opinions over the current transport system were also clarified. Klaipėda city territory was divided into 12 transport districts and four suburban areas whose residents' activity is closely tied with Klaipėda city (residents work and their children study there). Šilutė, Gargždai, Kretinga, and Palanga suburban districts were named according to the directions of the following cities or towns.

Based on the survey results from participants from all districts, it was possible to make conclusions about the city as a whole. The modal distribution of the Klaipėda city population is presented in the diagrams below.

	Male			Female			
District	<18	19-65	>66	<18	19-65	>66	Total
1	5	11	4	5	11	4	40
2	11	16	5	48	99	5	184
3	11	14	5	34	27	5	96
4	1	4	2	1	4	2	14
5	5	13	5	9	12	5	49
6	5	13	5	7	11	5	46
7	4	15	5	4	12	5	45
8	4	12	5	4	12	5	42
9	4	15	5	4	12	5	45
10	4	12	5	5	12	5	43
11	0	6	4	0	6	4	20
12	4	10	5	4	10	5	38
13	4	11	5	4	10	5	39
14	4	11	4	4	10	4	37
15	4	12	5	5	10	5	41
16	4	12	3	4	10	3	36
							815

Fig. 45. Distribution of respondents in areas divided by age and sex. (*Klaipėda sustainable mobility plan*, 2017)

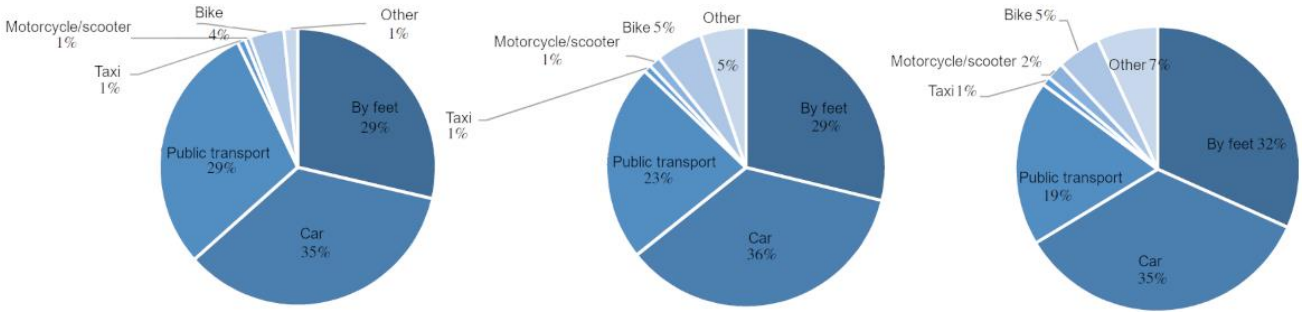

Fig. 46. Modal transport means distribution on Monday - Friday, Saturday and Sunday. (*Klaipėda sustainable mobility plan*, 2017)

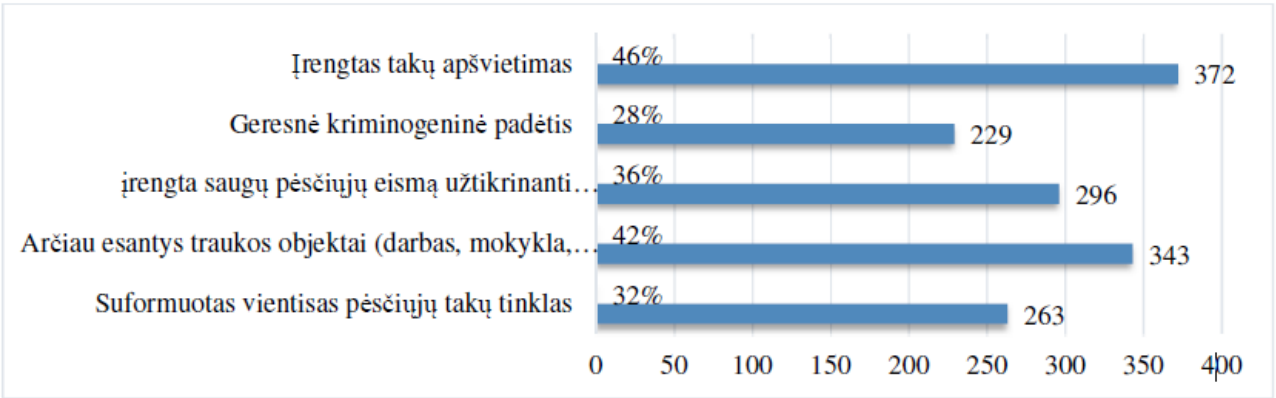

Fig. 47. Reasons that would encourage walking. (*Klaipėda sustainable mobility plan*, 2017)

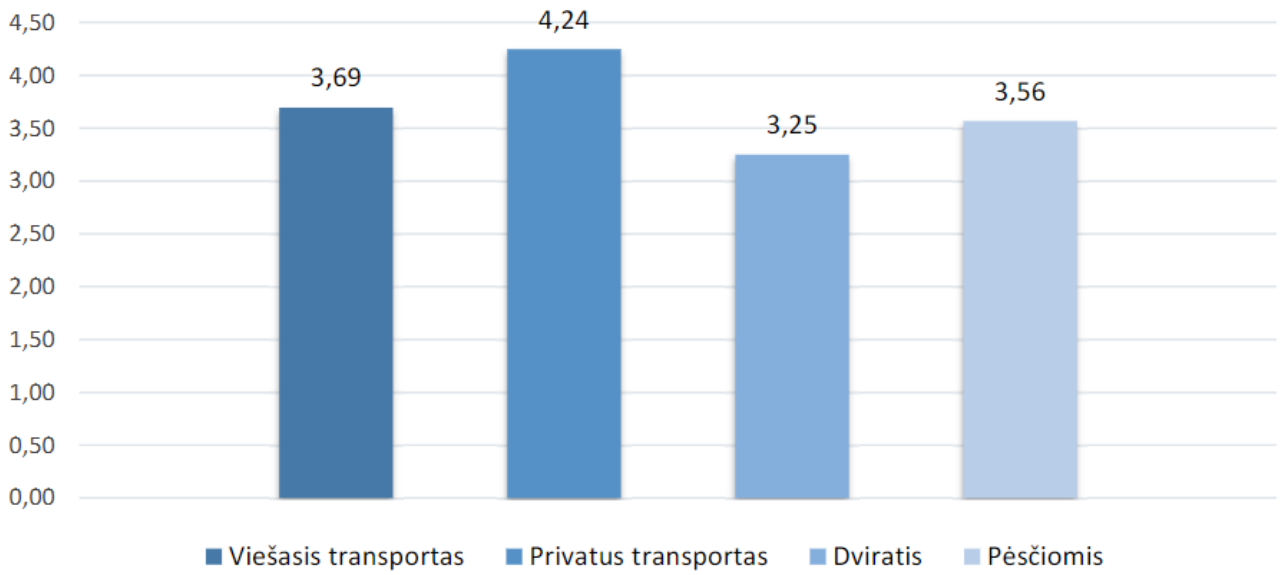

Fig. 48. Evaluation of traffic quality in different modes of transportation according to a 5-point system. (*Klaipėda sustainable mobility plan*, 2017)

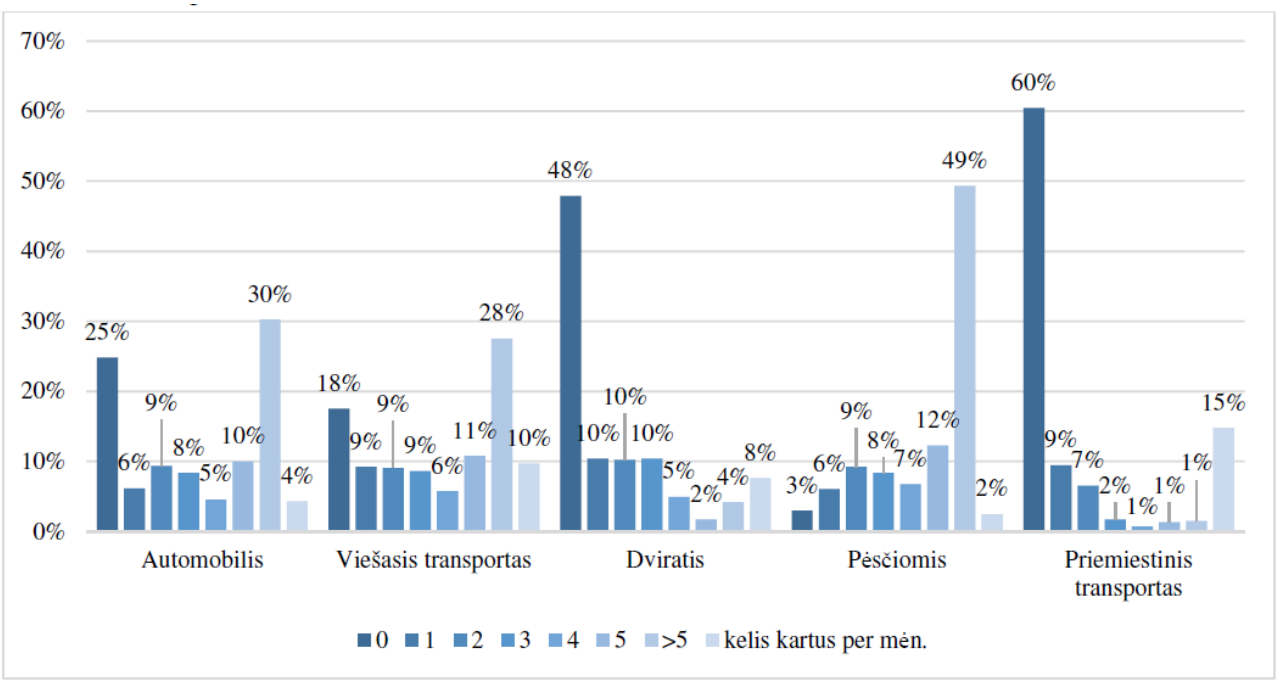

Fig. 49. Distribution of respondents by frequency of use of means of transport. (*Klaipėda sustainable mobility plan*, 2017)

The car remains the main transport mean for most Klaipėda citizens. However, people point out what would encourage them to walk, claiming proper lightning and better points of interest proximity and distribution as the main factors. Other essential elements are street networks providing secure pedestrian traffic, continuous pedestrian path networks and better criminogenic situations.

PORTIS SUMP Klaipėda sustainable mobility surveys

Throughout the creation and acceptance of SUMP, LEM (Local Evaluation Manager) organised three surveys (1st survey in May 2017, and second survey in October 2017, 3rd in October 2018) to ascertain if Klaipėda City residents are aware of and recognise the importance of SUMP. Additionally, residents' preferences for using various forms of transportation for everyday urban

mobility were analysed. The surveys highlighted issues with planning, unsuitable transport infrastructure conditions for daily movement, suggestions from the inhabitants, and their critical attitude towards putting sustainable urban mobility concepts into practice in the city. The pilot survey results were presented in May 2017 (n=169). Locals and other target groups were questioned during the survey. Below are excerpts from the key survey data for a public opinion study.

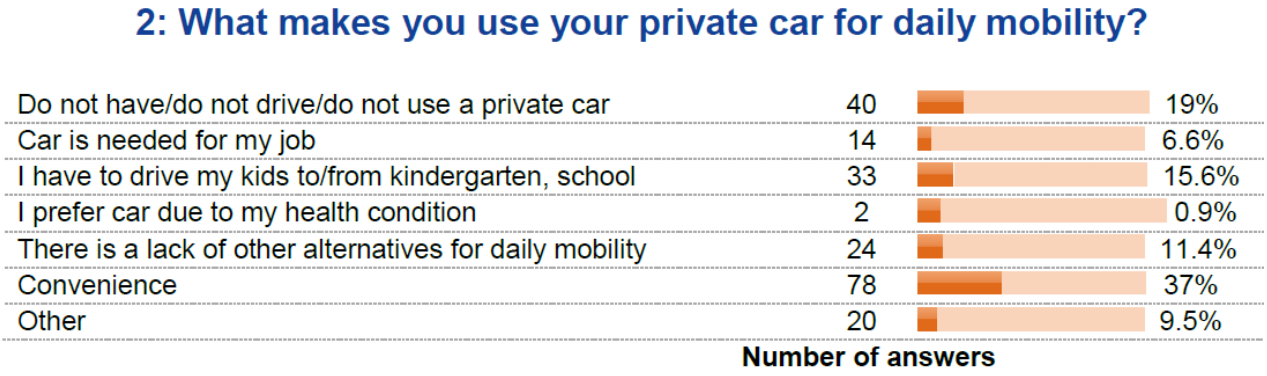

Fig. 50. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2017)

Some survey results, organised in October 2017 (n=187), are presented below. This study interviewed residents, business owners, employees, and state officials. In addition, a social survey platform and interviews were used to conduct the research.

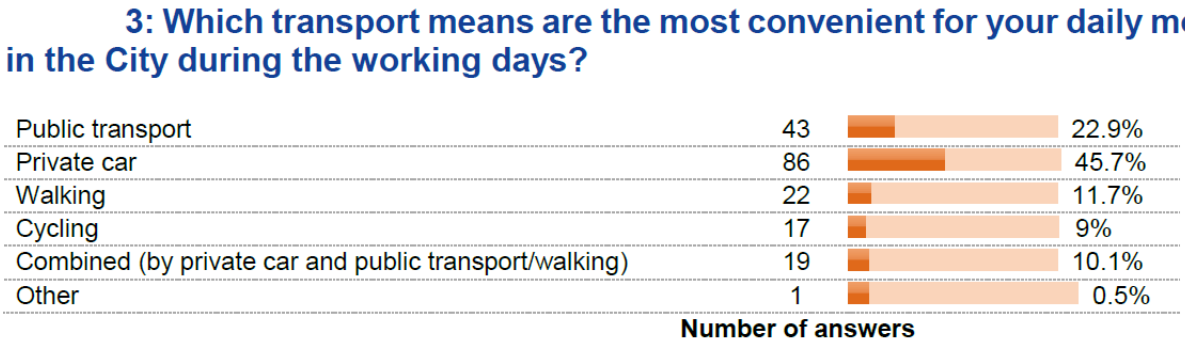

Fig. 51. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

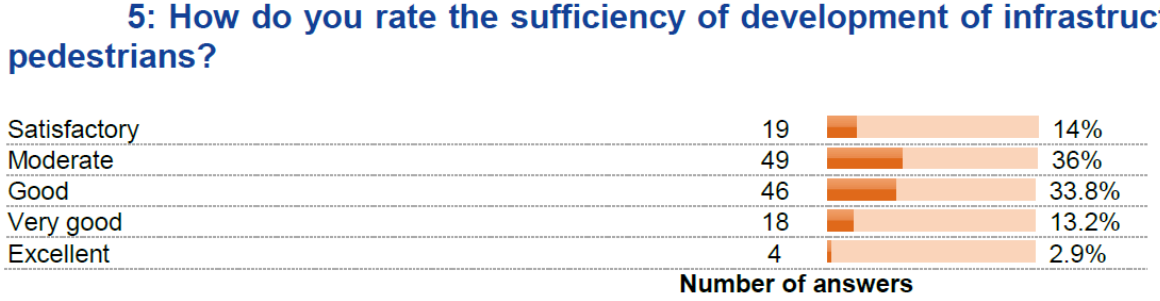

Fig. 52. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

Fig. 53. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

Some survey results organised in October 2018 (n=259) are presented below. This study included interviews with residents, business owners, employees, and state officials. A social survey platform

and interviews were used to conduct the research. The survey's organisers claim that a significant rise in the city's understanding and adoption of sustainable urban mobility concepts is the reason for the increase in responses. Social media and the media were used to influence this rise. (*PORTIS SUMP Klaipėda*, 2018).

