



Sustainable Urban Mobility Plan for Lviv

City policy for mobility improvement in Lviv

Commissioners and Developers

The Sustainable Urban Mobility Plan for Lviv was developed within the “Integrated Urban Development in Ukraine” program implemented by the German Federal Company “Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH” and funded by the Federal Government of Germany and Switzerland. The project is implemented in Lviv in partnership with Lviv City Council.

The process also engaged representatives of the “City Institute” MI, “Institute for Spatial Development” LME, “Lvivavtodor” LCE, “Lvivelektrotrans” LME, Department for Housing and Infrastructure, Transportation Office, Office for Architecture and Urban Development, international experts from Switzerland and Germany, experts from different fields, and representatives of the public interested in developing the city.

The project “Integrated Urban Development in Ukraine” was launched in Lviv in April, 2018. The objective is to support local self-government in long-term urban development planning. Urban planning is one of the key obligations of each city as the process defines the future of its citizens. The project “Integrated Urban Development in Ukraine” includes four components and is implemented in Lviv, Chernivtsi, Vinnytsia, Zhytomyr, Poltava, and Podil district in Kyiv.

Lviv, 2019



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What is a “sustainable urban mobility plan”

The Sustainable Urban Mobility Plan of Lviv (SUMP) is a strategic document that defines the city's transport policy for the next ten years and answers the question of how to optimize the city to make it efficient for its residents, in terms of time, comfort, value, health safety and the least negative impact on the environment.

SUMP addresses the transportation issue more broadly. It includes not only the movement of transport as a tool for transporting people but also focuses directly on people and their needs to find more efficient ways of meeting mobility needs that could improve the quality of life in the city. SUMP is an "umbrella" sectoral strategy that brings together the various urban activities that affect the mobility of people and goods within the city. Based on the framework, principles and goals laid down in the Plan, more detailed strategies, concepts, regulations and directories for specific areas of mobility shall be developed, such as public transport development strategy, parking concept in the city, individual motor vehicle traffic concept, cycling development concept, pedestrian zones development concept, electromobility, and more.

The Sustainable Urban Mobility Plan of Lviv was developed for:

- *employees of the Lviv City Council*, executive authority in charge of the quality of projects who directly supervise the implementation of urban projects in the fields of transport, street infrastructure, and public spaces;
- *MPs and politicians*, such as decision-makers prioritizing activities to be funded by the city;
- *NGOs and community activists*, as an agent of influence in the development of the city.
- *residents of Lviv* - end users of the outcomes of activities and project implementation;

Photo by: Volodymyr Karaim



Before:

TRANSPORT



Now:

MOBILITY = TRIPS



SUMP fosters a balanced development of all transportation and mobility modes while incentivizing the transition towards more sustainable mobility. The plan provides for an integrated set of technical, infrastructure, policy and other measures to increase the efficiency and economic feasibility of city council activities in the field of transport, which must meet the stated goal and specific objectives. SUMP addresses such issues as public transport, walking and cycling, intermodality (combining several mobility modes in one trip), traffic safety, motor vehicles (traffic and parking), urban logistics, mobility management, and smart transportation systems.

Without a sustainable mobility plan, the actions taken by various institutions will be chaotic and ill-considered. To date, Lviv has not had any strategic and realistic vision for the development of transport and mobility. The Master Plan proposes solutions impossible to implement in terms of the financial feasibility of the city, and they require a review for sustainable mobility. As a result, different subdivisions of the city had different motivations and goals in their work. The city needs a clear vision for the development vector that will guide all agencies in charge.

The early urban mobility plans in EU cities have been built since the late 1980s. Currently, legislation in most EU countries requires cities to develop Sustainable Urban Mobility Plans.

In fact, SUMP contains clear answers to the roots of problems, principles to be followed in decision-making, and a clear action plan to address problems and achieve the desired outcome. This is a manual for developing and making decisions for self-government officials and council deputies.

The availability of a high-quality Sustainable Urban Mobility Plan fosters external funding for infrastructure development, and enables loans at lower interest rates. In addition, it is a rather formalized way of addressing the interests of different stakeholders, which can be integrated into other urban planning documents.

This strategic document differs from the previous similar papers in that a part of the plan is a ready-made system for implementation and monitoring of all activities undertaken by the city in the field of mobility. The implementation of the plan should be regularly monitored by an interdisciplinary team, while the responsible units should systematically submit progress reports.

The Sustainable Urban Mobility Plan is developed with a ten-year vision, with the elaborated comprehensive four-year Action Plan. The SUMP can be reviewed and adjusted every four years.

Activities that go contrary to SUMP objectives shall not be implemented



Photo by: Bohdan Yemets

Who developed SUMP for Lviv and how?

In Ukraine, the development of such plans is not yet regulated by the law. The driving force to draft the Sustainable Mobility Plan for Lviv is the "Integrated Urban Development in Ukraine" project, in which Lviv has been participating since April 2018. The entity in charge of SUMP development in Lviv is the municipal institution - the City Institute. In addition to Lviv, Sustainable Urban Mobility Plans in Ukraine are being developed in Chernivtsi, Vinnytsia and Podilsky district of Kyiv. Separately, such a document has already been developed and approved in Mykolayiv. SUMPs have recently been approved in Zhytomyr and Poltava. The process of SUMP development in Lviv is funded by the Federal Government of Germany.

By the mayor's executive order No. 451 of September 4, 2018, a working group was created to elaborate the Integrated Concept for Lviv Development. It included the following members: A. Moskalenko, Yu. Chaplinsky, O. Kobzarev, S. Babak, H. Vaskiv, H. Slichna, N. Bunda, A. Bilyi, Sh. Habi, P. Adamyk, V. Veremchuk, Yu. Kuzheliuk, M. Lopachak, Yu. Melnyk, I. Telishevskiy, T. Choliy, A. Kolomeytsev, O. Oliynyk, M. Pastukh. During the working group meetings, each stage of development of the Sustainable Urban Mobility Plan of Lviv was presented.

In order to develop the most relevant document for today, in addition to local authors, the drafting process for the Sustainable Urban Mobility Plan for Lviv also engaged foreign experts with prior experience of both developing and implementing SUMPs in their respective cities.

The SUMP project working group included the following members:

- *Andriy Bilyy* – Deputy Director of the Department for Housing and Infrastructure, Head of the Working Group;
- *Stefan Gabi* – Head of Projects and Programs in the Field of Material / Non-material Production of a City Institute Municipal Office;
- *Demyan Danylyuk* – expert in Sustainable Urban Mobility;
- *Roman Zubachyk* – Head of Transport Planning and Modelling, Lvivavtodor Municipal Enterprise;
- *Ihor Mohyla* – Head of Development Department, "Lvivelektrotrans" Municipal Enterprise;
- *Orest Oleskiv* – Consolidated Information Analyst at the City Institute Municipal Office, Secretary of the Working Group;
- *Oksana Oliynyk* – Project Manager, Integrated Urban Development in Ukraine (GIZ) in Lviv;
- *Marta Pastukh* – Coordinator in the project "Integrated Urban Development in Ukraine" (GIZ) in Lviv;
- *Pavlo Syrvatka* – Head of Investment Projects Department, "Lvivavtodor" Municipal Enterprise;
- *Oleksandra Sladkova* – Head of Urban Development Department, Lviv Municipal Enterprise "Institute for Spatial Development";
- *Oleh Shmid* – Director of Lviv Municipal Enterprise "Institute for Spatial Development";
- *Oleksandr Shutyuk* – Designer at Urban Development Department of Lviv Municipal Enterprise "Institute for Spatial Development".

Contributed to the process:

- *Oleksandr Kobzarev* - Director of Lviv City Institut;
- *Anton Kolomeytsev* - Chief Architect of Lviv.



The Lviv team of experts and managers was advised by experts from Switzerland and Germany, who represent the companies: Basler & Hofmann AG, Van de Wetering Atelier für Städtebau GmbH, Burkhard Horn: Mobilität & Verkehr - Strategie & Planung:

- *Dr. Ulrike Huwer*, Head of Transportation and Spatial Planning, Basler & Hofmann, Zurich;
- *Martin Haag*, Deputy Mayor for Urban Planning, Freiburg;
- *Burkhard Horn*, expert on sustainable mobility strategy and planning, Berlin;
- *Torben Heinemann*, Head of Transport and Construction Office, Leipzig;
- *Rupert Wimmer*, Head of Transport and Spatial Development Office, Zurich;
- *Urs Thomann*, Project Manager, Van de Wetering Atelier für Städtebau, Zurich;
- *Manuel Oertle*, project manager, Basler & Hofmann, Zurich.