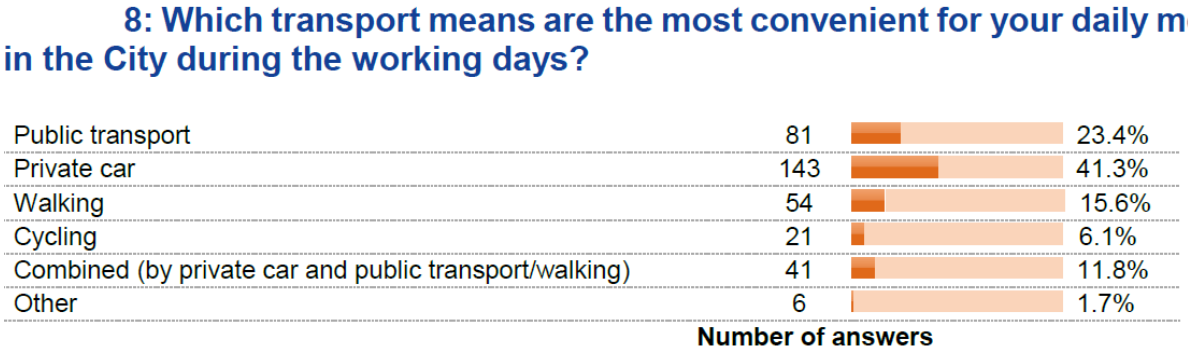

Fig. 54. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

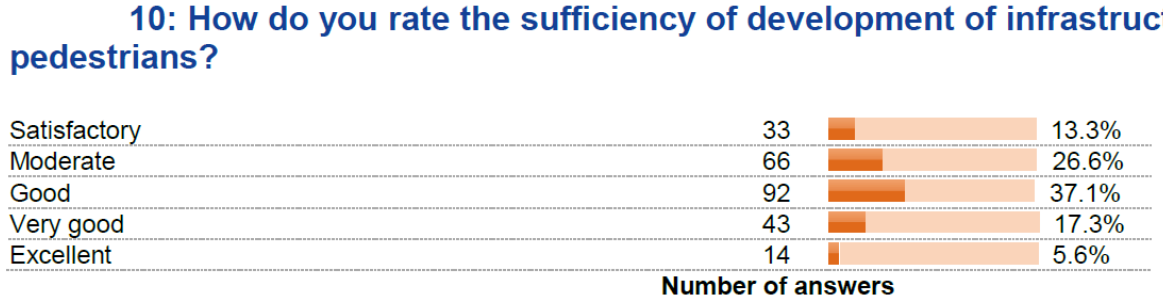

Fig. 55. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

Fig. 56. PORTIS SUMP Klaipėda sustainable mobility surveys. (*PORTIS SUMP Klaipėda*, 2018)

Surveys confirmed again that private cars are the most convenient mean of transport. Additionally, it gave an insight into citizens' evaluation of pedestrian infrastructure between 'moderate' and 'good'.

2.3.4. Walk audit and observation

Walk audits and observations were conducted mainly to analyse public spaces, street design quality and accessibility since it is a complex system with multiple elements. Two different neighbourhoods were chosen based on previous empirical research results (least and most walkable (Tauralaukis and Center)). Observations were conducted on 2022 April 30th, Saturday, around mid-day.

Centras quarter

Safety:

- Protection against traffic and accidents – feeling safe (streets are relatively safe, there is protection for pedestrians, eliminating the fear of traffic is also eliminated due to speed limits and other vehicle restrictions);

- Protection against crime and violence – feeling secure (public realm is relatively lively, there is passive surveillance in the day, no diversity of functions 24/7/365 (economically not liable), lightning is on a human scale);

- There is relatively low protection against unpleasant sensory experiences (wind/draft, rain/snow, cold/heat, pollution, dust, noise, glare.

Comfort:

- Opportunities to walk (there is enough room for walking, attractive facades, and minor obstacles, older adults, disabled people and parents with strollers might find it difficult to walk and navigate around due to recurrent pebble surfaces and no tacticle surface or other devices to help for people with disabilities);

- Opportunities to stop and stay (there are attractive and functional edges, partly defined spots for staying, and facades with good details that invite staying);

- Opportunities to sit (there are some defined zones for sitting, pleasant views, people watching, goa od mix of public and cafe seating, and resting/ waiting opportunities);

- Opportunities to see (reasonable viewing distances, unhindered views, exciting views, easy orientation, lightning when dark was not observed);

- Opportunities to talk and listen (noise levels are relatively low due to low speed and other vehicle limits, public seating arrangements are partly conducive to communicating, 'talk scapes');

- Opportunities for play and exercise (there is no place to exercise or other physical activities for adults, nor play or street entertainment, there are partly temporary activities (markets, festivals, exhibitions, etc.), by day in the summer season (winter and nighttime were not observed)).

Enjoyment:

- Dimensioned at human scale (dimensions of buildings and spaces in observance of the essential human dimension in relation to senses, movements, size and behaviour);

- Opportunities to enjoy the positive aspects of climate (there is tree landscaping which provides shade and protection from heat, as well as there are some seating and other small-scale urban design elements which provide an opportunity to enjoy the sun, although there are no shelters from coolness, wind/breeze,);

- Aesthetic qualities and positive sensory experience (sound design and detailing, suitable materials, fine views/vistas, rich sensory experiences: trees, plants, water);

Tauralaukis quarter

Safety:

- Protection against traffic and accidents – feeling safe (streets are relatively safe, there are partial sidewalks and crossings, and pedestrians are relatively protected due to the mainly residential function of the neighbourhood);

- Protection against crime and violence – feeling secure (there is a lack of lively public realm, barely any passive surveillance, no diversity of functions 24/7/365, partly well lit/ lightning in human scale);

- There is no protection against unpleasant sensory experiences (wind/draft, rain/snow, cold/heat, pollution, dust, noise, or glare;

Comfort:

- Opportunities to walk (there is room for walking, repetitive and not exciting facades, some obstacles, mixed surfaces, and no accessibility for everyone);

- Opportunities to stop and stay (no attractive and functional edges, no defined spots for staying, no facades with good details that invite staying);

- Opportunities to sit (there are no defined zones for sitting, lack of pleasant views, lack of people in streets, no public and cafe seating, resting/ waiting opportunities only at bus stops);

- Opportunities to see (reasonable viewing distances, unhindered views, no interesting views, not easy orientation due to repetitive views, lack of lightning;

- Opportunities to talk and listen (low noise levels, no public seating arrangements conducive to communicating, 'talk scapes');

- Opportunities for play and exercise (there are no places for physical activity, exercise, play and street entertainment, and no temporary activities (markets, festivals, exhibitions, etc.), by day and night, in summer and winter).

Enjoyment:

- Dimensioned at the human scale (dimensions of buildings and spaces are in observance of the essential human dimension in relation to senses, movements, size and behaviour);

- Aside from some trees, there are no opportunities to enjoy the positive aspects of climate;

- Aesthetic qualities and positive sensory experiences need to be improved (design might be considered dull, there are no fine but repetitive views/vistas, and although there is some greenery, its' potential is not being used).

Observations and walk audits clearly show the contrast between these two districts, where Tauralaukis faces multiple urban design challenges and issues caused by the modernistic urban design approach. In comparison, the Center is in relatively good condition aside from some accessibility issues and possibilities for enjoyment improvement.

2.4. Conceptual model and generalisation

All critical tasks of the empirical research were accomplished, and different methods supplemented one another to draw a final image of the city and conclusions:

1. PEI index is highest in the city centre. As well as, smaller centres can be seen emerging in modernistic neighbourhoods, mainly in the form of shopping malls. Citizens living in private housing estates face inconvenience. Due to the smaller number of points of interest, the population

is forced to use private cars or public transport more often, and their journey time to attractions is more prolonged and less comfortable;

2. Population density correlates with compactness. Neighbourhoods with low population density lack centres of attraction;
3. Traffic safety in Klaipėda is not enhancing. Therefore, various urban design measures should be implemented to reduce the number of accidents in unsafe places in the city street network. Many of these tools should be designed to separate or reduce flows for pedestrians and other transport means;
4. According to residents, key reasons that would encourage them to walk on foot are well-lit areas, better distribution and proximity of points of attractions, a street network providing secure pedestrian traffic, a continuous pedestrian path network and a better criminogenic situation.

A conceptual model was improved and established for an experimental design project.

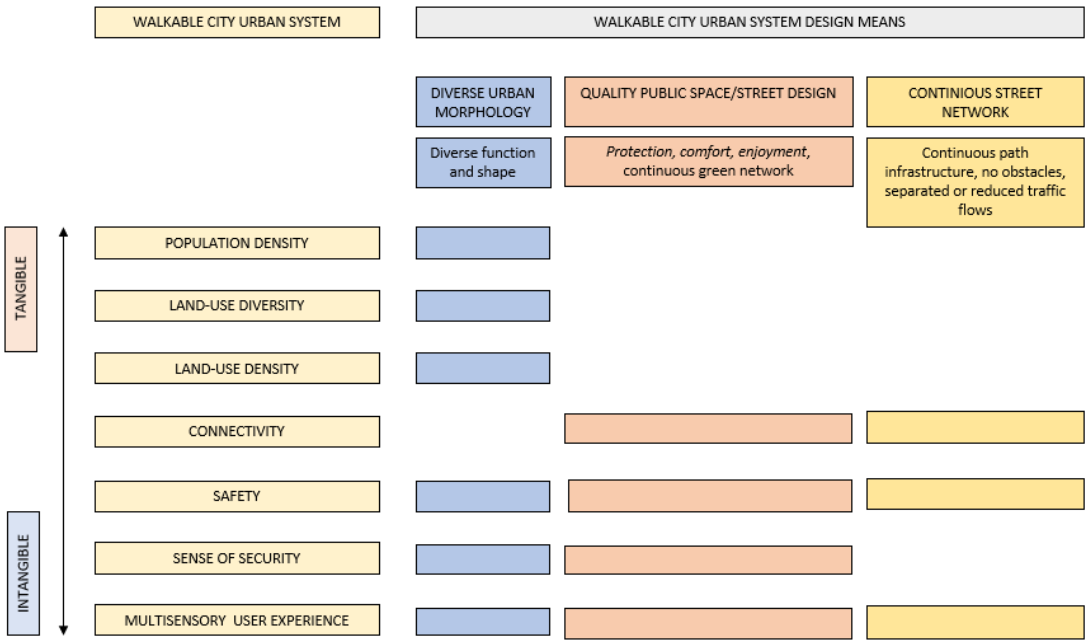

Fig. 57. Walkable city conceptual model. (Compiled by the author, 2022)

Walkable city elements were refined and divided into intangible and tangible ones. Additionally, a three-level walkable city urban system was established, showing how these elements interconnect within the city through diverse urban morphology, quality public spaces, street design, and a continuous street network.

Further research focused on the least walkable neighbourhoods development and sought solutions to enhance walkability through urban design transformations.

A deeper insight could have been made regarding weather conditions and movement patterns in winter; walk audits were only conducted in spring.

3. Experimental project for Klaipėda city walkability enhancement

3.1. Experimental project location selection and justification

After empirical research data analysis, a considerable discrepancy was evident between Klaipėda city's old town, city centre and Klaipėda south modernistic neighbourhoods' walkability ratings. Therefore, the initial choice was to implement the experimental design project in one of the south Klaipėda modernistic neighbourhoods called Žardininkai I, with a low walkability index but high population density as it would have a more significant impact on a city's urban fabric compared to the previously analysed Tauralaukis neighbourhood.

The initial idea was to focus solely on one neighbourhood with a low walkability score and tackle residents' daily issues regarding walkability around the neighbourhood.

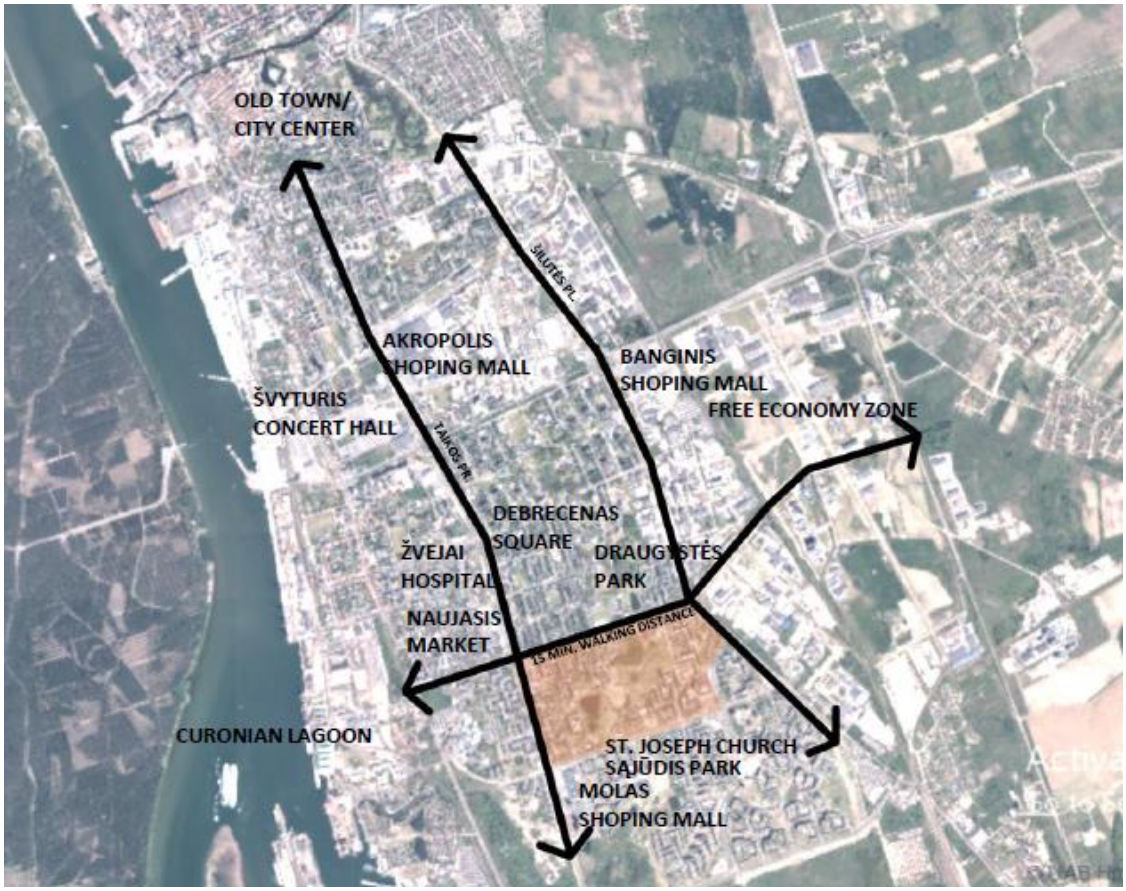

Fig. 58. Initial experimental design project location. (Compiled by the author, 2022)

Key neighbourhood issues were soon identified. Public spaces, green and pedestrian networks are neglected, old and unappealing, with low design quality and not responding to the current needs of the residents. There is a lack of identity within quarters; repetitive layouts, high crime rates; lack of recreational activities; partly developed and chaotic pedestrian and bicycle network; high traffic incidents and abandoned areas.

Proposals with the most significant impact were made (to develop continuous pedestrian, green network and public spaces infrastructure; to use the recreational and functional potential of green spaces and waterfront; to create unique looks for public spaces and surrounding area; to regenerate existing quarters; to create multisensory, joyful and comfortable user experience and to promote diversity and inclusivity for all users.

Fig. 59. Alternative 1 concept. (Compiled by the author, 2022)

While implementing urban neighbourhood analysis, the realisation came that similar urban scenarios and problems repeat throughout all cities' modernistic neighbourhoods, which go all the way up linearly towards the city centre and old town where city fabric changes for the better and produces higher walkability score.

Fig. 60. Linear path of city modernistic neighbourhoods going up to the city centre. (Compiled by the author, 2022)

Therefore similar urban issues could be tackled on the more prominent city scale with a more significant impact while considering not only one neighbourhood's life but the city as a whole organism and how all neighbourhoods could be incorporated towards enhancing city walkability.

The city was analysed again from a different perspective. It was noticed that each neighbourhood has an extensive green area, which is not being used to its full potential. After the Ministry of Environment announced new norms for green areas in cities, it became clear that in Klaipėda, there are two and a half times more per inhabitant than required from 2022. However, the calculation might not represent reality fully since it does not consider the proximity of the green area to the inhabitant. Therefore maps, photo fixations and walk audits fully proved the current green network situation.

Fig. 61. Existing Klaipėda green network. (Compiled by the author, 2022)

There is enough greenery in Klaipėda. However, most green spaces serve barely any purpose for their' residents rather than just being green. Many old or abandoned park spaces and empty green fields were around housing blocks. Both pedestrian infrastructure, public spaces and the green network were not continuous, cohesive, user friendly and lacked good urban design qualities.

Fig. 62. Existing modernistic neighbourhoods infrastructure and pedestrian and public space network. (Compiled by the author, 2022)

Fig. 63. Existing modernistic neighbourhoods, green network and public spaces. (Compiled by the author, 2022)

So the idea was developed to establish a continuous and cohesive neighbourhood green spaces network throughout the city until it connects to the city's centre and old town green spaces network. In this way, it would provide an active mobility-focused path as an alternative to the Taikos Avenue connection, which is more car-oriented.

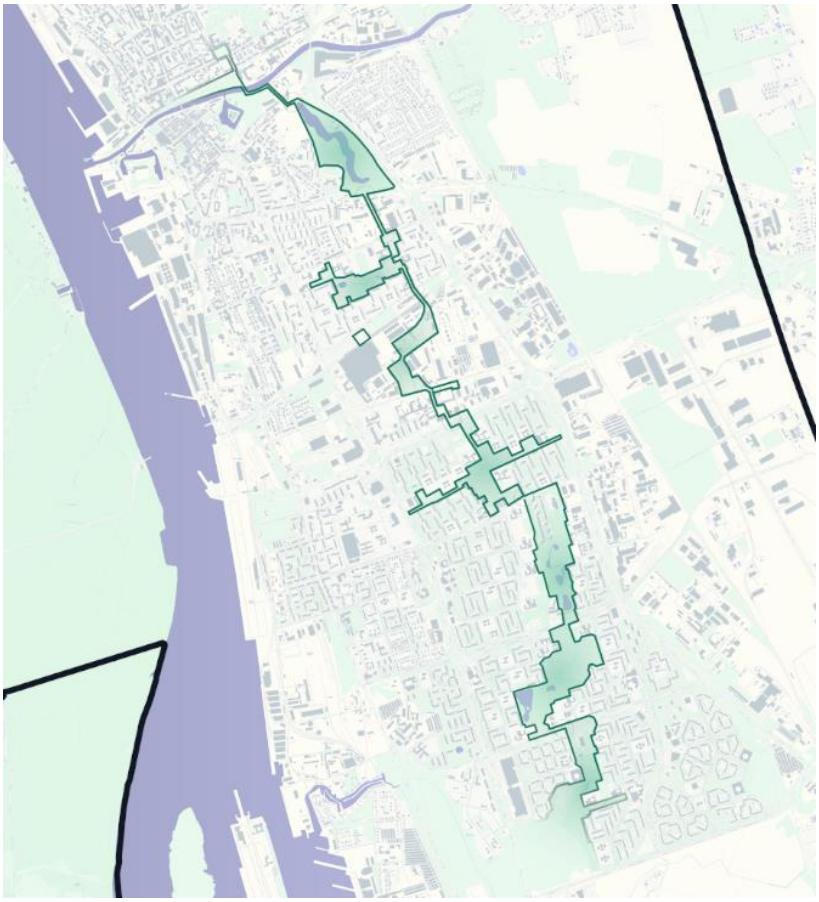

Fig. 64. Klaipėda green link concept. (Compiled by the author, 2023)

Additionally, based on the 15-minute city concept coined by Paris-based urbanist Carlos Moreno which promotes the idea city where its' residents can fulfil their daily needs within 15 minutes walking radius, analysis was done establishing what current walking proximity neighbourhoods have. A comparison of 15-minute walking isochrones and radiuses in neighbourhoods was made.

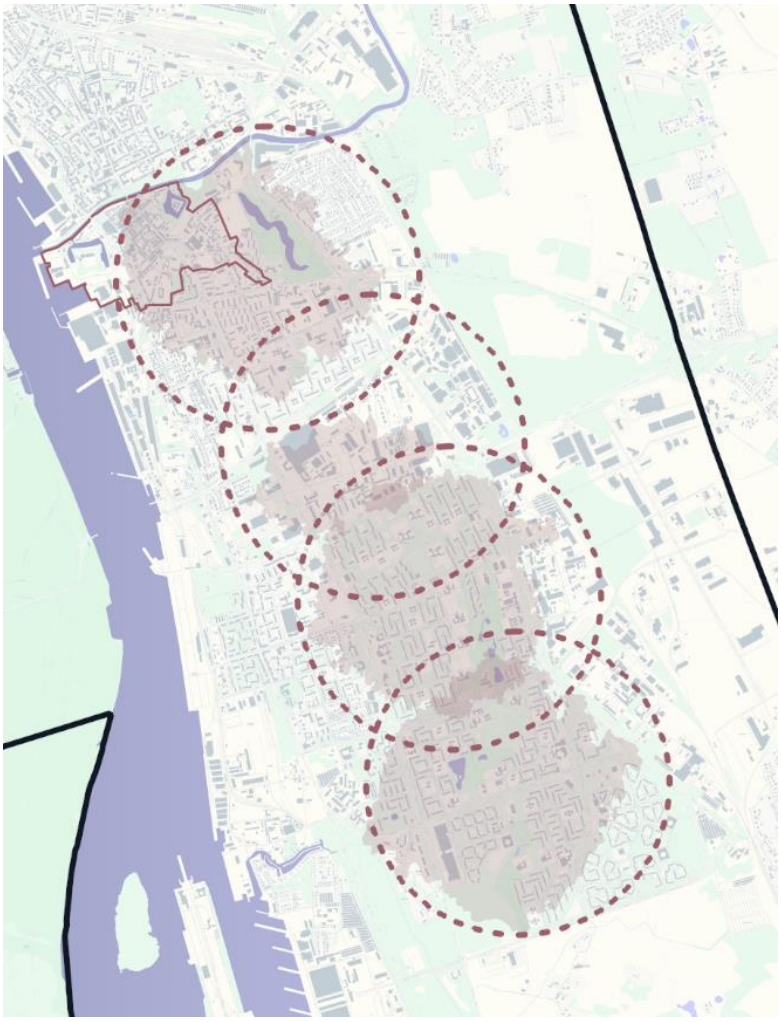

Fig. 65. A comparison of 15-minute walking isochrones and radius in neighbourhoods. (Compiled by the author, 2023)

It became evident that there is an interruption in the Policijos district between neighbourhoods, which requires additional, more considerable urban intervention to establish cohesive and continuous green link while providing optimal infrastructure for city residents.

Moreover, after analysing the city and establishing a potential green link route, it became evident that Danė riverfront public spaces at the end of Gluosnių Cross Street require urban intervention as well in order to seamlessly connect to the city centre and old town green spaces network.

Therefore, finally, to make green link work, three urban design intervention areas for further analysis and urban design were established:

1. South Klaipėda modernistic neighbourhoods network;

2. Policijos district;

3. Danė riverfront public space at the end of Gluosnių Cross Street.

Fig. 66. Klaipėda green link concept and urban design intervention locations. (Compiled by the author, 2023)

3.2. Experimental project location analysis

3.2.1. South Klaipėda modernistic neighbourhoods green network

Since all modernistic neighbourhoods had similar or almost identical structures, one was analysed more complexly as a prototype to establish a common understanding of what urban design interventions might be needed. More specifically, the Žardininkai I neighbourhood was chosen.

The sixth (Žardinkai) residential district and public centre

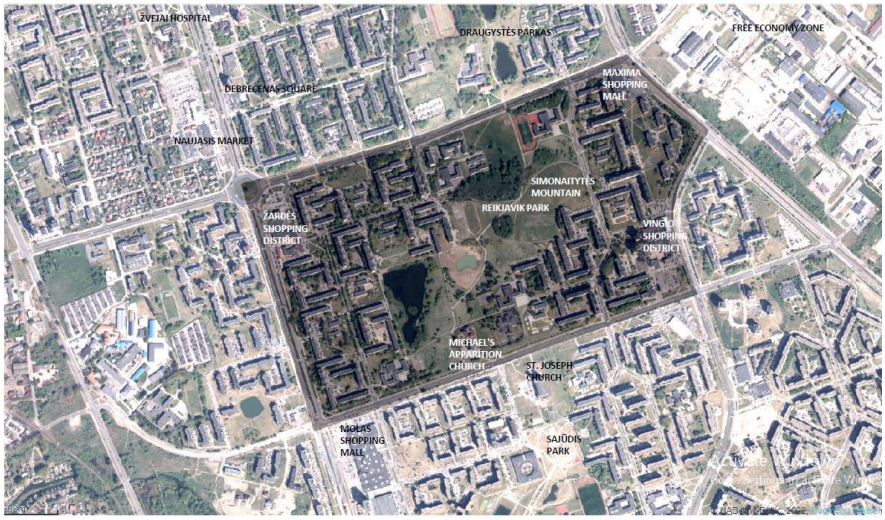

Fig. 67. Žardininkai I district. (Compiled by the author, 2023)

The sixth residential district (arch. R. Valatka) is located between Statybininkų Ave., Vingio St., Smiltelės St and Taikos Ave, covering almost 100 hectares. As in the other residential areas, in 1976-1981, identical typical five-and nine-story flat houses were built. This district consists of two micro-districts separated by a green pedestrian zone. Exclusive residential houses in this area are near the shopping centre in Vingio St. Architect Gytis Tiškus designed two 12-story brick buildings.

The community centre for the sixth residential district was also located at Taikos Avenue and built according to a typical project; only the composition of the individual blocks differs. The community centre had a grocery store, canteen, pharmacy, communications department, household service companies and a house board. The shopping centre was opened in 1981, the opening of the communication centre and the beverage store moved in 1984. Currently, it is a shopping centre.

Neighbourhoods adapted to become more convenient to their users rather than it was initially designed. However, since they are still predominantly residential, many citizens must commute daily to their workplaces via public or private transport. According to Klaipėda SUMP (2017), the longer the journey, the more often it is done by car, and the shorter, the more often going on foot. The average trip takes around 15-20 minutes. In addition, based on Klaipėda SUMP (2017) information, some city areas are inconveniently served by public transport. For residents who do not use cars, it often takes a long time (more than 30 minutes) to make these trips on foot and by public transport.

Pedestrian and public spaces network

Pedestrian and public spaces quality in the neighbourhood is moderate. Starting from basic needs, it does not provide comfort and security for vulnerable groups of society. Additionally, it is confusing and not cohesive, creating a maze feeling. There are only a few places to stop or sit.

Fig. 68. Žardininkai I district pedestrian and public space network. (Compiled by the author, 2023)

The public spaces network needs to be established better. Urban design quality and small architecture elements are poor - loads of empty, no man-land spaces. There is a lack of recreational functions variety. Low aesthetic qualities and negative multisensory experience. However, it does have good potential for regeneration due to its current landscape: loads of greenery, ponds and tree alleys.

Green network

As mentioned before, the neighbourhood has a good ratio of greenery. More than two-thirds of the district is covered in it. In addition, the neighbourhood has a unique topography with a couple of water bodies and a hill, which is used in winter as a recreational activity for children.

Fig. 69. Žardininkai I district green spaces network. (Compiled by the author, 2023)

However, the water body's potential is not fully used; there is no comfortable access or spaces to hang out next to it, even though residents are showing interest. Additionally, most of the meadows are plain; there is no plant variety.

Infrastructure

Road infrastructure is old; there are no bicycle lanes. Parking spaces no longer cover resident needs. Access to the buildings is complicated.

Fig. 70. Žardininkai I district road infrastructure. (Compiled by the author, 2023)

Even though the neighbourhood is residential, no pedestrian priority and safety is established. In the broader streets, the human scale is lost.

Existing housing typology

Typical soviet housing blocks cover most of the neighbourhood with little variations in heights and layouts.

Fig. 71. Žardininkai I district existing housing typology. (Compiled by the author, 2023)

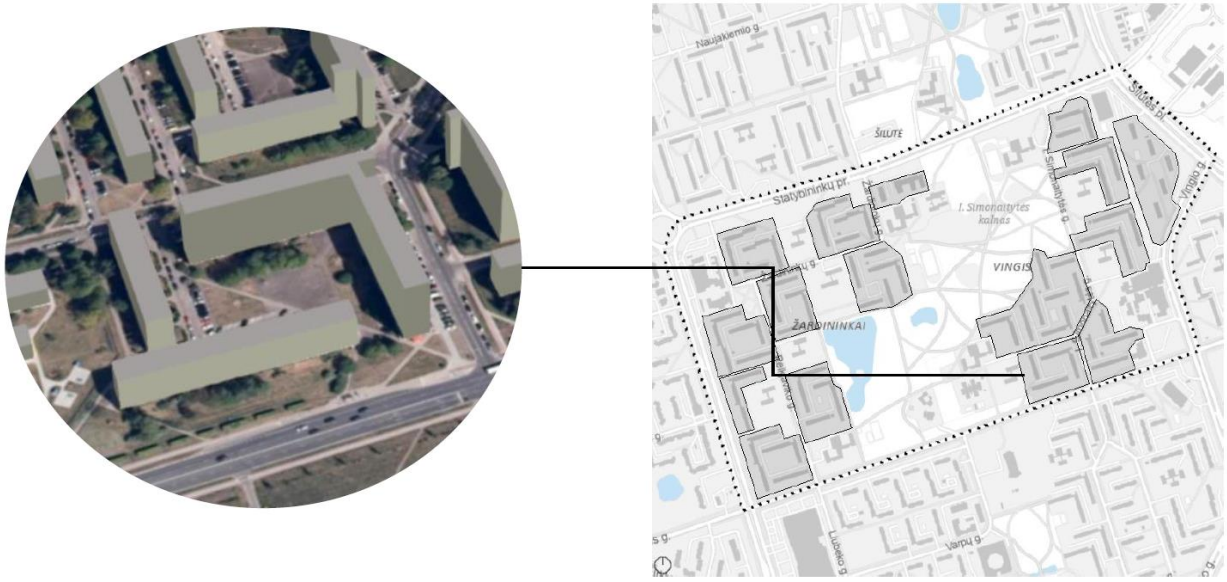

Fig. 72. Žardininkai I district quarters distribution scheme. (Compiled by the author, 2023)

Repetitive and dull looks make it easy to lose the sense of coordination and get lost in the surroundings for the newcomer. The environment is not inviting or aesthetically pleasing. One could not tell in which city or post soviet country he is. There is a lack of identity. Loads of spaces with no apparent function surround the blocks.

Public functions within the territory

Like the other modernistic neighbourhoods in Klaipėda, the Žardininkai I mainly has residential housing with schools and kinder gardens. The used-to-be community centres now provide commercial functions such as shopping centres, cafes, barber shops, pharmacies, etc. Moreover, some residential housing ground floor apartments had changed their function and established beauty parlours, pharmacies or other daily services establishments. Additionally, new shopping centres opened.

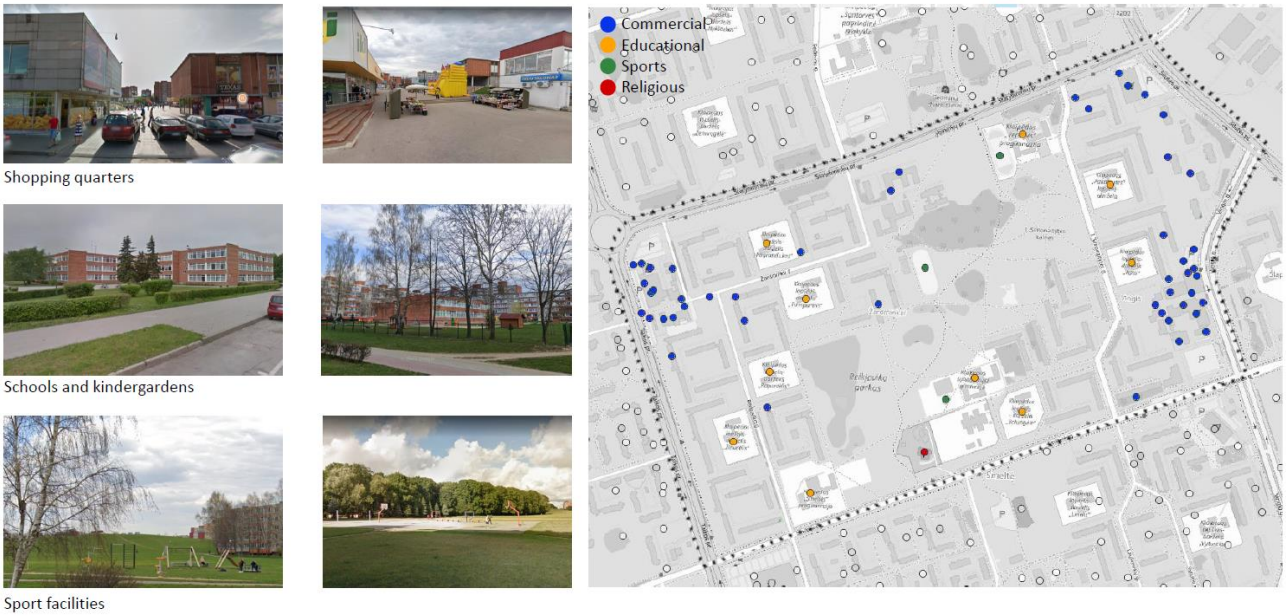

Fig. 73. Žardininkai I district public functions within the territory. (Compiled by the author, 2023)

Almost a third of the neighbourhood land is designed for public use. However, residents do not get fully enjoy the land. There is one neglected public stadium, an old basketball court and a couple of benches within the area.

Fig. 74. Žardininkai I district area types. (*Klaipėda general plan*, 2021)

Overall, neighbourhoods are in a strategically good city location; they have high public space density; the green network takes over half of the area space; good function variety and social infrastructure; high intersection density and moderate pedestrian network.