An important part of the work was the continuous involvement of the public, an open process of development, and a multi-stage discussion of the outcomes produced.

A special two-stage survey was conducted to collect the ideas from residents, as well as to assess the residents' perceptions of SUMP objectives and activities. The first step was gathering information through an online survey asking residents to engage in SUMP development, in a focus group format. Nine focus groups were conducted to explore more in-depth needs. The groups were composed under the following criteria:

1. Persons who take a long trip to work.
2. Persons with two children and more.
3. Persons who make over four trips a day.
4. Persons who walk more than an hour a day.
5. Persons who often go by bicycle.
6. Persons who live outside the city.
7. Persons who work in the city center.
8. Persons with special mobility needs.
9. Students



Photo by: Bohdan Yemets

During the SUMP development, the working group held several meetings and exchanged experiences with the working group of the Integrated Development Concept of Lviv (IDC), in particular with Yulian Chaplinsky and Anton Kolomeyts. Having carried out different analytical work, both working groups came to complementary conclusions and produced both documents in complete harmony and correspondence with each other. The IDC is the basis for adjusting the Master Plan of Lviv, or developing a new one that will reinforce the decision of the Sustainable Mobility Plan of the city.

Parallel to the development of SUMP, the Green City Action Plan (GCAP) is under way, which made it possible to critically re-evaluate SUMP activities, and to include them in a broader document. The latter envisages the transition of the city to more sustainable forms of management of all municipal sectors.

At the final stage of SUMP development, the IFC (International Finance Corporation) joined the review, providing conclusions and recommendations for adjusting the document to better meet the city's expectations of international credit institutions for infrastructure development projects.



Related Strategies and Programs underpinning SUMP:

1. Urban Transport Strategy for Lviv, Dreberis, 2009
2. Lviv - 2025. Master Plan, City Project SDI, 2010
3. Integrated Concept of Development of the Central City, GIZ, 2011
4. Lviv Public Transport Project: Improving the Regulatory Environment for the Urban Transportation System, Louis Berger, 2011
5. Lviv Sustainable Energy Action Plan (SEAP), Lviv City Council, 2011
6. The project of the complex development program of electric transport of the city of Lviv, NGO "Lviv citizens for electric transport", 2014
7. Integrated Strategy Lviv-2025, City Institute MO, 2011
8. Solution of Traffic Problems in the Central Area of Lviv, Gottfried Zantke, Architectural Studies, 2015
9. Concept for design of parking lots, car parks, and garages, PP Arkhnovo, 2016
10. Concept of Electric Mobility Development, NGO "Environmental Initiatives", 2017
11. Development strategy of Lvivelektrotrans LME, "Lvivelektrotrans" LME, 2018
12. Optimization of the Lviv tram route network, "Lvivelektrotrans" LME, 2018
13. Integrated Development Concept, Lviv City Council, (under development)

Definition of Terms

Street – a public area of urban space in a settlement restricted by building borders or boundaries of recreational areas designed for the mobility and stay of people and vehicles. In a broad sense, the term also includes lanes, avenues, boulevards etc.

Master Plan – town planning documentation that regulates urban activity in cities and other settlements, defines the conditions for the safety of the population, ensures the necessary sanitary and environmental requirements, reasonably determines land-use boundaries, areas of residential, community, industrial development, areas under special protection status, zones of different urban value, locations of workplaces, development of engineering and transport infrastructure, landscaping, preservation of historical and cultural heritage and anthropogenic landscapes.

Demonstration Measures – measures that can be taken to quickly visualize the benefits of SUMP priorities for different users.

Road – a linear section in space intended for safe and comfortable movement of motor vehicles between settlements.

Accessibility – unimpeded access for people with reduced mobility to independent use of urban infrastructure.

E-ticket – a payment system for public transport services in accordance with the volume and quality of the provided transportation. Includes a unified system for collecting and controlling the trip fares paid by passengers.

Traffic-calming measures – road (street) structural elements or technical regulation controls designed to reduce the speed of motor vehicles and to increase the attention of road users (DSTU "Traffic Calming Measures" project).

Institutional capacity – the ability of a public authority to effectively perform its most important functions and control their performance from the highest to the lowest level.

Integrated concept of city development – a strategic document that defines the spatial and substantive directions of city development for the next decade.

Intermodality – the use of two or more ways of mobility in one door-to-door trip (walking to the garage, further driving by car to a parking lot, and then walking to work; cycling from home to a tram stop, then taking a tram and walking from the stop to work, etc.).

People with reduced mobility – people who experience permanent or temporary difficulties when travelling independently, receiving a service, the information they need, or when navigating within the space. People with disabilities, people with temporary health issues, pregnant women, elderly people, people with baby strollers, etc. (SCS "Accessibility of Homes and Structures for Low-Mobility Groups").

Route network – set of city passenger transport routes.

Mode Share – (also called mode split, mode-share, or modal split) is the percentage of travelers using a particular type of transportation or number of trips using said type.

Carrying capacity – number of people who can be transported through a certain corridor per unit of time.

Mobility, or “movement”, is a broader concept than “transportation”. The concept of “transportation” does not imply walking on foot, it is almost unrelated to bicycle travel, and leaves behind the planning of city building development.

Sustainable Urban Mobility Plan – a strategic document designed to meet the mobility needs of residents and businesses within cities and neighborhoods to improve the quality of life.

SUMP principles – the key statements to help implement SUMP as planned. It is a theoretical framework that must be referred to in decision-making on infrastructure development or urban development.

Road/street capacity – number of units of transport that can travel through a certain corridor per unit of time.

Radial structure of city streets – when most of the main streets lead from the center to the outskirts of the city.

Rolling stock – public transport units: trams, trolleybuses, buses, trains.

Sustainable mobility – means of transportation (including rolling stock and infrastructure) that are efficient in terms of social, environmental and climatic impact on the environment.

Transport Model – the specialized software designed to analyze current and estimate future traffic intensity of the network. It includes arrays of the street network, public transport, settlement patterns, jobs, demand for city traffic, the interaction of different modes of transportation, etc.

The chord – a connection line between areas of a city that does not run through the center.

Density of the route network – saturation of the city area with public transport routes, measured in km / km².

The Belt of Opportunities – the area of former industrial sites along the railway track within a radius of approximately 4 km from the center of Lviv.

Definition of abbreviations

ATP-1 – Lviv bus transport enterprise No.1, municipal bus operator of LCC

EBRD – The European Bank for Reconstruction and Development

EIB – The European Investment Bank

GCAP – Green City Action Plan (Green City Action Plan)

GIS – geo-information system

IUDC – Integrated Urban Development Concept

IFC – International Finance Corporation

LCE / LME – Lviv communal / municipal enterprise

LCC – Lviv city council, local government (includes executive [public servants] and representative [local deputies] government)

LET – LvivElektroTrans, Lviv electric transport enterprise, municipal tram and trolleybus operator of LCC

PT – Public Transport

RTA – road traffic accident, accident

SUMP – Sustainable Urban Mobility Plan

TA – traffic organization

TC/TR – traffic codes or traffic rules

Analysis of the current situation in Lviv

Starting point

Spatial analysis of the city in terms of mobility

Lviv has a structure typical of European cities. It is more or less compact and dense, with a radial structure and a clear organization and hierarchy of streets, well-distributed functions and mostly self-sufficient neighbourhoods.

The situation has developed despite the absence of a single formal plan for the development of the city center at the time of its construction and until the 19th century. Historically, major transportation routes headed downtown, bounded by old fortification walls. With the

advent of cars to the streets, especially in the post-WWII period, there were problems with the lack of bypass roads. Master plans of different years suggested the construction of detours around the central area, and main avenues through the city center. They proposed laying streets in difficult terrain and increasing the capacity of the downtown streets by demolishing buildings. For various, mostly economic, reasons, these plans have remained on paper.