There is an opportunity to develop continuous pedestrian, green networks and public spaces infrastructure; use the recreational and functional potential of the landscape; create a unique look and identity for existing apartment blocks; regenerate public spaces in commercial quarters; and create the multisensory joyful and comfortable user experience.

The weaknesses of the neighbourhoods are neglected old and unappealing public spaces, green and pedestrian networks; lack of identity within the quarters; high crime rates; lack of recreational activities; partly developed and chaotic pedestrian and bicycle networks; and high traffic incidents.

There is a threat of increasing crime rate due to undeveloped public areas, increasing car usage and emissions, and decreasing walkability.

3.2.2. Policijos district

Currently, districts are mainly commercial and industrial, with abandoned land lots in between. However, they fall out of the city's urban fabric since mainly residential neighbourhoods surround them. Hence, the land is marked for conversion in Klaipėda general plan.

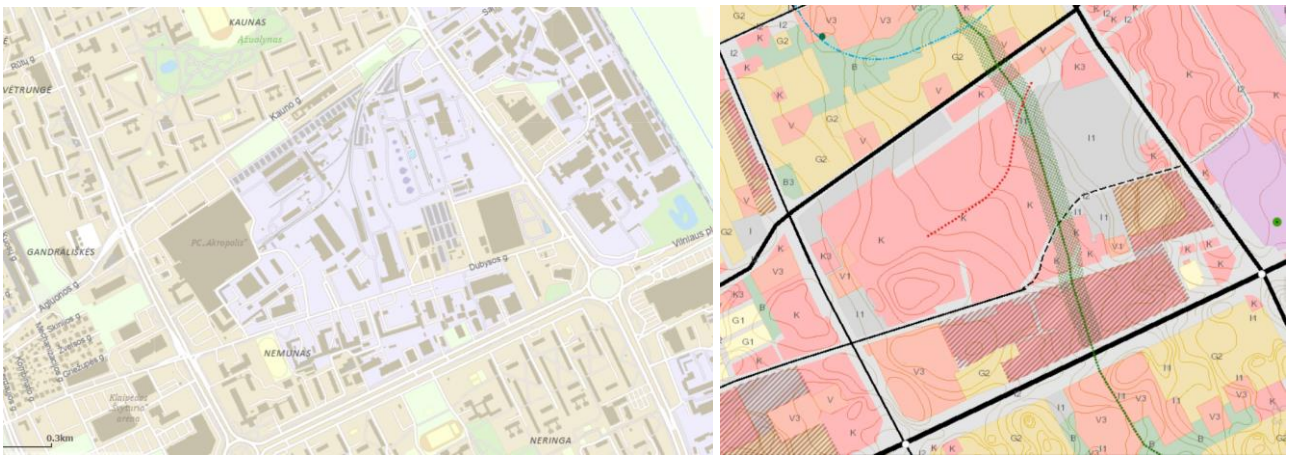

Fig. 75. Area of interest in municipality maps. (*Klaipėda general plan*, 2021)

Industrial sites in the city do not serve any direct purpose for city residents, disrupt pedestrian traffic flows and create interruption between neighbourhoods. Additionally, they are poorly maintained, partly abandoned and create aesthetic pollution. Land strategically located in such a good and important place could generate higher value for the city residents. For example, abandoned buildings could be converted or renovated; low-value function buildings such as old garages could be relocated to the city outskirts.

Policijos district surroundings

The greenery ratio is low within the districts and is maintained poorly. Additionally, there is no cohesive landscape design strategy. Greenery barely serves any purpose. Public spaces network does not exist.

Fig. 76. Policijos district surroundings. (Compiled by the author, 2023)

Current buildings functions and conditions

Most of the buildings in the area's current condition are bad. There is no clear design strategy or cohesive design within the area. Additionally, some of the good-condition buildings facades are morally outdated.

Fig. 77. Buildings condition within the Policijos and district surroundings. (Compiled by the author, 2023)

The main point of attraction is the Akropolis shopping mall. It is one of the most active attraction points in the Klaipėda. Farmers sell their produce next to the Akropolis shopping mall and the parking lot on the weekend couple. The rest of the district serves barely any functions for residents. There are a couple of car services and other small specialised commercial stores.

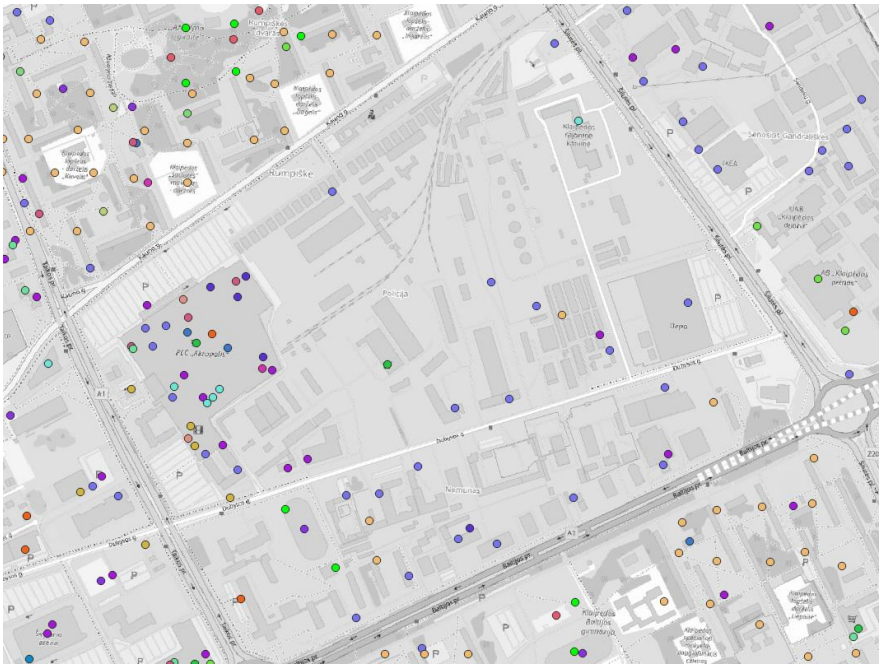

Fig. 78. Policijos district function map. (Compiled by the author, 2023)

However, the place does have a unique industrial character. Additionally, there are traces of old train rail on the site. It could be used as an advantage and help to embrace and represent places' unique character and identity.

Fig. 79. Industrial elements within Policijos district. (Compiled by the author, 2023)

Infrastructure

There is no proper pedestrian path infrastructure. All district is car-oriented. A vast, visually unappealing parking lot is next to the Akropolis shopping mall. The bicycle network is not fully established or continuous as well. The public transport access is good. However, additional bus stops could be considered in Dubysos St if further development is proposed.

Fig. 80. Unexpectedly ending bicycle path, parking lot next to the Akropolis shopping mall, unestablished pedestrian path infrastructure in Dubysos St. (Compiled by the author, 2023)

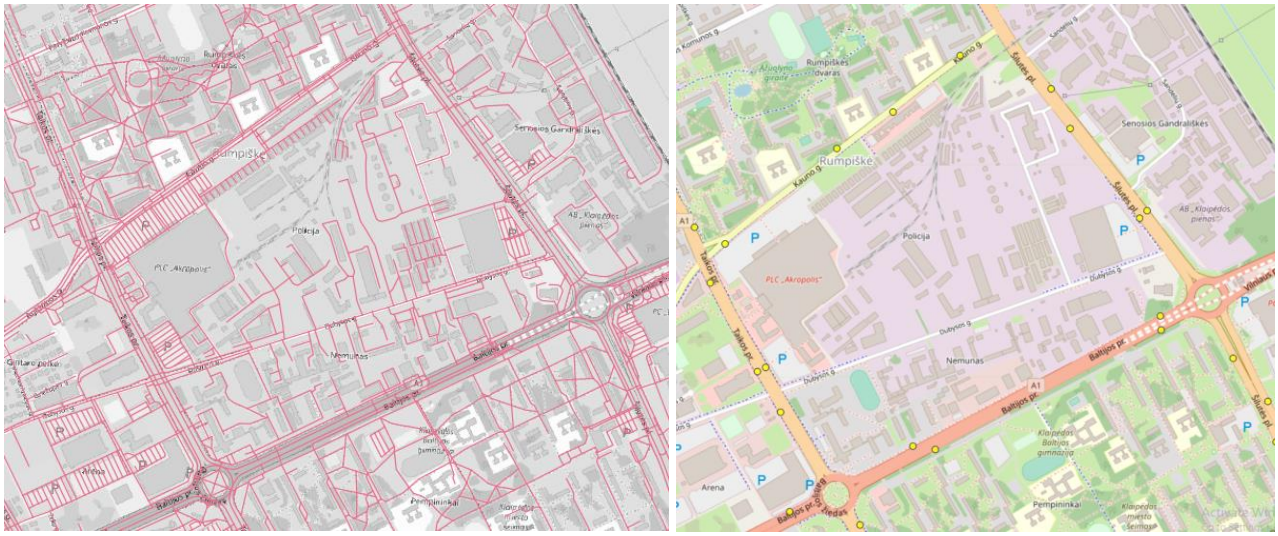

Fig. 81. Policijos district road infrastructure and public transport stop. (Compiled by the author, 2023)

Overall, the district is unique due to its industrial character. It has a strong point of attraction – the Akropolis shopping mall. However, it does not propose other functions or free activities rather than commercial ones. The public spaces network is not developed. The district does not integrate well within the current city's urban fabric and causes interruption between residential neighbourhood districts. It could serve higher functions to city residents. Infrastructure for active mobility is not developed as well.

3.2.3. Danė riverfront public spaces at the end of Gluosnių Cross Street

Currently, the site is not actively used, abandoned and has no specific functions other than pedestrian transit. Therefore, it is not integrated into the city's urban fabric.

Fig. 82. Current site situation, area of interest and proposed green link route connecting to the city centre and old town green network. (Compiled by the author, 2023)

The location has enormous potential and is strategically good. It is next to the city's old town centre and the Danė riverfront. According to the city municipality, few future developments are planned, mainly consisting of residential complexes with some commercial uses on the ground floor. Additionally, there is a proposal for a new bridge connection and Klaipėda energy site conversion.

However, there is no clear urban concept regarding riverfront public spaces in this particular area other than a brief explanation.

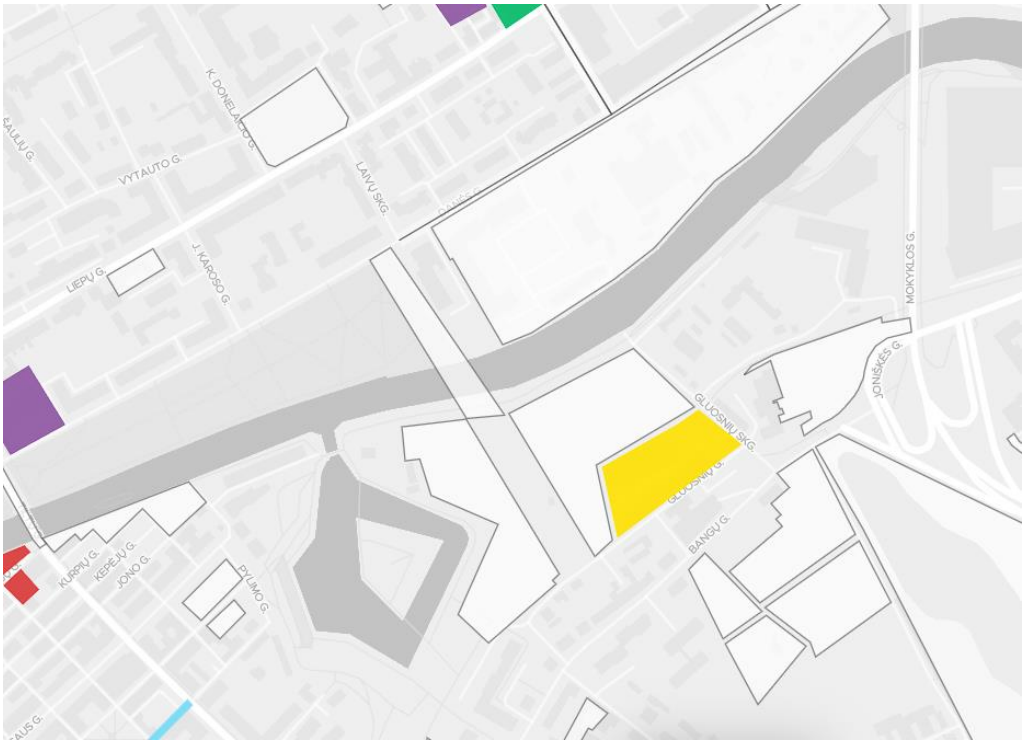

Fig. 83. Planned developments around the area of interest. (*Citify*, 2023)

Public spaces network

The analysed embankment area functions as a transit area towards the old town and becomes more active during the summer. Existing public space could be more functionally varied, with a more

coherent stylistic and visual identity. The area could be more integrated into the existing public network/system of spaces.

Fig. 84. Public spaces network. (*Bauland*, 2022)

Overall, the area does not have a clear typological hierarchy and precise functions in relation to other public spaces and surroundings.

Green spaces

Even though the green areas ratio is good, they are not designed intentionally. For example, there is no clear landscape design concept or various plants. Meadow is abandoned.

Fig. 85. Current landscape situation in the area of interest. (*Google maps*, 2021)

Regardless of the public or green spaces ratio, the area and its surroundings could be more visually and functionally varied. There is a potential for urban variety and multisensory experiences. In addition, the landscape and small architecture elements could be updated.

Infrastructure

Currently, the area is not integrated too well within the city infrastructure. For example, the bicycle paths are not continuous. However, higher pedestrian flows might be expected, considering the future developments and the active Jonas Hill zone. The waterfront location would work well for better pedestrian path integration.

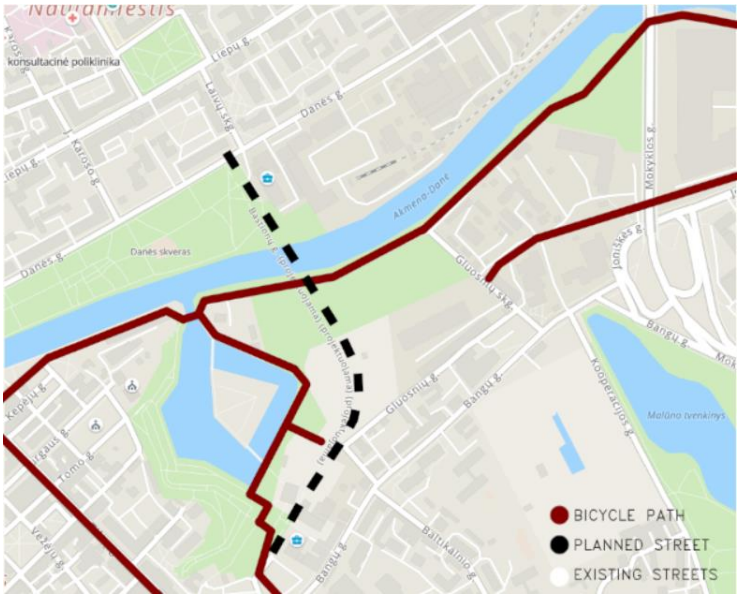

Fig. 86. Active mobility infrastructure. (Compiled by the author, 2023)

Public transport stops are distributed sufficiently. Regarding water transport infrastructure, Danė water transport traffic flow includes various vessels (cruise, ferry, water carriers, etc.). However, these flows are not organised effectively. For example, the quay is unsuitable for smaller ships even though they mainly use it. More convenient access could be provided. Furthermore, the need for additional connections across the Danė River is identified in various analyses. As a result, in the general plan, Klaipėda city municipality is suggesting a new bridge and street connection.

Fig. 87. Public transport infrastructure. (Compiled by the author, 2023)

Overall, creating pedestrian-friendly spaces and convenient access to water vehicles would be beneficial. River waterfront has a good potential for recreational purposes (piers, water transport stops, and landings to the water). Additionally, there is a need for place character and identity to be created. Various functions rather than just transit and different public spaces would be appreciated. There is no aesthetic cohesion within the area. Landscape and small architecture elements should help to show the place's character and identity; enhance functionality which would meet different users' needs.

Generalisation

SWOT analysis was conducted to identify and analyse locations' strengths, weaknesses, opportunities and threats. As well as increase awareness of the factors that go into establishing an urban design strategy.

Table 2. SWOT Analysis.

SWOT ANALYSIS			
STRENGTHS	OPPORTUNITIES	WEAKNESSES	THREATS
High public spaces density	To develop continiuos pedestrian, green network and public spaces infrastructure	Public spaces, green and pedestrian network are neglected, old and unappealing	Increasing crime rate due to undeveloped public areas
Green network takes more then half of an area space	To use recreational and functional potential of green spaces and waterfront	Lack of identity within quarters	Increasing traffic accidents rate
Area is in strategically good city location	To create unique looks for public spaces and surrounding area	High crime and traffic accidents rates	Decreasing walkability
High intersection density	To regenerate existing quarters and propose new functions	Lack of recreational activities	Increasing car usage and amount of emissions
Moderate pedestrian network	To create multisensory, joyful and comfortable user experience	Partly developed and chaotic pedestrian and bicycle network	
Waterfront	To promote diversity and inclusivity for all users	High rate of traffic incidents	
		Abandoned industrial areas	

It helped to crystalise and establish the primary urban design issues and possibilities within the areas. Finally, it became evident that areas require different approaches and urban strategies and could be divided into three segments:

1. Klaipėda south modernistic neighbourhoods green network establishment and regeneration;
2. Policijos district industrial sites conversion;
3. Danė riverfront public spaces at the end of Gluosnių Cross Street generation.

3.3. Experimental project urban strategy

The design strategy was developed based on previous theoretical and empirical research and urban analysis. Mainly, it arose from New Urbanism ideas promoting city creation where residents can access all their daily needs within walking distance from their homes. Movement promotes a sustainable and inclusive urban lifestyle with reduced car reliance, short commute times, and a sense of community and belonging. It emphasises the importance of creating walkable neighbourhoods with safe and attractive streetscapes, efficient public transit, and diverse amenities and services. Additionally, the concept advocates for more localised and people-centric urban design, resulting in more livable, sustainable, and inclusive cities.

With that in mind, after the Klaipėda city analysis, it became clear that these urban design aspects require additional attention and improving them would enhance Klaipėda city walkability:

Connectivity

Klaipėda city's urban mobility network system is moderate, focusing more on car movement. Establishing a continuous pedestrian-oriented network of streets and pathways that enable easy movement and connectivity for all residents would increase their will to change their mobility habits, reduce reliance on private cars, and mitigate traffic congestion and air pollution. Another benefit of active travel is that it is accessible and inclusive, creates opportunities for social interactions, economic activities, and cultural exchange, and enhances a city's livability and vibrancy.

Regeneration

Underutilised or abandoned industrial areas revitalisation and repurposing. Industrial sites such as in Policijos district do not serve any direct purpose for city residents, disrupt pedestrian traffic flows, create interruption between neighbourhoods and generally fall out of the city's urban fabric. Transforming them into sustainable, economically viable, and socially inclusive spaces that contribute to the city's and its residents' overall well-being, implementing adaptive reuse of existing buildings, and creating mixed-use spaces promote economic development, job creation, and community engagement. Additionally, it reduces the need for long commutes in order to reach different interests.

Generation and establishment

Generating new spaces in modernistic neighbourhoods or abandoned green areas within the city and introducing diverse activities to meet the residents evolving needs. By incorporating elements such as sports facilities, playgrounds, community gardens, art installations, and performance spaces, these spaces can become vibrant community hubs catering to various people's interests and preferences. Covering different needs, from relaxation and solitude to active recreation and community events, these spaces can serve as inclusive and dynamic places that foster a sense of community and contribute to the overall well-being and vitality of the city.

Identity

Consider city identity as a critical design aspect, reflecting a place's unique characteristics, culture, and history, resonating with the local community, and creating a sense of place, pride, belonging, and attachment among neighbourhood residents. Preserving and embracing the identity of a city to create places that are not only physically functional but also emotionally meaningful to the people who live, work, and visit there.

Inclusiveness

Recognising the diversity of people living in the city and aiming to create spaces that are accessible, equitable, and inclusive for all. Especially since the Klaipėda population is ageing, prioritise the needs of vulnerable and marginalised population groups. Design sidewalks, buildings, transportation systems, and barrier-free public spaces that accommodate people of all abilities. Promote inclusive

public facilities and civic participation, foster social cohesion, and ensure that all residents have equal access to opportunities, amenities, and services.

Sustainability

Ensure that Klaipėda city is developed to meet the needs of the present without compromising the ability of future generations to meet their needs (*International Institute for Sustainable Development*, 2018). Use and enhance Klaipėda city greenery potential to enhance biodiversity, promote climate regulation, and improve air quality. Aim to create an urban environment that is in harmony with nature with the help of existing green network system and the latest eco-design solutions.

3.4. Experimental project urban concept

After city analysis, potential has been found in its green network. Even though it is not cohesive, it has a good premise for establishment. Additionally, it connects all Klaipėdaa south modernistic neighbourhoods. Green link could work as a continuous, obstacle and car-free, uninterrupted pedestrian-friendly path throughout the city with an established green and public spaces network as a better alternative to car-oriented Taikos Avenue. Aside from providing basic needs such as safety and continuity, it could propose new *places*, aims and interests for different users, hence, more reasons to walk.

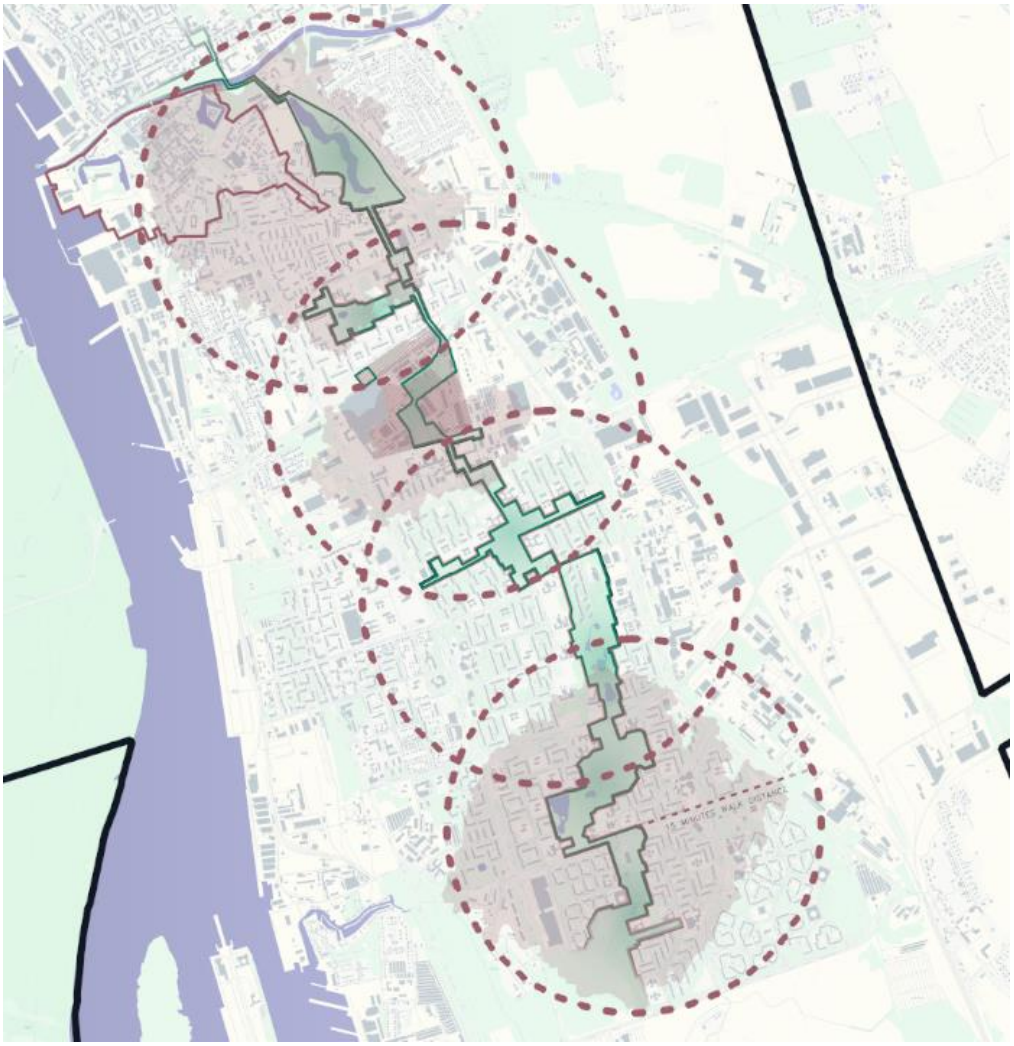

Fig. 88. Klaipėda green link concept. (Compiled by the author, 2023)

Jan Gehl's ideas about enhancing walkability and joyful user experience also influenced design decisions and were kept in mind while developing the experimental project urban concept.

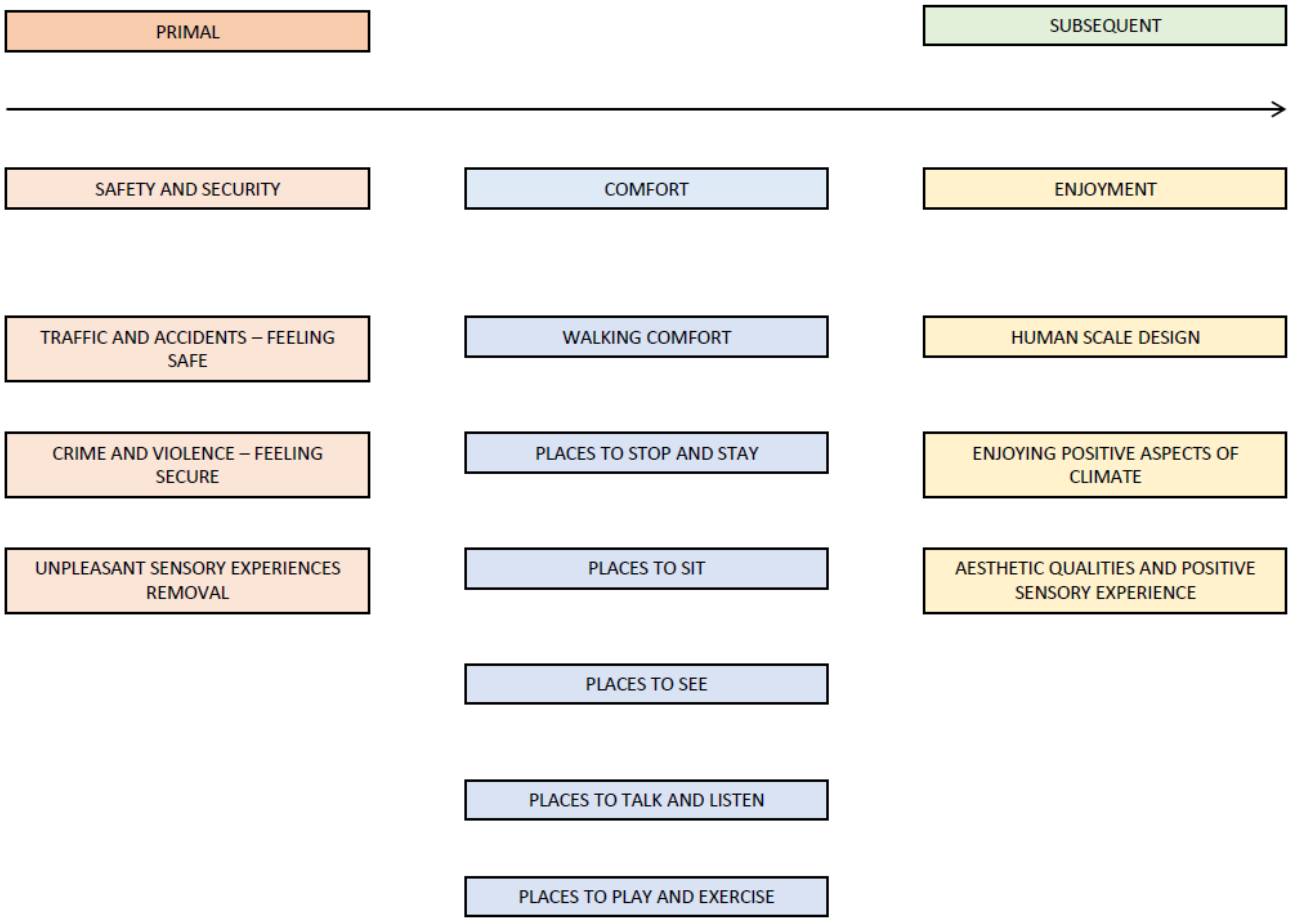

Fig. 89. Key aspects for urban design quality based by Jan Gehl. (Compiled by the author, 2023)

Gehl's urban design principles could be grouped by distinguishing people's needs into primal and subsequent. Additionally, it can be divided into a three-level structure. Firstly, emphasis is put on covering basic human needs, such as safety and security (reducing crime and traffic rates and removing unpleasant sensory experiences). Then, the goal is to achieve comfort in spaces by creating walking comfort and places to stop and stay, sit, see, talk and listen, play and exercise. Finally, enjoyment is considered by implementing human scale design, enjoying positive aspects of climate and creating good aesthetic qualities and a positive sensory experience. These urban design qualities are crucial for creating places for people to live comfortably and enjoy.

While developing a walkable city conceptual model, these and other crucial interconnected urban city system elements were revealed and divided by their tangibility:

a) Population density – it directly affects economic productivity, social interaction, and improved access to services and amenities.
b) Land-use diversity – different functions within the area reduce reliance on motor transport in order to reach points of interest and creates a sense of place with sustainable and livable communities that are well-connected, efficient, and economically vibrant.
c) Land-use density – compact cities are more walkable and reduce car reliance. Additionally, developments that consume less land and reduce carbon print are more sustainable.

d) Connectivity – fast and easy movement, navigation and access in the city.
e) Safety – prevention of harm to people. Designing urban infrastructure where people can move safely and securely.
f) Sense of security – feeling safe, comfortable and protected in the surrounding environment. The most important urban design factors that can influence it are the presence of other people, good visibility of surroundings and the accessibility of transportation.
g) Multisensory user experience – acknowledging other people's senses rather than just visuals while designing. Spaces are experienced through sounds, smells, textures and tastes as well. These experiences create memories which are associated with the places. Therefore, designing with that in mind could enhance user experiences and interactions.

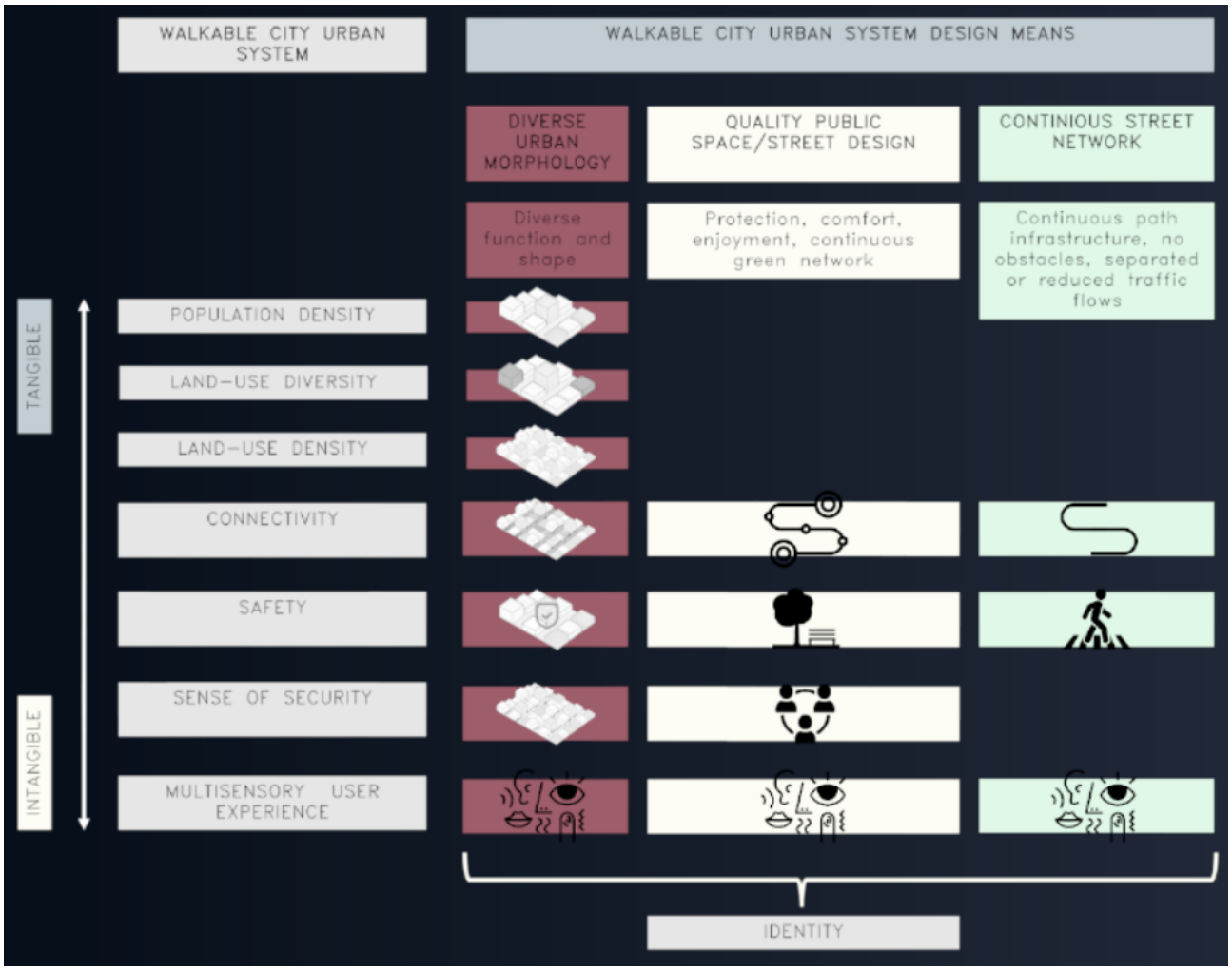

Fig. 90. Walkable city conceptual model. (Compiled by the author, 2023)

These walkable urban city system elements can be translated into three categories of urban design: firstly, diverse urban morphology establishment. A built environment provides its users with a vast range of services, functions and experiences; it is easy to access and safe. Secondly, public spaces network establishment. Providing high-quality design public and green spaces that are well connected and integrated into the urban fabric. Lastly – continuous street network. Creating clear, continuous, pedestrian-friendly paths that integrate well within the city's urban transit system.