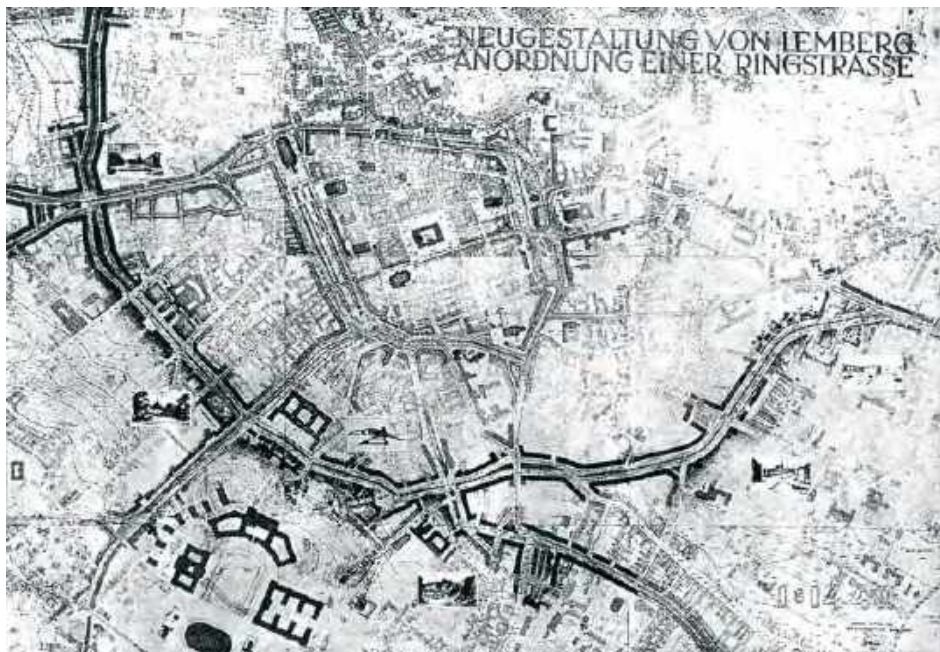


Photo by: Volodymyr Karaim



1920 Polish Inner City Plan

Source: www.lvivcenter.org



Plan of reorganization of the city center with the formation of a transport bypass around the center during the German occupation, 1942-1943

Source: www.photo-lviv.in.ua



The first 1946 Master Plan of Lviv

Planned urban development has grown with each new Master Plan. Moreover, residential and industrial development of the city for decades has taken into account that in the future all streets and junctions would be constructed within projected framework. This was a lesser problem in the Soviet era when the planned economy made it impossible to significantly increase the number of vehicles on the streets and to allow a direct redistribution of enterprises revenues for the construction of new infrastructure.

However, with the transition to a market economy, changes in the distribution of tax revenues and increased flexibility of decision-making, the pace of implementation of infrastructure decisions of the Master Plans become noticeably slower, compared to the planned administrative economy. As a result, Lviv now has a pronounced radial structure, not only in terms of urban transport networks, but also due to demand for transportation. A considerable number of educational, cultural, administrative functions and jobs are concentrated in the city center. Seven out of ten tram and trolleybus routes and over 50% of bus routes run through or near the central part of the city.

The full implementation of the planned radial-ring system of traffic organization has historically been complicated by natural and artificial barriers and the presence of valuable historical areas in the city.

Historically, streets and paths have evolved, passing the arrays of the hills of the High Castle, Znesinnya, Citadel, Kortumova Mountain and other sites with complex landscape. At the beginning of the twentieth century, the ravines of the tributary and the bed of Poltva river were filled. This is how new main streets appeared: Chornovola, Vitovskoho, Stusa, etc. The railway has created a new barrier, which has been complicated by the location of industrial enterprises along it. The city swallowed up former villages with low-rise buildings and the respective scale of streets. Military units with large areas and other restricted access facilities emerged. The early Master Plans suggested demolishing historic buildings for the sake of widening the main streets.

Due to the increase in the number of cars since the 1990s, barriers have begun to form the bottlenecks between the main streets with relatively high traffic capacity. The Master Plan did not reject the idea of a radial-ring pattern but has been modified to overcome these barriers in various ways.

Any plans to build new connections through sites that are large barriers require significant funding. That is why this kind of projects moved from one Master Plan to another. Instead, facilities were built that were cheaper and easier to implement. Therefore, there are very many chord connections between some radial ways, while there are few between others.

Thus, the streets with no connection to others are Lychakivska Street (with two connections outside the center with Zelena Street along Mechnikova and Pasichna Streets), and after Opryshkivska Street there is only one connection with Bohdana Khmelnytskoho Street - through Bohdanivska Street.

Other neighborhoods separated from the rest of the city are:

- *Sykhiv* – surrounded by railway, industrial area and forest park with the possibility to get to Stryiska, Zelena streets and Novyi Lviv;
- *Levandivka* – separated by the railway from the neighbouring districts, with bridges to Horodotska and Shevchenka streets, and with the pedestrian path to the railway station;
- *Riasne*, with the only connection to rest of the city through Shevchenka Street.

On the other hand, the southwest part, with simpler terrain, has much better interconnectedness, since the construction of infrastructure there was much easier. However, this part of the city is not sufficiently connected to the center because of the industrial belt running along the railway.

All this creates a surplus of the transport supply in some places and its considerable lack in others, because sooner or later the traffic needs to cross the "bottlenecks".

In addition, it is becoming increasingly more apparent that transport junctions on different levels increase the distances needed to get from one part of the city to another, and present significant obstacles for walking. Substantial traffic pressure on the main streets, especially congestion when approaching the "bottlenecks", worsen the attractiveness of streets for life,

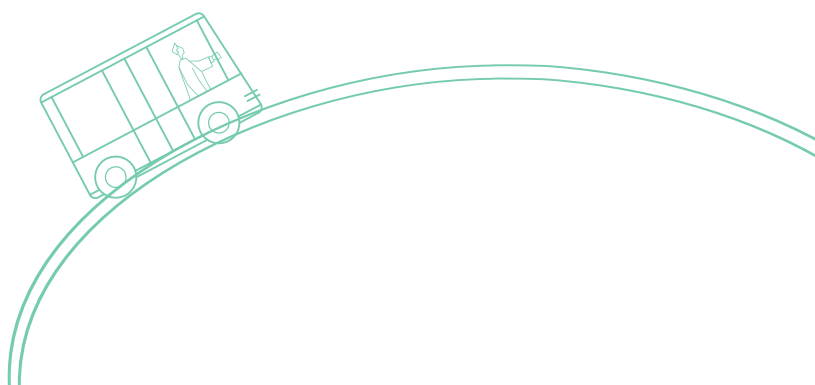
commerce on the ground floors, pedestrian mobility, by cycling and public transport, recreational and aesthetic properties of streets, destroy valuable architecture, and necessitate the sacrifice of green spaces.

Statistics and real estate growth

Present-day Lviv is on active stage of development due to private investment in real estate. Many territories are being developed, housing is being built, commerce is developing, which, unfortunately, is practically not provided with adequate transport infrastructure, and impairs pedestrian connections.

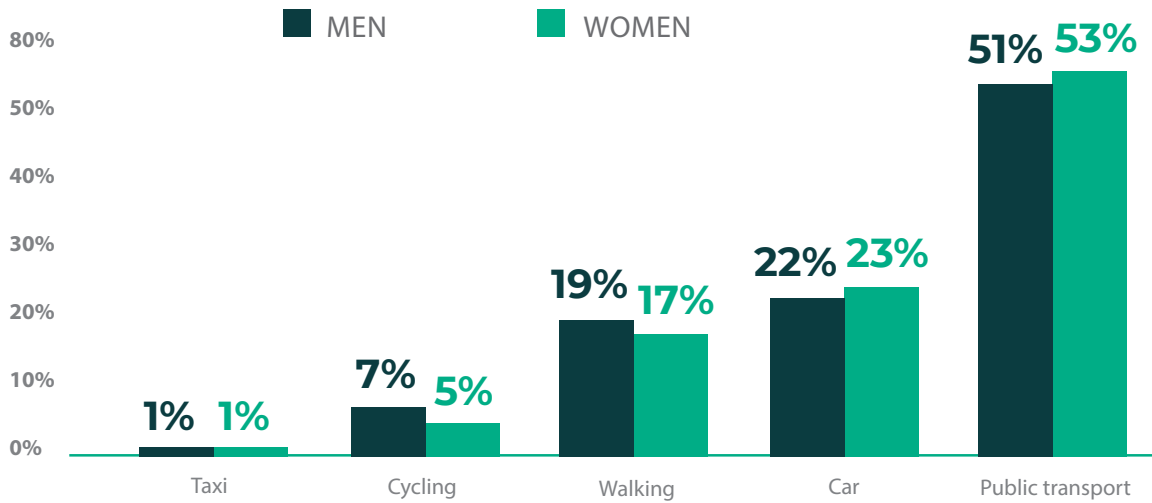
Despite the common opinion among Lviv citizens about continuous increase in number of residents, this cannot be confirmed. As of January 1, 2019, there were 724,713 people living in Lviv. The long-term projection of the demographic situation in the city by 2030 within the International Technical Assistance Project "Capacity Building for Economically Sound Planning for the Development of Regions and Cities of Ukraine" (REOP) indicates the absence of demographic factors for either rapid population growth or decline. The number of people who come to Lviv for a long period is approximately equal to the number of people who leave to other cities and countries every year. The agglomeration of Lviv has up to 1 million inhabitants (including 725 thousand of Lviv residents). According to the data of mobile operators, 150,000 residents from other settlements commute to Lviv on a daily basis.