Moreover, the empirical research conceptual model was enhanced by emphasising the importance of identity, unique character and a sense of belonging and pride. Developing spaces that are not only

functional but are *places* where people want to be, live, work and visit and have an emotional connection with.

3.4.1. South Klaipėda modernistic neighbourhoods green network establishment and regeneration

Using and regenerating existing greenery potential within the modernistic green spaces is part of the experimental project urban design strategy. Throughout the neighbourhoods, there are already five parks equally distributed. However, most of them are not cohesive and underdeveloped empty green areas. The socio-type analysis provided insight into what neighbourhoods currently have and what could be enhanced. The proposal is to introduce new activities while creating diverse community spaces and covering different people's needs. A new park is also being proposed in the Policijos district to make a continuous green spaces network. It is proposed to design while considering the general appeal and the uniqueness between different neighbourhoods based on existing natural features and landscape and current resident activities to encourage migration among all city residents, increasing inclusivity, walkability and accessibility for all.

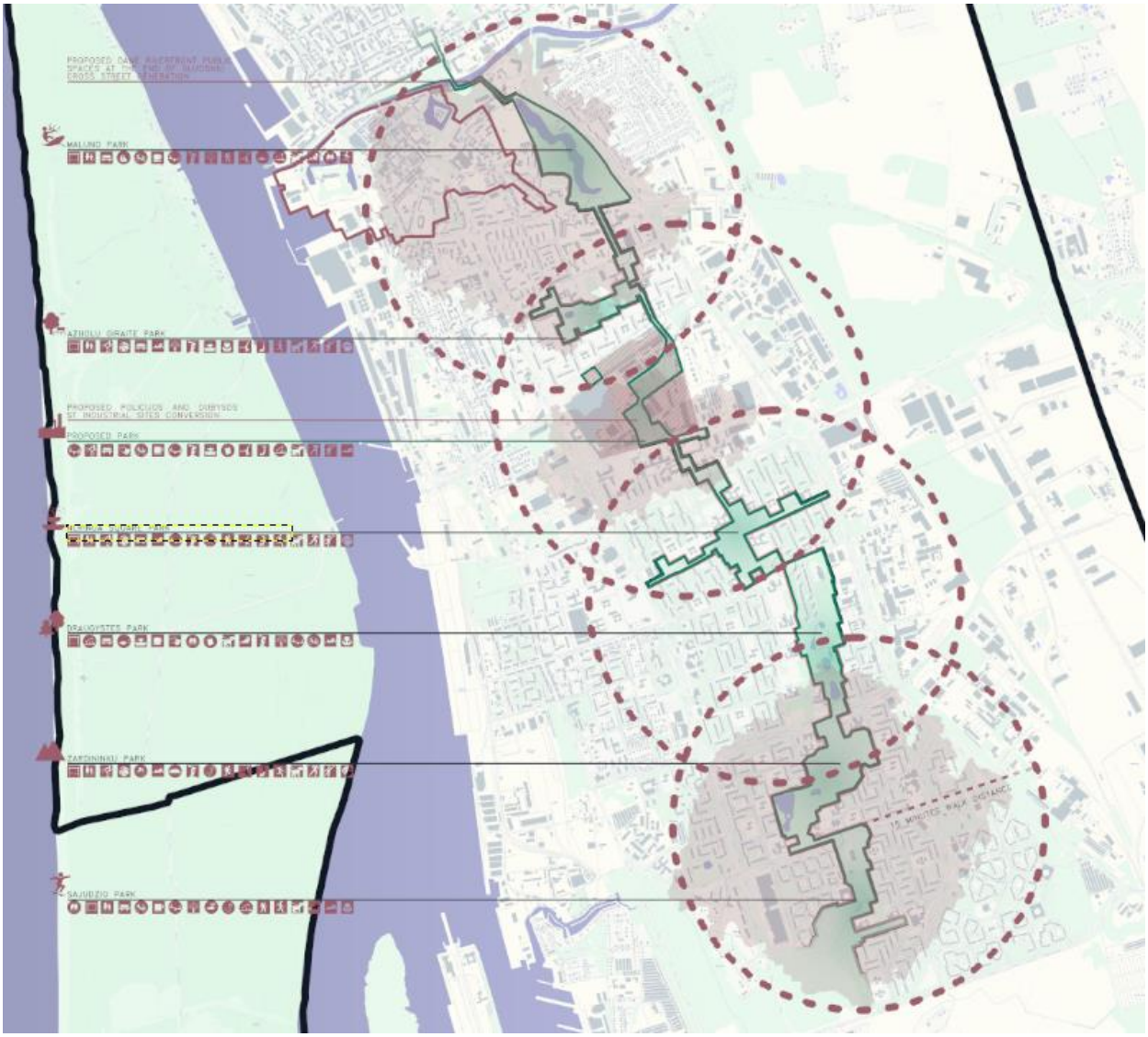

Fig. 91. Neighbourhoods green network establishment and regeneration concept. (Compiled by the author, 2023)

Urban design intervention areas were divided into three segments.

Places

In order to provide a sense of belonging, community and identity, it requires thinking not only about basic needs or functions. So current places' character is being analysed to see what could be emphasised and used as a particular space feature/advantage. So dull/empty spaces would be transformed into meaningful places that enhance the quality of life for people who use them and make them feel proud, connected to and invested in the place.

Additionally, urban design means are proposed, such as incorporating nature, art and cultural elements, providing diverse seating options, and creating a sense of enclosure to help achieve attractive, engaging and memorable spaces.

Ideally, for such places design, approaches like placemaking, temporary urbanism and bottom-up urbanism should be used.

Edges

After analysis, three types of edges were found: spaces between apartment blocks, educational buildings, commercial units and public realm spaces. They lacked definition and meaning, creating a dull and empty landscape. Therefore different solutions were introduced to create a joyful, multisensory experience for the user. Removing modernistic emptiness and dullness by suggesting new activities and simple facade solutions or different ground floor spaces realm (for example, introducing ground floor terraces or creating semi-private/public spaces) in order to revive residents' surroundings and introduce more livability and vibrancy to the place.

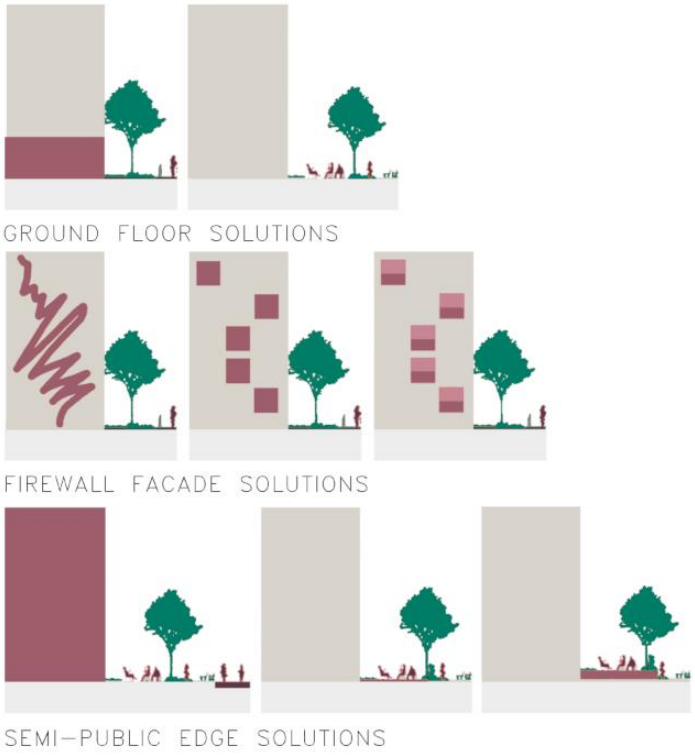

Fig. 92. Neighbourhoods green network establishment and regeneration concept edge solutions. (Compiled by the author, 2023)

Paths

The proposed green network needs to be connected into continuous pedestrian paths and bicycle lanes system with designated rest areas for vulnerable groups of people. Additionally, existing wide and empty streets with their current streets scapes should be redeveloped, providing comfort for pedestrians with the separated bike, pedestrian, and car flows, greenery, human scale design, small architecture elements for comfort, and other relevant universal design means should be introduced to enhance current street profile and usage.

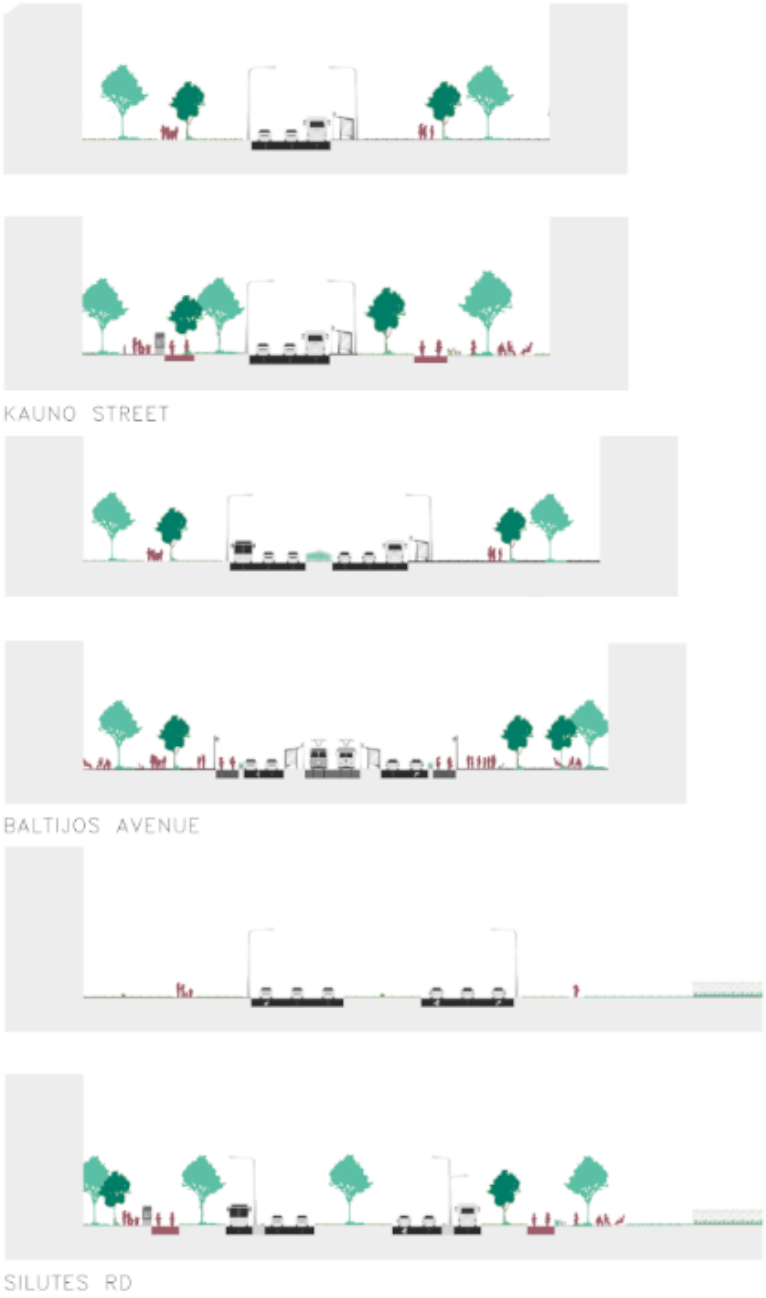

Fig. 93. Neighbourhoods network establishment and regeneration concept street profile solutions. (Compiled by the author, 2023)

Overall, enhancing and connecting these three elements in a cohesive system could create an urban network system that enhances residents' quality of life.

3.4.2. Policijos district industrial sites conversion

Generating a new vibrant quarter and embracing its' unique identity (industrial past) while connecting it to the rest of the existing city fabric would benefit Klaipėda city as a whole. In the middle of linear city residential neighbourhoods, this partly abandoned area could provide new services and activities for the locals and become a lively place to be.

Fig. 94. Policijos district industrial sites conversion before and after visualisation. (Compiled by the author, 2023)

Buildings

After analysis of the existing buildings within the site, a sustainable approach is taken by not completely demolishing but converting and reusing salvageable buildings within the site and embracing their industrial character. New building construction is also proposed to create a cohesive

quarter, establish vertical dominants and increase land-use density and diversity. Finally, renovation is proposed for some of the existing morally old buildings in order to reduce visual pollution and establish a cohesive look.

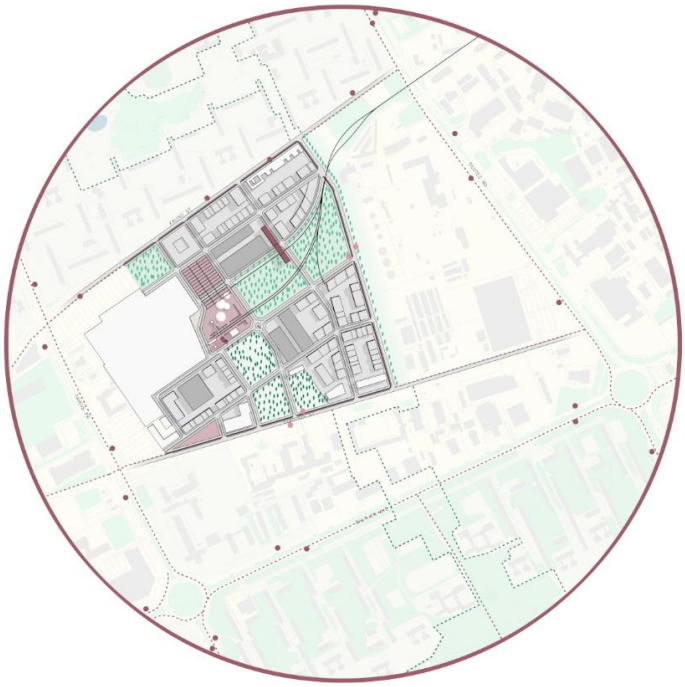

Fig. 95. Policijos district industrial sites conversion masterplan. (Compiled by the author, 2023)

Functions

Diverse functions are being proposed for the quarter's development. Emphasis is given to a new cultural and social activities programme as a counterweight to only commercial ones proposed by the Akropolis shopping mall within site, making the quarter more inclusive. Functions such as cafes, gyms, and small shops are being proposed on the ground floor of residential and office buildings. Aside from offices and lofts, a community centre, recreation and leisure centre, library, art gallery, museum, artist colony, market place and nightclub are also being introduced, making the quarter a new point of attraction to the different groups of people and creating a new community hub in the strategically good city location.

Fig. 96. Policijos district industrial sites conversion function scheme. (Compiled by the author, 2023)

Public spaces

Establishing continuous and comfortable public and green spaces network with small pocket stops where people can rest, play, interact comfortably and enjoy different experiences. The new plaza within the quarter is a new space for events, hanging out, socialising and another reason for people to come.