The growth of real estate is due to the increase in purchasing power and the needs of residents for comfortable housing. While in the Soviet era three generations could live in one apartment, now every family wishes to buy individual housing, in the first place.



How do Lviv citizens travel?

The starting point for any Sustainable Urban Mobility Plan is to calculate the distribution of the mobility share (modal split). The City Institute conducted a survey to identify this ratio.



Survey period: June, 12 – August, 5, 2019.

2,500 people aged 14 and above were interviewed.

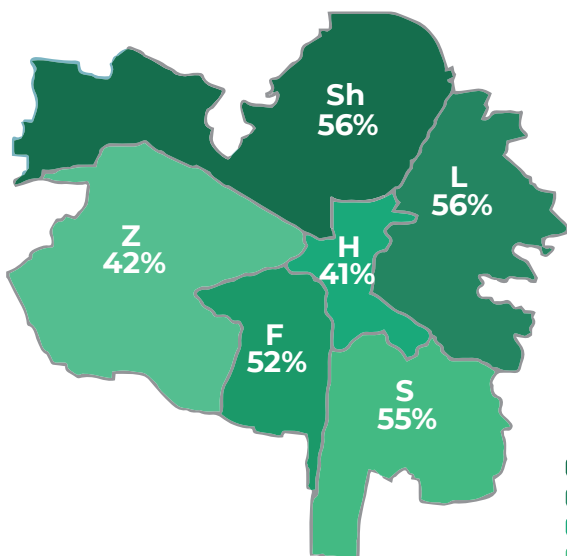
Three quotas: gender, age and areas / satellites of residence.

Method: 72% - questionnaire online (Google Form); 28% are interviewed by interviewers to fulfill three quotas.

The sampling error does not exceed 2.3%.

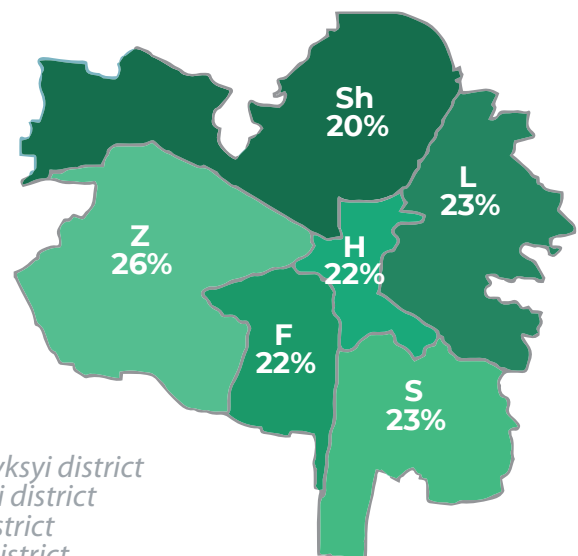
It was also established how different areas of Lviv differ in terms of using public transport and private cars:

PUBLIC TRANSPORT



Satellites - 58%

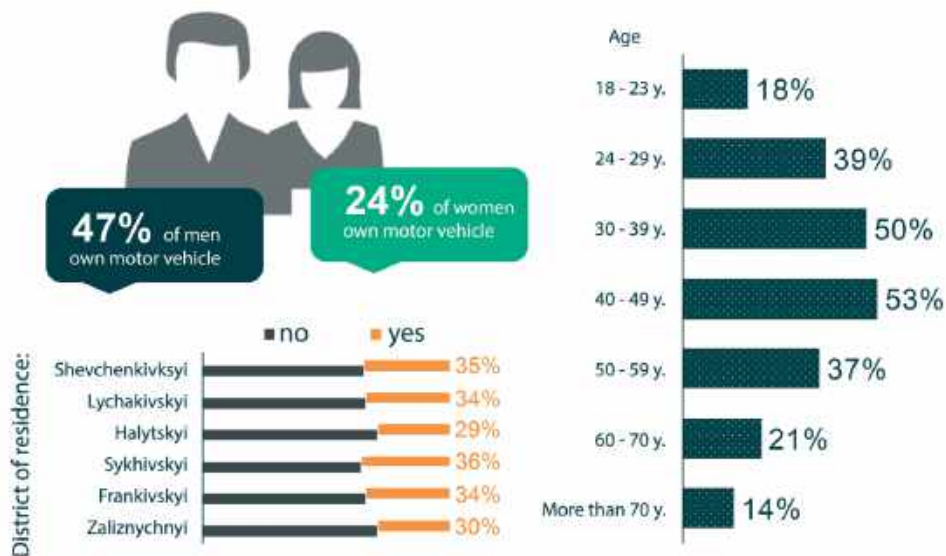
PRIVATE CARS



Satellites - 21%

- Shevchenkivskiy district
- Lychakivskiy district
- Halytskyi district
- Sykhivskiy district
- Frankivskiy district
- Zaliznychniy district

Growth in private car ownership in comparison with 2014:



	2014	2019
1	39%	43%
2	8%	11%
≥3	1%	1%
none	52%	44%

Level of bicycle ownership has also been monitored:

51%

of respondents generally have a bicycle in the household

% of all respondents



28% own 1 bicycle

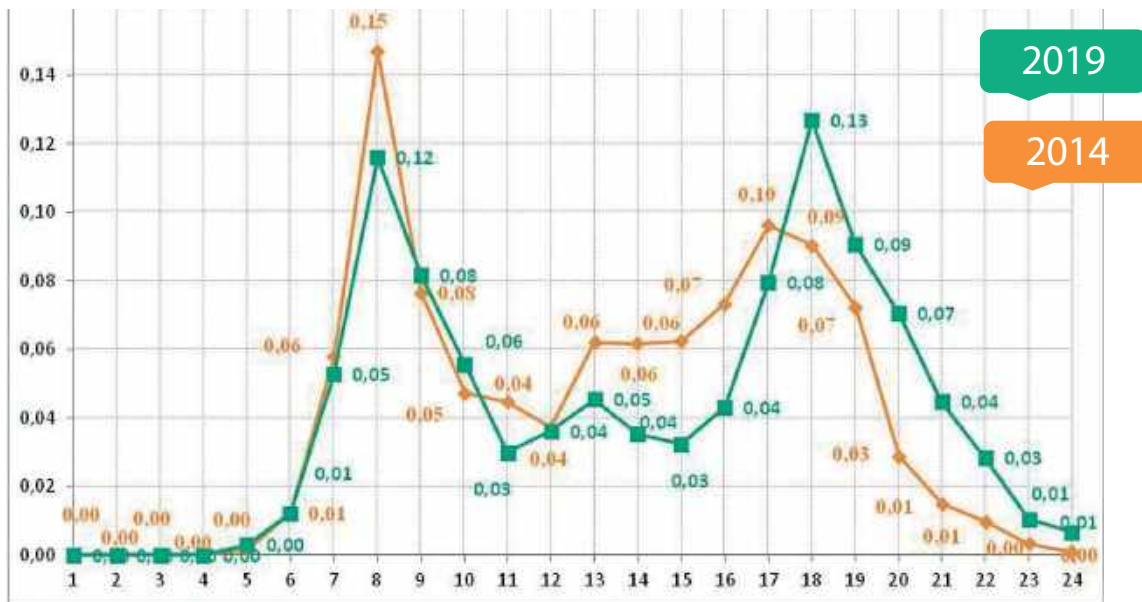
17% own 2 bicycles

4% own 3 bicycles

2% own >3 bicycles

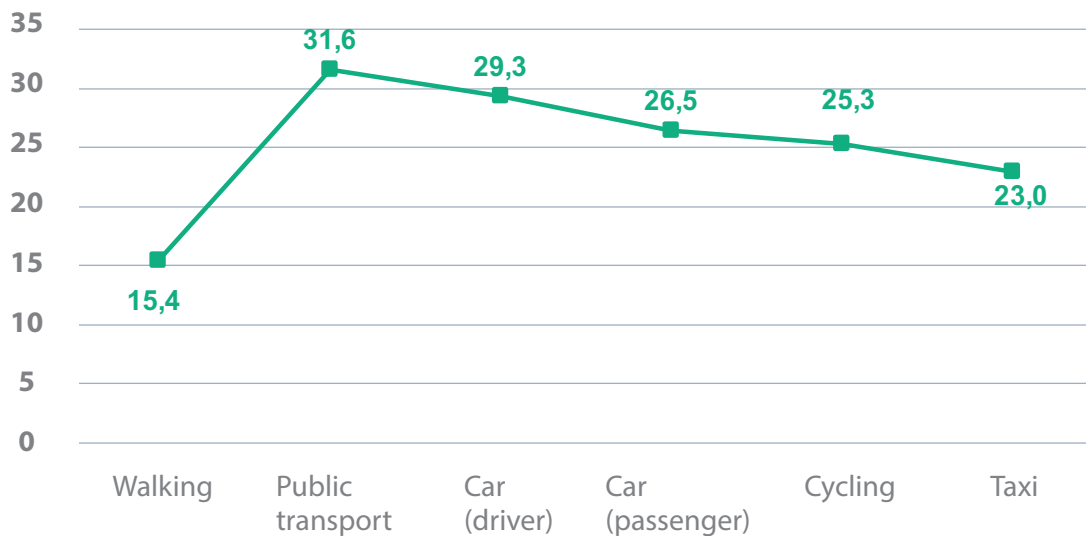
Findings of when residents move around the city:

Starting time of a trip



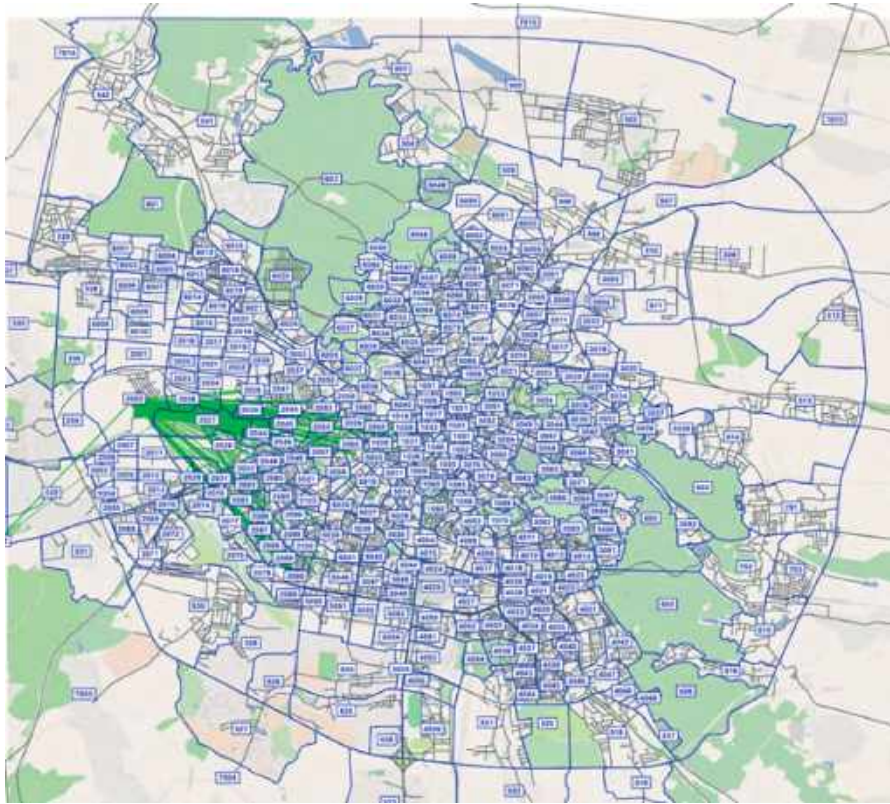
The average duration of trips is determined depending on the type of trip:

Average trip duration by different transport modes

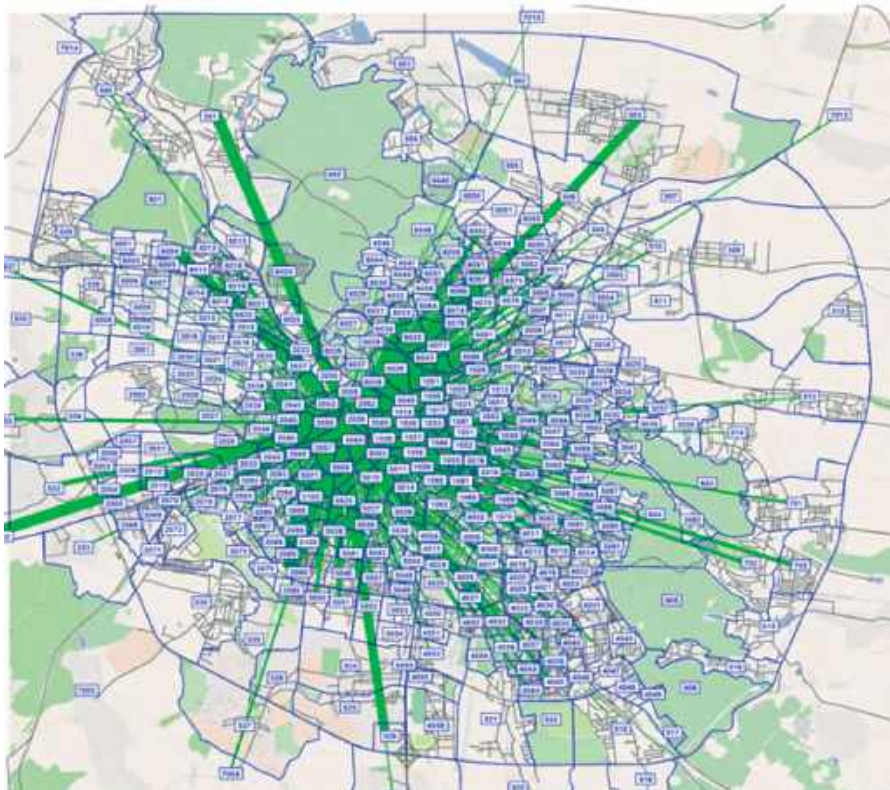


Based on the survey, the transport model of the city of Lviv developed in 2010 and updated in 2014, has been adjusted. The transport model makes it possible to predict the impact of different urban projects on traffic in the city.

The transport model data allow us to estimate the demand for transfers in certain neighbourhoods.



Intensity of mobility demand from / to Bilohorshcha



Intensity of mobility demand from / to the railway station area

For example, residents of Bilohorshcha need communication with the center, Levandivka and the area of Vyhovskoho Street. On the other hand, they rarely travel to the eastern part of the city, while the connection with the railway station is important for most of the city. The Riasne industrial area employees mostly live on Shevchenka Street, and those who live or work on Vashynhtona Street rarely travel to the northern part of the city, Riasne and Levandivka.

City Investment into transportation infrastructure development

The current city Master Plan, approved in 2011, suggested addressing transportation needs through significant investments into transport infrastructure development. Specifically, it included the possibility of constructing new highways, expanding existing roads (sometimes by the demolition of already existing buildings), constructing multi-level interchanges, construction of inner-city transport ring, chorde with several tunnels, completion of construction of a city ring road, development of a public transport network, particular electric transport and construction of three metro lines.

The Master Plan contains many unrealistic ideas for improving car use, but there are exceptions, too. The most successfully implemented part of the Master Plan was the construction of a tram line to Sykhiv. Its efficiency exceeded even the most optimistic expectations.

However, the implementation of all solutions from the Master Plan is not feasible due to the current economic situation. Moreover, they are largely unreasonable when compared to other opportunities for urban development. A positive consequence of the current Master Plan is the reservation of space for the construction of future transport infrastructure.

Over the last ten years, the city has overhauled most of the main streets. The design was mostly based on car-centric approaches. Only recently the city has begun to apply sustainable mobility principles in the design of infrastructure.



- Road building
- Car Parking
- Lower density
- Dispersion



- Public transport
- Cycle network
- Roadspace reallocation



- Public realm
- Street activities
- Traffic restraint
- Mixed-use developments



Photo by: Volodymyr Karaim

Street reconstructions were carried out mainly for the sake of the widest possible extension of the roadway, with little or no account for contemporary needs, such as priority of public transport, the comfort of pedestrians, landscaping, convenient and safe bicycle infrastructure, transportation of low-mobility persons, car parking, delivery and special vehicles.