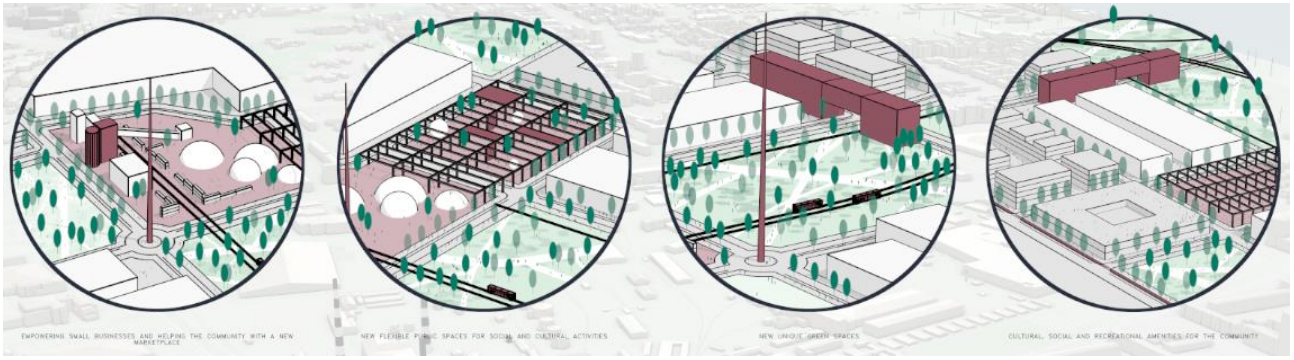

Fig. 97. Policijos district industrial sites public spaces. (Compiled by the author, 2023)

Paths

Human-scale streets are being established mainly for pedestrians and cyclists, emphasising their comfort and needs. Connectivity, intersection density and navigation are enhanced by making new building blocks well thought out and adequate size. New bus stops are being introduced for better accessibility. In addition, existing streets are being humanised with greenery and small architecture elements. Most of the streets could be pedestrian-only during the weekends.

Fig. 98. Policijos district industrial sites conversion before and after visualisation. (Compiled by the author, 2023)

Greenery

Green connection is being established throughout the quarter, joining surrounding neighbourhoods' green systems. Existing green spaces are being established, and new ones are being introduced to cover the potential needs of the new site users and to create a pleasant environment. Since currently, the sites' greenery ratio is low, tree alleys and diverse types of greenery are being introduced to establish biodiversity. Part of the site is given back to nature with minimum design interventions. Additionally, opportunities for passive, active recreation and exploring are being introduced.

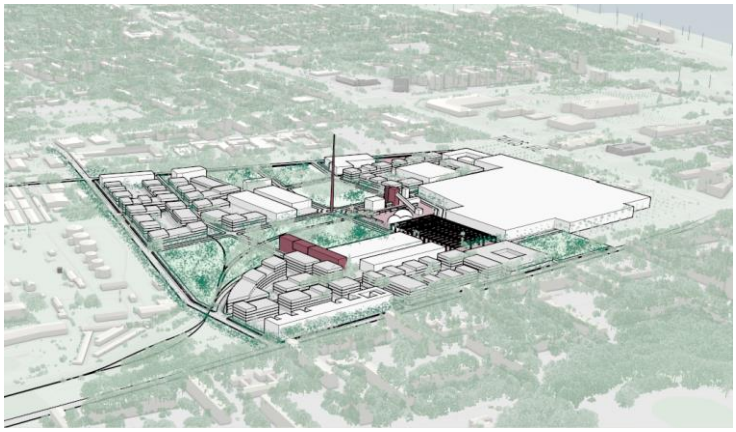

Fig. 99. Policijos district industrial sites conversion green spaces. (Compiled by the author, 2023)

Identity

The quarter has a unique character and identity for its industrial past and present functions. It is suggested to convert and move away from remaining industrial services. However, to keep and embrace unique industrial motives as a reminder of the site's original history.

Fig. 100. Policijos district industrial sites conversion before and after visualisation. (Compiled by the author, 2023)

Additionally, it is proposed to use an existing railway as a unique architectural and urban feature that dictates the layout around it. Modular wagons could be introduced, providing different activities (small gardens, art installations, play and rest areas) for local users who can change and move it according to their needs.

Fig. 101. Policijos district industrial sites conversion before and after visualisation. (Compiled by the author, 2023)

Overall, Policijos district has great potential to become an additional city's centre of attraction and reduce the time and amount of trips made by the locals for the needs that could not be covered before within the surrounding area.

3.4.3. Danė riverfront public spaces at the end of Gluosnių Cross Street generation

Establishing Danė riverfront public spaces at the end of Gluosnių Cross Street is the final step for a seamless and cohesive green link throughout the city.

The location is special. Residents can enjoy the historic city panorama while walking down the Danė riverfront. Upcoming developments promise more activities to residents rather than just residential. The increased population within an area will demand well thought public spaces that would cover different people group needs.

Paths

The whole city fabric is considered while developing an urban transit strategy. Continuous pedestrian and bicycle paths are being established within an area to connect cohesively with the rest of the city. Additionally, instead of a projected bridge, a suggestion is made to make it a pedestrian-only bridge connection to the other side of the Danė. Green connection is being established all the way down from Trinyčių parkas through the Gluosnių Cross street down the riverfront. Traffic flows are separated to make cyclists, pedestrians, and other path users feel safe and secure. Additionally, pedestrian traffic is divided into fast transit movement, slow wandering, relaxation and riverfront enjoyment.

Fig. 102. Danė riverfront public spaces at the end of Gluosnių Cross Street generation concept section. (Compiled by the author, 2023)

Spaces

Different types of spaces are being introduced. For example, it could be divided into active leisure, relaxation and exploration zones. People can enjoy river flow on proposed landings, grass, or designated different types of seating areas. They can seek shade under the tree alleys or refresh themselves with ice cream from commercial grounds units or food trucks. Going towards the west, citizens or tourists can explore unique landscape elements, sculptures, fountains or temporary art exhibitions. There are zones designed for kids' playgrounds or exercise. Spaces division repeats the proposed development pattern in order to merge cohesively within the area.

Fig. 103. Danė riverfront public spaces at the end of Gluosnių Cross Street generation plan. (Compiled by the author, 2023)

Greenery

The proposed design incorporates existing trees and proposes additional tree alleys. Additionally, various bushes, flowers, and meadows are being proposed to increase the biodiversity and aesthetical qualities of the place. Moreover, green spaces are being used to help separate traffic flows.

Small architecture and materials

Materials are chosen that resemble the current city identity and, as well, merge with the planned development. Materials such as wood, metal, granite and stone are being chosen. In addition, all relevant necessities, such as trash bins, lighting, and seating, are being introduced. A place for art sculptures or temporary exhibitions is established as well.

Fig. 104. Proposed materials for Danė riverfront public spaces at the end of Gluosnių Cross Street. (Compiled by the author, 2023)

Overall, these design implementations could revive the currently abandoned site and Danė riverfront, improve future residents' lives and create new places for people to be and walk to.

3.5. Evaluation of experimental project results

The conceptual model was justified and allowed to tackle multilayered city fabric issues regarding walkability by implementing different type and scale solutions.

Different scale solutions can be distinguished in urban design interventions: starting from safe, accessible and continuous urban transit systems and diverse and dense land use. On a smaller scale, urban design means such as incorporating nature, small architecture elements, and a choice of materials creates the whole. Less tangible factors must also be established, such as a sense of security and multisensory user experience.

People's needs could be divided as well into primal and subsequent. Therefore, firstly, safety and security must be established, then comfort and finally, people can fulfil subsequent needs such as enjoyment.

An additional, important factor was found to supplement the conceptual model, such as a place's identity, uniqueness and character, meaning that the exact solutions cannot be automatically repeated throughout the city. Dull and repetitive layout arrangements are one of the reasons why modernistic neighbourhoods are unattractive. Therefore it is essential that these spaces would be transformed into

meaningful places that enhance the quality of life for people who use them and make them feel proud, connected to and invested in the place.

However, ideally, for such places as neighbourhoods design, approaches like placemaking, temporary urbanism and bottom-up urbanism should be used, requiring community involvement, more extensive data collection and time.

Overall, multiple factors must be considered while enhancing city walkability. They can be divided by needs: primal and subsequent; subjects: tangible and intangible and by scale: small and large.

Conclusions

1. Theoretical research revealed that although the walkability research field is vast, some gaps remain (directing research to practitioners' specific needs, considering more elements affecting walkability). For example, Lithuania's master plans, especially sustainable mobility plans, lack structure and general objective evaluation criteria. There is an overuse of vague, general terms. The partial analysis is done on specific criteria, but there is still a gap for more general evaluation and measurement, including multiple factors altogether. Even though walkability is part of a complex urban system, there could be more depth in the analysis and criteria for Lithuania's walkability and pedestrian policies.
2. After analysis, key quantitative and objective parameters for a walkable city hypothetical model were established (connectivity – efficient mobility around the city; density – denser land use reduces travel distance and time; diversity – different services and attractions nearby reduce the need for vehicle travel; green network – the natural environment positively impacts people mobility patterns; quality streets and public spaces design – quality and intentional design positively impact users' transit flows; accessibility – an environment has to be designed to be comfortably used by all groups of society; safety – a relevant design measures reduce traffic accidents and crime risks, hence increase walkability).
3. Empirical research revealed that population density correlates with compactness. Pedestrian Environment Index is the highest in the Klaipėda city centre. As well as, smaller centres are emerging in the city's south Klaipėda modernistic neighbourhoods, however, mainly in the commercial form. More diverse functions could be introduced. Neighbourhoods with low population density lack centres of attraction; for example, citizens living in private housing estates face connectivity issues. Additionally, traffic safety in Klaipėda is not enhancing. Various urban design measures should be implemented to reduce the number of accidents in unsafe places in the city street network.
Moreover, sociological survey analysis revealed the main reasons that would increase Klaipėda city walkability (well-lit areas, better distribution and proximity of points of attractions, a street network providing secure pedestrian traffic, a continuous pedestrian path network and a better criminogenic situation.)
4. Hypothetical model was justified and improved into a better-defined conceptual model. A walkable city urban system was established, consisting of tangible and intangible elements (population density, land-use density and diversity, connectivity, safety, sense of security, and multisensory user experience), and it showed how these elements interconnect within the city through diverse urban morphology, quality public space/street design and continuous street network. Additionally, users' needs were divided into primal and subsequent. Therefore, firstly, safety and security must be established, then comfort and finally, subsequent needs such as enjoyment should be fulfilled.
5. The conceptual model was justified throughout the experimental design project and allowed to tackle multilayered city fabric issues regarding walkability by implementing different type and scale solutions. On a bigger scale, urban design solutions such as safe, accessible and continuous urban transit systems and diverse and dense land use can be distinguished. On a smaller scale, urban design means such as incorporating nature, small architecture elements, and a choice of materials creates the whole. Less tangible factors must also be established, such as a sense of security and multisensory user experience.
Moreover, an additional, important factor was found to supplement the conceptual model, such as a place's identity, uniqueness and character, meaning that the same approaches cannot be automatically repeated throughout the city. Dull and repetitive urban design solutions are one of the reasons why

many city spaces are unattractive. Therefore it is essential that these spaces would be transformed into meaningful and vibrant places that enhance the quality of life for people who use them and make them feel proud, connected to and invested in the place.

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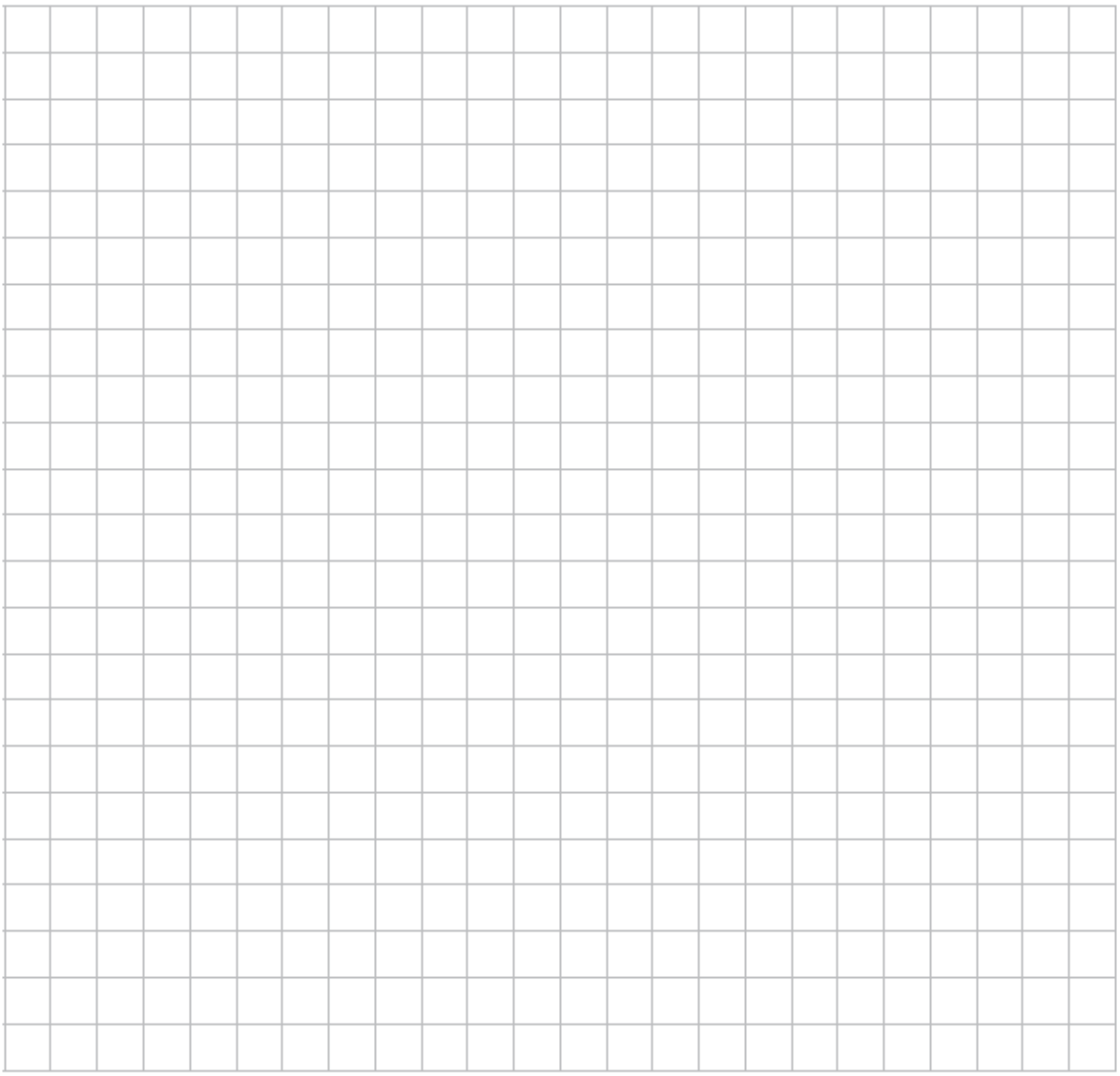
Appendix 1. AARP Walk Audit Worksheets

AARP

AARP Walk Audit Tool Kit Worksheet

Make a Map

- Use a mapping website to capture and print a bird's-eye-view image of the walk audit area or draw a simple map of the location in the space below.
- Label the streets and make note of any key features, such as stores, schools and (if they exist) sidewalks.
- Take photographs and/or video of the area so others can see the challenges and strengths of the audit location. Match and mark the images on the map.
- Indicate any other problem spots or areas of opportunity (e.g., a bus stop with no seating or shelter).



Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Who's Using the Street — and Why?

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

Use hash marks (𝍸) for counting the number of people observed. (Yes, some will likely be counted more than once.)
Use your best guess to determine each person's age range and reason for walking.

WHO'S WALKING?	NUMBER OF PEOPLE
Young children (e.g. elementary school students)	
Teens	
Adults	
Older Adults	
HOW:	
While pushing a baby stroller and/or walking with a child or children	
While using a mobility aid (i.e., a wheelchair, cane, walker)	
While riding a bicycle, scooter, skateboard or other mobility device	
POSSIBLE REASONS:	
Traveling to/from school	
Waiting for and/or heading to public transit	
Commuting to/from work	
Shopping and/or getting something to eat	
Walking/running for fitness	
Walking a dog	
Walking to a park or outdoor public space	
Just out for a walk	
Other/unknown	

ALSO, WHO'S NOT WALKING? Do the observed pedestrians represent the demographic composition of the neighborhood? If not, which segments of the population appear to be missing? Why might that be the case? (Use a notebook or the back of this worksheet to record these answers and observations.)

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Sidewalks, Streets and Crossings

SINGLE-LOCATION AUDIT

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

Posted speed limit(s): _____ **Do the motorists appear to be obeying the speed limit(s)?** _____

Total number of vehicle lanes: _____ **The street is:** ☐ one-way | ☐ two-way

If more than one lane: Does the roadway have ☐ a median and/or ☐ a pedestrian island?