With the increase in income, residents are more often choosing a car to organize all their mobility needs. Because transit routes go through the city center and there are many points of attraction here too, there is an overload of cars. Since 2008, the city has taken several measures to restrict transit through the central part of the city and organize parking. In 2014, a pedestrian zone was introduced within the former medieval city walls, a tram line was retained in the pedestrian area, a project of reorganizing traffic around the central part of the city was developed, a paid parking area was introduced, and a new pedestrian street network was created. There is an rising public request to minimize car use in the central part of the city.

Persons who come by car to the center usually spend much time searching for a parking slot if they do not wish to use paid parking. Parking on the sidewalks used to be another long-standing problem, until a public initiative was suggested to install anti-parking poles, later supported by the city government. Other well-known Lviv public initiatives largely supported by municipal authorities are crowd funding for planting trees on the streets and for installation of additional lighting on pedestrian crossings.

External transportation in Lviv

Lviv is connected to the rest of the world by road, air, and rail.

Seven main streets provide access from any part of Lviv to ring road that connects national and international highways. However, there is a missing link in the north of the city. Ukravtodor already has a project developed for the site, and the construction should start soon.

Lviv is an important hub of truck haulage. Its main infrastructure elements are truck companies and service centers providing repair services for the region and for Western Ukraine, logistics centers that handle cargo for much of Ukraine.

Lviv Railway Station serves 24,000 long-distance passengers per day. In terms of passenger traffic, Lviv Railway Station is the second-largest in Ukraine after Kyiv Central Station. There are concepts of connecting Lviv to the rail network of Standard track gauge of 1,435 mm, as part of the reconstruction of the railway line from the existing border stations of Mostyska-2 or Rava-Ruska. The completion of the "Euro-track" will not significantly increase the total number of passengers in the city but will increase the importance of Lviv as a transit point between Ukraine and the EU.

Large areas in the city are covered with infrastructure that not only transports freight for Lviv but also provides transportation between regions of Ukraine and international traffic. Two shunting yards - Lviv and Klepariv (both of which are in the top 12 most important stations of National Railways) are the stations where

traffic is possible simultaneously under both types of current used by National Railways. The stations operate at full capacity And there is a demand for a significant increase in capacity. However, due to geographical constraints, any expansion of production capacity, and especially the relocation of a shunting yard station complex, requires a considerable amount of investment.

Passenger traffic at Lviv Airport ranks second in Ukraine after airports of Kyiv. Convenient location of the airport within 20 minutes by public transport to the city center, a modern terminal with a significant reserve in capacity of 2000 passengers per hour (in 2018 the airport reached a record high passenger traffic of 1.5 million passengers, which is more than three times higher than 10 years before; in 2019, 2.2 million passengers have used the airport), and an area of 39,000 m2. The runway reconstructed for Euro 2012 was extended from 2,510 to 3,305 meters to accommodate Class D long-haul aircraft, making Lviv Airport one of the most promising facilities in Ukraine for both the airlines and the passengers.

Photo by: Volodymyr Karaim



Suburban Connections

Every day, some 150,000 residents of surrounding settlements come to Lviv and return afterwards, according to data from mobile operators officially submitted to the Lviv City IT Office in 2019.

Many people who daily commute to Lviv use suburban and interurban bus routes. However, passenger comfort is critically low. The city has no influence on the quality of transportation, but it does affect the location and quality of bus stations. The vast majority of bus stations do not provide the necessary comfort level of transportation. The most critical are Yavoriv-bound (BS-4) and Zolochiv-bound (BS-6). They do not even have the waiting rooms. Other bus stations, such as Central Bus Station, North Bus Station, BS-3 on Sadova Street, BS-5 on Zelena Street, BS-8 on Dvirtseva Square, BS Zakhidna (West Bus Station) on Horodotska Street, require investments to provide a high level of service for passengers and carriers. The inconvenience of transfers to public transit affects passenger comfort.

Suburban railway connection also has an extremely low level of comfort, with passenger traffic decreasing every year. Suburban rail infrastructure available in the city is not in use and in decline.

The Lviv railway junction connects the lines to Krasne, Khodoriv, Stryi, Sambir, Mostyska, Rava Ruska, Sapizhanka. There are eight railway stations located within the city. However, only two of them serve long-distance passengers (main station and Pidzamche station), while there is no passenger service at the Riasne-2 station. The city has 11 railway platforms, but only on five of them currently served by suburban trains, other platforms are not used and are in a state of disrepair. Passenger traffic is concentrated mainly at the central station.

Therefore, despite the developed infrastructure of suburban transport, anyone who has the financial capacity shifts to private cars. With the growth of welfare and relocation of wealthier residents to suburban areas, the car traffic at entrances to the city increases, impairing the quality of life and mobility of Lviv residents. Existing suburban public transport infrastructure is degrading and declining.

Urban Public Transport

Public transport is the main type of transportation in Lviv. Over 50% of residents use it daily.

The city has a well-developed public transport network, one of the best electric transport networks in Ukraine. Compared to most European cities, the share of PT use is high, but it is a consequence of the lasting low purchasing power of residents rather than conscious choices.

Citizens are travelling to European countries more and more often. It raises the demand for the quality of urban infrastructure they have experienced. However, the city budget has an disproportionate capacity coming from tax revenue.

With the growing expectations of citizens to public transport quality, there are many challenges for its development. The obsolete rolling stock and the lack of rolling stock make transport crowded and unattractive. Residents complain that there is no guarantee of getting by public transport to their destination due to frequent downtime caused by road accidents and illegal parking on driving lanes, or due to tram breakage (less frequent). The city still has private midi-buses, but they are gradually being replaced by large (12m) municipal buses.

There is a large number of privileged (free of charge) categories of travelers in Ukraine, which make up to two-thirds of public transport users. Privileged category passengers do not pay for travel and the city does not sufficiently compensate transport operators for the cost of transporting privileged passengers. In addition, raising fares always leads to difficult discussions among residents. Lack of funding for public transport causes failure to deliver bus runs by operators, and a shortage of skilled workers and drivers in municipal public transport, difficult working conditions and problems in servicing the network.



Since the 1990s, electric transport started being perceived as a means for privileged categories of passengers. After all, in general, public transport was perceived as a mode of transport for people who could not afford a car. Since 2011, the situation has been improved due to the purchase of used and new high-capacity rolling stock, due to increase in the share of routes managed by municipal operators, due to introduction of monthly transit passes, electronic fare payments, first steps in introducing public transport priority over other road vehicles with the help of dedicated public transport lanes and priority at traffic lights.

Due to the construction of the tram line to Sykhiv, residents were able to feel the benefits riding modern public transport, which has full priority on the 70% of the route.

However, failure to cover all transportation needs generated a large number of bus routes serviced by individual businesses, including those operating around the clock, located in remote parts of the city away from major public transport routes or outside. Some shopping centers and private educational establishments arrange transportation on their own.

Cycling Infrastructure

Lviv is one of the first cities in Ukraine introducing various elements of cycling infrastructure. They were implemented based on the growing interest in cycling, and the emergence of public initiatives that promoted cycling.

In 2010, the City Council approved the "Concept for Development of Bicycle Traffic and Arrangement of Cycling Infrastructure in Lviv." The document elaborated on the concept of implementing a bicycle network. These documents envisaged the construction of 268 kilometers of bicycle infrastructure by 2020. The concept was launched in 2011. However, the implementation pace significantly went behind schedule from the very beginning. As of 2019, about 100 kilometers of bicycle infrastructure (cycle paths, cycle lanes, etc.) have been built, which makes 45% of the planned scope by 2020.

Before 2015, the city has hardly implemented any solely bicycle infrastructure projects. The bicycle infrastructure was built along with the reconstruction of street sections. Lack of experience in designing bicycle infrastructure and the priority of planning for car traffic led to the fact that the first bike lanes were built on a residual basis, provoking a conflict with pedestrians, and they were not comfortable enough for daily commuting. It also resulted in considerable fragmentation of the bicycle network.

The first full cycle route was formed in 2016. It connected the northern area of the Halyske Perekhrestia with the central part of the city. The emergence of this route and the flat terrain contributed to the fact that northern areas of city have the most active cycling traffic, according to the count of cyclists at intersections. Overall, in 2018, the share of city trips by bicycle in the warm season was about 1,5%. The share of bicycle trips is increasing every year.

Walking Options

It can be claimed that almost 100% of Lviv residents are moving around the city more or less on foot. However, since there is more focus on transport, the comfort of pedestrian mobility is out of sight. There was an indicative situation when during the preparation for Euro-2012 the roadway on the main streets of the city was repaired, but these repairs hardly ever touched the pedestrian infrastructure, and failed to take into account the needs of cyclists. The sidewalks on these streets were partially repaired separately, after the football championship ended.

Now, during repairs and reconstruction of streets, the pedestrian space is obligatory to arrange, but often on a residual basis, under minimum requirements, or conserving the pre-reconstruction condition.

The cars parked on the sidewalks were the first challenge that city activists had to fight. The "Let me pass" public initiative installed the first anti-parking bollards on the edges of narrow footways across several streets in the city center.

The second challenge was on the summer open-air cafes. Under constant public pressure, the city's Commission on Summer Cafe Terraces started making pedestrian-friendly decisions, but almost every new open-air terrace is a new challenge, especially in the pedestrian area.

Since 2014, pedestrian-friendly and reduced mobility friendly sidewalks have been actively repaired in the city using special paving slabs. Due to the active position of the City Mayor Adviser on Accessibility, pedestrian crossings started having special



Photo by: Volodymyr Karaim

gradient (lowering) with no curb long before this rule became mandatory nationwide.

The introduction of public spaces, pedestrian alleys and pedestrian streets has become an important part of the city's development. Over the past five years, more than 40 such spaces have been created in different parts of the city.

Most conflicts today are about pedestrian crossings. For those who are often walking, there are no crossings in pedestrian-friendly locations, but those who travel mainly by car complain about too many pedestrian crossings on the road.

Poor air quality due to motor vehicles exhaust emissions is felt, as well as lack of green spaces in the streets, too narrow sidewalks and pedestrian crossings in highly-popular places.

Motor Vehicle Infrastructure

The city remains car-oriented. In most cases, getting somewhere by car is faster, safer and more comfortable than by other modes of transport. The number of vehicle transfers has been steadily increasing, in line with the increase in the well-being of residents, but this causes more congestion each time.

The peculiarity of most streets in Lviv is that the lanes are much wider than the current standard of 3-3.75 meters. Usually, within one non-standard wide lane, two cars are driving in the same direction, or there is illegal parking or cases of overtaking public transport. There is also a problem of no clear traffic organization at intersections, which

complicates the driving. This leads to a large number of maneuvers, violations and minor car accidents, which cause delays to other traffic and create constant stress for drivers.

The risk of accidents and fatality rate due to traffic accidents is relatively lower than the average in Ukraine but much higher than in European countries. According to official statistics, the incidence of fatal traffic accidents in Ukraine is five times higher than in the EU member-states. Every year, over 3,000 people are killed in traffic accidents in Ukraine, and over 30,000 persons get injured. The country loses USD 5 bln annually through traffic accidents, or 2.5% of GDP. Over 43% of those killed in 2016 are pedestrians and cyclists. Persons admitted to hospital after a traffic accident who died within 30 following days are not included in the statistics. 76% of traffic accident victims in Ukraine die at the pre-hospital stage, while in the EU the share is 28%.

The available infrastructure has a negative effect and contributes to the exceeding of speed limits and the lack of irreversible nature of punishment in most cases of traffic violations. An average daily traffic accidents rate in Lviv is 20. Most of those killed in traffic accidents were pedestrians, such as 46 of the 66 people killed in the 20 months from August 2016 to May 2018. Friday is the day when the highest number of traffic accidents occurs (17%). The most dangerous period in the day is from 3 p.m. to 7 p.m., the time that accounts for a third of all accidents.

On the user level, there is disrespect among traffic participants. Ownership of a car is still considered a sign of higher social status, while the prevailing public transport users are pensioners, school pupils, students, and women. Men are more likely to use private motor vehicles. Cyclists are predominantly young men, given the risk of cycling within the city. The planning and decision-making process in the field of infrastructure mostly engages persons for whom the main mobility option is driving a car. Politicians sometimes use transport populism, resulting in ill-considered and chaotic decisions.

The city authorities are allocating more money for the construction of new infrastructure, thus the available infrastructure elements are being neglected.



Photo by: Volodymyr Karaim

Financial Capacity of the City

Lviv city budget in 2019 was over EUR 365 million (UAH 9,857.1 million).

City budget revenue structure:

- personal income tax gives Lviv about 57% of all revenues;
- unified tax (11.02%);
- rent for urban property and land (4.3% in total);
- excise taxes (3.92%, of which excise tax on fuel sales is 1.3%);
- real estate and land tax;
- 32.93% of the city budget revenues were the transfers from the central budget and other sources.

Traditionally, the largest share in expenditures from the budget of Lviv in 2019 is composed of the following elements: education - 23.76%, health care - 6.6% and expenditures for municipal transport - 2.4% (UAH 240 million). The costs of municipal transport are mainly intended to cover the free and preferential travel passes for certain categories of passengers. Expenditure on city improvement (public realm) and public utilities is about 4.79% (or about UAH 380 million). This includes tariffs for utility companies, street cleaning, park cleaning, winter maintenance, ongoing repair of streets and buildings. This amount is commensurate with the amount of money that Lviv sends to the central budget every year. The city spends a commensurate amount each year on repayment of loans to public utilities (Lvivvodokanal, Lvivteploenergo, Lvivavtodor, Lvivelektrotrans, Green City) in the form of contributions to their authorized capital, and another UAH 240 million was spent on compensation to PT operators for privileged passengers (free of charge).

Revenues of local public transport enterprises allow to cover the operational activity only partially, in particular the expenses connected with the payment of labor and energy supply. However, for the repairs and maintenance, subsidies from the city are necessary. Increasing the level of service provided can only be possible through additional contributions from the city.

Therefore, for the maintenance of home and street infrastructure, communications, street reconstructions, repairs and purchase of rolling stock, the city provides UAH 1.15 billion a year, or EUR 40 million, which is 12% of the city budget.

CITY	BUDGET	ONGOING MOBILITY COSTS		INVESTMENT IN INFRASTRUCTURE	
	Mio, EUR	Mio, EUR	share, %	Mio, EUR	share, %
Lviv	365	23	6,30	14	3,84
Krakow	1 383	315	22,77	40	2,89
Prague	3 000	810	27,00	82	2,73
Warsaw	4 300	763	17,74	215	5,00
Paris	5 150	1 650	32,04	254	4,93
London	18 450	8 030	43,52	2790	15,12

Comparison of mobility expenditures and infrastructure development of Lviv with several European cities

In different countries, different shares of the budget are spent on mobility.

For example, from the City of London budget for the 2018-2019 financial year, the total amount of which is £ 16 315.5 million, funding for the operation and development of urban public transport and urban mobility is provided for £ 9 570.5 million. Of this, £ 7 103.0 million will be allocated to the current expenditures of the municipal operator "Transport for London" (TfL), and £ 2,467.5 million to capital investment in the municipal public transport. The total amount of these expenditures is 58.66% of the budget of London.

Another example of significant public transport and urban mobility costs is Prague. Despite its former affiliation with the Soviet Bloc, the share of funds allocated annually to mobility goals from the Prague budget is fully commensurate with Western European cities: according to the 2019 city budget, out of the total expenditure of 77.569 billion korunas, public transport operations and infrastructure development expenditures make about 21 billion - 27% of annual budget expenditures.

Warsaw also provides significant funds for the operation of public transport in the city. Of the 17.5 billion zloty of 2018 annual budget, about 4.8 billion zloty was allocated for the operation of public transport, accounting for 27.3% of city budget expenditures.