The street has:
☐ no sidewalk ☐ no sidewalk but needs one ☐ no sidewalk but needs two
☐ partial sidewalks ☐ a sidewalk on one side of the street ☐ sidewalks on both sides of the street

YES | NO | OTHER Skip any statements that don't apply

THE SIDEWALK:

☐ ☐ ☐ 1. Is separated from the street by a barrier or buffer (a curb, grass, landscaping)
☐ ☐ ☐ 2. Is surfaced with a material that is smooth and consistent (e.g., or asphalt rather than bricks)
☐ ☐ ☐ 3. Is in good condition, without cracks or raised sections
☐ ☐ ☐ 4. Is free of obstacles (hydrants, utility poles, overgrown landscaping, trash receptacles)
☐ ☐ ☐ 5. Is free of interruptions from driveways (such as to/from homes, parking lots, etc.)
☐ ☐ ☐ 6. Is continuous (no segments are missing) and complete (it doesn't randomly end)
☐ ☐ ☐ 7. Is wide enough (at least 5 feet) for two people to walk side by side or pass one another
☐ ☐ ☐ 8. Has tactile ground surface indicators so pedestrians with vision impairment will know when the path is ending
☐ ☐ ☐ 9. Has a curb cut ramp (for use by wheelchairs, baby strollers, etc.) wherever it is interrupted by a street

THE STREET:

☐ ☐ ☐ 1. Has traffic lights and/or stop signs at intersections and crossings
☐ ☐ ☐ 2. The traffic lights and/or stop signs are clearly visible to drivers and pedestrians
☐ ☐ ☐ 3. Has crosswalks
☐ ☐ ☐ 4. The crosswalks are well marked and clearly visible to drivers and pedestrians
☐ ☐ ☐ 5. Has signage alerting drivers to the presence of pedestrians
☐ ☐ ☐ 6. Has a designated bicycle lane
☐ ☐ ☐ 7. Has a pedestrian crossing signal, also called a beacon (if yes, complete the next section)

THE PEDESTRIAN CROSSING SIGNALS:

☐ ☐ ☐ 1. Are working
☐ ☐ ☐ 2. Have a "push-to-walk" mechanism, meaning pedestrians can stop vehicle traffic
☐ ☐ ☐ 3. Have audible prompts for people with vision impairment
☐ ☐ ☐ 4. Are placed in appropriate locations (if not, make note of where more are needed)
☐ ☐ ☐ 5. Provide enough time to cross (indicate the amount of time: _____ minutes _____ seconds)
☐ ☐ ☐ 6. Provide suitable opportunities to cross (indicate the amount of time pedestrians must wait for a traffic light change in order to cross: _____ minutes _____ seconds)

Consider using the "Build a Better Block" worksheet as well.

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Sidewalks, Streets and Crossings WALKING AUDIT

Community Name: _____

Starting location: _____ **Ending location:** _____

Route: _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

Posted speed limit(s): _____ **Do the motorists appear to be obeying the speed limit(s)?** _____

Total number of vehicle lanes: _____ **The street is:** ☐ one-way | ☐ two-way

If more than one lane: Does the roadway have ☐ a median and/or ☐ a pedestrian island?

The street has:
☐ no sidewalk ☐ no sidewalk but needs one ☐ no sidewalk but needs two
☐ partial sidewalks ☐ a sidewalk on one side of the street ☐ sidewalks on both sides of the street

YES | NO | OTHER Skip any statements that don't apply

THE SIDEWALK:

☐ ☐ ☐ 1. Is separated from the street by a barrier or buffer (a curb, grass, landscaping)
☐ ☐ ☐ 2. Is surfaced with a material that is smooth and consistent (e.g., concrete or asphalt rather than bricks)
☐ ☐ ☐ 3. Is in good condition, without cracks or raised sections
☐ ☐ ☐ 4. Is free of obstacles (hydrants, utility poles, overgrown landscaping, trash receptacles)
☐ ☐ ☐ 5. Is free of interruptions from driveways (such as to/from homes, parking lots, etc.)
☐ ☐ ☐ 6. Is continuous (no segments are missing) and complete (it doesn't randomly end)
☐ ☐ ☐ 7. Is wide enough (at least 5 feet) for two people to walk side by side or pass one another
☐ ☐ ☐ 8. Has tactile ground surface indicators so pedestrians with vision impairment will know when the path is ending
☐ ☐ ☐ 9. Has a curb cut ramp (for use by wheelchairs, baby strollers, etc.) wherever it is interrupted by a street

THE STREET:

☐ ☐ ☐ 1. Has traffic lights and/or stop signs at intersections and crossings
☐ ☐ ☐ 2. The traffic lights and/or stop signs are clearly visible to drivers and pedestrians
☐ ☐ ☐ 3. Has crosswalks
☐ ☐ ☐ 4. The crosswalks are well marked and clearly visible to drivers and pedestrians
☐ ☐ ☐ 5. Has signage alerting drivers to the presence of pedestrians
☐ ☐ ☐ 6. Has a designated bicycle lane
☐ ☐ ☐ 7. Has a pedestrian crossing signal, also called a beacon (if yes, complete the next section)

THE PEDESTRIAN CROSSING SIGNALS:

☐ ☐ ☐ 1. Are working
☐ ☐ ☐ 2. Have a "push-to-walk" mechanism, meaning pedestrians can stop the vehicle traffic
☐ ☐ ☐ 3. Have audible prompts for people with vision impairment
☐ ☐ ☐ 4. Are placed in appropriate locations (if not, make note of where more are needed)
☐ ☐ ☐ 5. Provide enough time to cross (indicate the amount of time provided: _____ minutes _____ seconds)
☐ ☐ ☐ 6. Provide suitable opportunities to cross (indicate the amount of time pedestrians must wait for a traffic light change in order to cross: _____ minutes _____ seconds)

Consider using the "Build a Better Block" worksheet as well.

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Sidewalks

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

If more than one lane: Does the roadway have ☐ a median and/or ☐ pedestrian island?

The street has:
☐ no sidewalk ☐ no sidewalk but needs one ☐ no sidewalk but needs two
☐ partial sidewalks ☐ a sidewalk on one side of the street ☐ sidewalks on both sides of the street

YES | NO | OTHER **Skip any statements that don't apply**

THE SIDEWALK:

☐ ☐ ☐ 1. Is separated from the street by a barrier or buffer (a curb, grass, landscaping)
☐ ☐ ☐ 2. Is surfaced with a material that is smooth and consistent (concrete or asphalt rather than bricks)
☐ ☐ ☐ 3. Is in good condition, without cracks or raised blocks
☐ ☐ ☐ 4. Is free of obstacles (hydrants, utility poles, overgrown landscaping, trash receptacles)
☐ ☐ ☐ 5. Is free of interruptions from driveways (such as to/from homes, parking lots, etc.)
☐ ☐ ☐ 6. Is continuous (no segments are missing) and complete (it doesn't randomly end)
☐ ☐ ☐ 7. Is wide enough (at least 5 feet) for two people to walk side by side or pass one another
☐ ☐ ☐ 8. Has tactile ground surface indicators so pedestrians with vision impairment will know when the path is ending
☐ ☐ ☐ 9. Has a curb cut ramp (for use by wheelchairs, baby strollers, etc.) wherever the sidewalk is interrupted by a street

NOTES OR OTHER OBSERVATIONS:

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Streets and Crossings

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

YES | NO | OTHER Skip any statements that don't apply

THE STREET:

☐ ☐ ☐ 1. Has traffic lights and/or stop signs at intersections and crossings
☐ ☐ ☐ 2. The traffic lights and/or stop signs are clearly visible to drivers and pedestrians
☐ ☐ ☐ 3. Has crosswalks
☐ ☐ ☐ 4. The crosswalks are well marked and clearly visible to drivers and pedestrians
☐ ☐ ☐ 5. Has signage alerting drivers to the presence of pedestrians
☐ ☐ ☐ 6. Has a designated bicycle lane
☐ ☐ ☐ 7. Has a pedestrian crossing signal, also called a beacon. (If yes, complete the next section.)

THE PEDESTRIAN CROSSING SIGNALS:

☐ ☐ ☐ 1. Are working
☐ ☐ ☐ 2. Have a push-to-walk functionality, meaning pedestrians can stop vehicle traffic
☐ ☐ ☐ 3. Have audible prompts for people with vision impairment
☐ ☐ ☐ 4. Are placed in appropriate locations (if not, make note of where more are needed)
☐ ☐ ☐ 5. Provide enough time to cross (indicate the amount of time provided: _____ minutes _____ seconds)
☐ ☐ ☐ 6. Provide suitable opportunities to cross (indicate the amount of time pedestrians must wait for a traffic light change in order to cross: _____ minutes _____ seconds)

NOTES OR OTHER OBSERVATIONS:

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Street Safety and Appeal

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

YES | NO | OTHER Skip any statements that don't apply

THE LOCATION HAS:

☐ ☐ ☐ 1. Places to sit
☐ ☐ ☐ 2. Shade trees
☐ ☐ ☐ 3. Grass, flowers and landscaping (if yes, is the greenery well maintained? _____)
☐ ☐ ☐ 4. Awnings, outdoor umbrellas or other shelter from rain and other weather conditions
☐ ☐ ☐ 5. Drinking fountains (if yes, are they working and clean? _____)
☐ ☐ ☐ 6. Public restrooms (if yes, are they clean and safe? _____)
☐ ☐ ☐ 7. A transit or bus shelter (if yes, is there seating? _____)
☐ ☐ ☐ 8. Trash receptacles (if yes, so they appear to be regularly emptied?)
☐ ☐ ☐ 9. Buildings and/or homes that are well-maintained
☐ ☐ ☐ 10. Informative signage
☐ ☐ ☐ 11. Well-placed signage
☐ ☐ ☐ 12. Streetscape features (art, signage, etc.) that are representative of/suitable for the community
☐ ☐ ☐ 13. Pedestrian-scaled lighting
☐ ☐ ☐ 14. A posted speed limit that seems suitable (if yes, does it appear that drivers are obeying the limit? _____)

IMPRESSIONS:

☐ ☐ ☐ 1. The location/street is a safe and appealing destination
☐ ☐ ☐ 2. The location/street is a safe and appealing travel route
☐ ☐ ☐ 3. The location/street appears to be safe for users of all ages, abilities, races, income levels, etc.
☐ ☐ ☐ 4. The location/street appears to be safe for pedestrians during both the day and night
☐ ☐ ☐ 5. Pedestrians appear to be safe from moving vehicles
☐ ☐ ☐ 6. Pedestrians appear to be safe from crime, harassment or similar threats

For "No" or "Other" answers, use the space below or on the back of this worksheet to briefly explain the response.

NOTES OR OTHER OBSERVATIONS:

_____

_____

_____

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Public Transit Access

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

YES | NO | OTHER Skip any statements that don't apply

IMPRESSIONS:

☐ ☐ ☐ 1. Pedestrians can safely access and depart from the transit stop or station
☐ ☐ ☐ 2. The transit stop or station is in a useful location
☐ ☐ ☐ 3. The transit stop or station protects waiting passengers from moving vehicles
☐ ☐ ☐ 4. The transit stop or station has suitable seating for waiting passengers
☐ ☐ ☐ 5. The transit stop or station features shelter from (check all that apply) ☐ rain ☐ sun ☐ heat ☐ cold ☐ wind
☐ ☐ ☐ 6. The transit stop or station is clean and well-maintained
☐ ☐ ☐ 7. The transit stop or station is well lighted
☐ ☐ ☐ 8. The transit stop or station has useful amenities (if yes, describe what they are)
☐ ☐ ☐ 9. The transit stop or station feels safe from crime
☐ ☐ ☐ 10. I would feel safe and comfortable waiting in this location

NOTES OR OTHER OBSERVATIONS:

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Build a Better Block

Would the safe walkability and appeal of the walk audit location or route be improved by any of the following features? Select those you think could help:

- ☐ 1. Sidewalks (because there aren't any at all)
- ☐ 2. Sidewalk repairs
- ☐ 3. Wider sidewalks
- ☐ 4. Safety barriers between the sidewalk and street (landscaping, low walls, fencing, etc.)
- ☐ 5. Decorative sidewalk features (hanging flower baskets, planters)
- ☐ 6. Crosswalks (because there aren't any at all)
- ☐ 7. Raised crosswalks
- ☐ 8. Artistic crosswalks
- ☐ 9. Pedestrian "bulb-outs" at intersections or crossings
- ☐ 10. Pedestrian island(s)
- ☐ 11. Pedestrian-friendly lighting
- ☐ 12. One-way rather than two-way traffic
- ☐ 13. Outdoor seating and furnishings for public use (benches, tables, parklets, etc.)
- ☐ 14. Decorative and/or directional (also called "wayfinding") signage
- ☐ 15. Public art (sculpture, wall murals, banners)
- ☐ 16. More street-level/street-facing shops and businesses
- ☐ 17. Shelter from the elements (awnings, outdoor umbrellas, etc.)
- ☐ 18. Green space (such as a small park or "pocket park")
- ☐ 19. Street trees and landscaping
- ☐ 20. Improved landscape maintenance
- ☐ 21. Drinking fountains
- ☐ 22. Public restrooms (or, if already present, better maintenance)
- ☐ 23. Litter removal
- ☐ 24. Graffiti removal
- ☐ 25. Trash receptacles
- ☐ 26. Security features (cameras, call-boxes, etc.)
- ☐ 27. Management of off-leash dogs
- ☐ 28. Repair or removal of vacant or rundown buildings
- ☐ 29. On-street parking
- ☐ 30. Parking garage or structure

OTHER FEATURES:

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Winter Weather

Community Name: _____

Location/Street Name(s): _____

Audit date: _____ **Start time:** _____ **AM | PM** **End time:** _____ **AM | PM**

YES | NO | OTHER Skip any statements that don't apply

WALKWAYS (sidewalks or similar pedestrian paths)

☐ ☐ ☐ 1. The walkway is cleared of snow after a storm. (If yes, make note of how soon after.)
☐ ☐ ☐ 2. The walkway is cleared of snow but remains icy
☐ ☐ ☐ 3. The walkway is cleared of snow but remains slushy
☐ ☐ ☐ 4. The walkway is salted or sanded
☐ ☐ ☐ 5. The full-width of the walkway is cleared of snow, slush and ice
☐ ☐ ☐ 6. The full-length of the walkway is cleared of snow, slush and ice
☐ ☐ ☐ 7. The walkway is accessible (i.e. It's not blocked by snowbanks or piles of plowed snow.)
☐ ☐ ☐ 8. The walkway is well-lighted
☐ ☐ ☐ 9. Pedestrians can use the walkway without being sprayed by slush or ice from passing cars

STREETS

☐ ☐ ☐ 1. Crosswalks are visible. (If not, why not? e.g. The paint is faded. There's snow, ice or slush covering the path.)
☐ ☐ ☐ 2. Pedestrians crossing the street are clearly visible to motorists
☐ ☐ ☐ 3. Bus or public transit stops accessible
☐ ☐ ☐ 4. The bus or public transit stop has a shelter to protect waiting riders from bad weather

BUILDINGS AND MORE

☐ ☐ ☐ 1. Benches and other outdoor seating areas have been cleared of snow and ice
☐ ☐ ☐ 2. The steps, ramps and entries to public buildings have been cleared of snow and ice
☐ ☐ ☐ 3. The steps, ramps and entries to businesses have been cleared of snow and ice

Who is responsible for the clearing and winter maintenance of the sidewalk(s) or pedestrian pathway(s)? *Check all that apply*

☐ The local government
☐ Each property owner (e.g. business or homeowner/tenant)
☐ Other (explain below)
☐ Don't know

NOTES OR OTHER OBSERVATIONS:

_____
_____
_____

Walkability of the area, based on the findings above: ☐ **Great** ☐ **Acceptable** ☐ **Mixed** ☐ **Poor**

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Summary

Record the score totals for each observation type

- Record the total number of yes responses for the category
- Record the total number of no responses for the category
- Record the one-word rating for the category

This information — as well as all notes, photographs, videos and observation discussions — will be helpful for writing a short report and/or preparing a PowerPoint presentation.

Community Name: _____

Street/Intersection Observed: _____ **and** _____

Audit Date: _____

WORKSHEET	YES RESPONSES	NO RESPONSES	RATING Great | Acceptable | Mixed | Poor
Sidewalks, Streets and Crossings (Single-Location Audit)			
Sidewalks, Streets and Crossings (Walking Audit)			
Sidewalks			
Streets and Crossings			
Street Safety and Appeal			
Public Transit Access			

NOTES OR OTHER OBSERVATIONS:

Visit *AARP.org/WalkAudit* to download, print, copy and/or share additional worksheets.

Copy of the graphical part