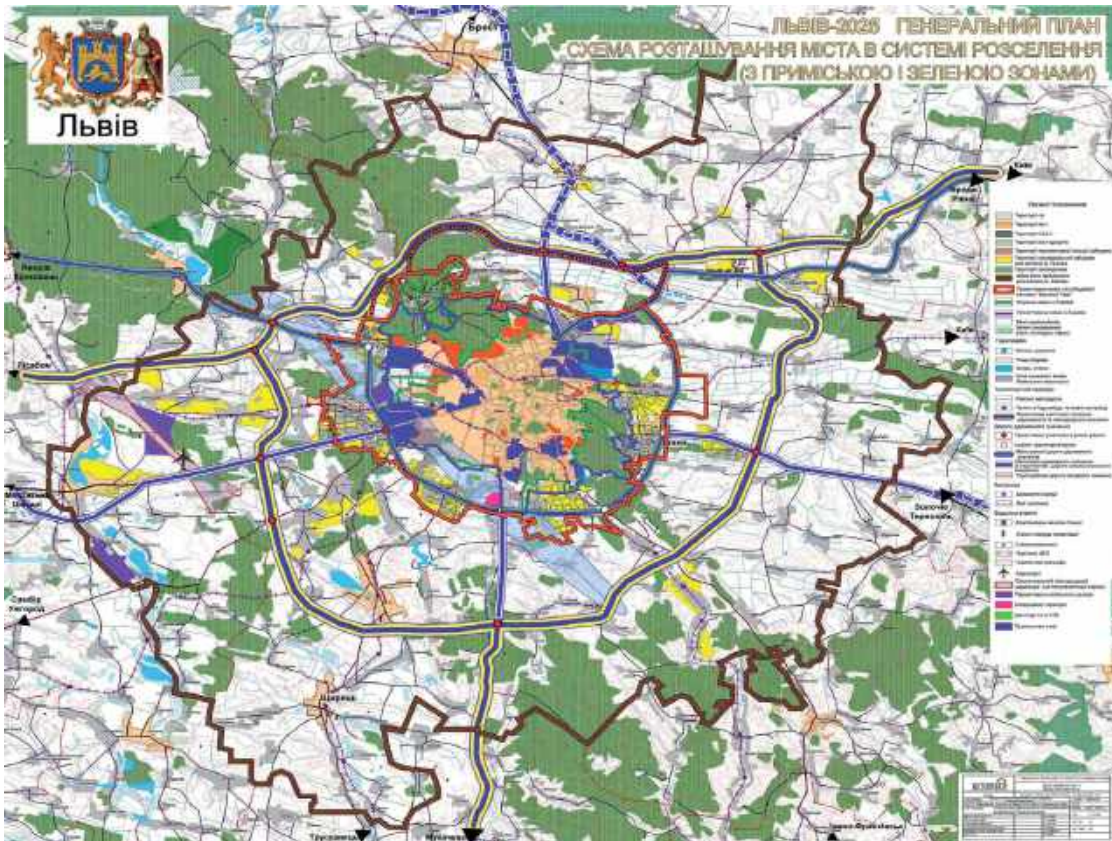
In addition, active budgetary financing of public transport can be seen not only to cities but also to agglomerations of major cities in Europe. An example would be the Ile-de-France region, the metropolitan area of Paris. Of the 2019 agglomeration budget (constituting a separate administrative region of France), EUR 1.53 billion is allocated to support and invest in the development of transport and mobility in the Paris region - 30.6%.

One explanation for these differences is that, in different countries, different costs are covered by the budget. Besides, Lviv budget is much smaller than in the EU cities.





2010 Master Plan and Reality

The Master Plan requires for a 20-year investment period of EUR 4 billion in the construction of new transport



Highway scheme according to the Master Plan 2010

Source: www.city-adm.lviv.ua

INFRASTRUCTURE	AMMOUNT OF WORKS	COSTS
		
metro / underground	43 km, 3 lines	EUR 3,000 million
development of tram network	32 km	EUR 100 million
development of trolleybus network	47 km	EUR 100 million
construction of tunnels and multi-level interchanges	4 km tunnels, 54 two-level interchanges, 2 three-level interchanges	EUR 240 million
construction of new streets	80 km of two-lane streets, 40 km of four-lane streets, 30 km of six-lane streets	EUR 380 million
new railway crossings in different levels	11 bridges over the railway and tunnels under the railway	EUR 60 million

Approximate assessment of the measures proposed by the General Plan for 15 years (from 2010 to 2025)

infrastructure, equivalent to, for example, the entire Defence Ministry budget for 2019.

Factual Lviv annual investment in infrastructure is EUR 14 million (much of that amount are loans).

Given that all the costs of maintaining existing and creating new infrastructure, purchasing and repairing of rolling stock, repayment of loans is under EUR 50 million a year, the implementation of everything proposed by the Master Plan in cities will take about 100 years, provided no repair of existing vehicles, no procurement of new vehicles, and no repair of existing street network. If you abandon the most expensive part - the construction of the metro / underground - it can be achievable in 25 years, provided the complete lack of any maintenance.

In addition to the purchase of vehicles, it is important to ensure that they run and carry passengers. The following amounts are required per year to provide high-quality service per one passenger unit in modern transport: tram – EUR 800, articulated trolleybus – EUR 1,000, regular trolleybus – EUR 1,400, diesel bus – EUR

1,600. This includes salaries of drivers and other personnel, spare parts, timely check-ups and repairs.

Up to 50% of this money is now received from the ticket sales, but the current state of transport demonstrates that revenue from ticket sales alone is not enough. Therefore, some kind of support is needed from the city budget.

In the current transportation model, when there is significant duplication in one areas and a lack of transport supply in others, the real expenditures of all transportation process participants is over EUR 80 mln per year, but the quality of passenger service is not high enough.



Photo by: Oleksandr Shutyuk

Vision



Photo by: Volodymyr Karaim

**Safe, environmentally friendly,
comfortable and fast urban
mobility for everyone**

Lviv: perspective

By 2035, Lviv will, for the most part, be an attractive city with a high quality of life for both its citizens and its numerous visitors from near and far. Compact and integrated urban structures in line with the concept of "the city of short distances", high-quality, pleasant public spaces, and good environmental and transport conditions noticeably contribute to it.

Mobility is not a luxury and all citizens, regardless of their age, gender, income and health have good access to public transport, which interconnects all the locations of the city reliably, quickly and inexpensively due to a dense and well-structured bus and tram network offering a high service frequency. As a result, on-street cycling has become an attractive and fast way of travelling through the whole city without cyclists being impeded by cars and congestion. Cycling has therefore become a fully-fledged alternative mode of transport, including for longer distances. People continue to walk frequently, including longer distances, since the provision of green infrastructure along the streets and in the public realm as well as a well-connected pedestrian network within the urban neighbourhoods resulted in more pleasant and safer walking conditions.

Automobile transport continues to exist, however, due to attractive alternatives and appropriate management and regulations (including parking), people only drive if there is no suitable alternative. Digital and demand-responsive mobility offers form part of a "smart mobility" service and are further conducive to reduced car use, with offers including demand-responsive minibuses that provide services for large residential areas situated at the urban edge, car-sharing / car clubs, bike-sharing / cycle hire schemes, scooter-sharing etc. Delivery of goods and services to the city and its residential neighbourhoods is reliable and efficient, in particular due to an integrated city-wide freight strategy with a network of high-priority routes and distribution centres, regulations and environmentally-friendly vehicles, for example cargo bicycles.

How did it happen/ what brought about the change?

How did it happen / what brought about the change? 15 years ago Lviv was at a crossroad. During the previous years car ownership and usage had considerably grown; large housing developments have sprung up/emerged, often in areas with poor public transport connectivity. However, whilst motorization was still much lower than that of similar Western European cities, congestion

was already causing significant problems (primarily in areas close to the city center. Further concerns included numerous road collisions with many injuries and fatalities, considerable delay for public transport (overcrowded in rush hours), negative health impacts of car emissions and transport noise, as well as unappealing public spaces with unsatisfactory conditions for walking and cycling, with the exception of the pedestrian zone in the city centre. Lviv was in danger of becoming a city suffocating from automobile transport like other European cities that had gone through this several decades before.

There were other negative challenges for the city:

- Numerous road transport accidents resulting in injuries and fatalities;
- significant obstacles for the public transportation movement during the rush hour;
- exhaust fumes and traffic noise negatively affecting the wellbeing and health of the city residents;
- unattractive pedestrian infrastructure (with exception of the downtown area), adverse conditions for pedestrian and bicycle movement;
- poorly designed public space areas, not adapted for handicapped, especially for people with trolleys, elderly, people with other movement disabilities.

There was a threat that Lviv would transform into a city that is always congested and full of traffic jams caused by the individual motorized transport. It is still in dire need of transportation improvement similar to the improvement occurring in other European cities a few decades earlier.

There were 3 key determinants for, firstly, bringing these negative developments / trends to a halt and then reverting them:

1. While developing its transport policy and strategy, Lviv did not make the mistake of merely copying the solutions of other cities. Lviv was looking for its own approach to address local problems. The car was not seen as an enemy and it was not intended to restrict/limit car ownership further. People had realized that increasing car use would exacerbate the city's problems, as they faced the above-mentioned problems daily. Taking into account the financial constraints and regulatory framework, the main aim was to limit car use to a level that was acceptable for the city. This was achieved by enhancing the walking and cycling environment, and, above all, the public transport provision on the one hand, and regulatory measures on the other hand, including parking management, speed limit and traffic management. Key to achieving acceptability of this strategy were a number of public realm pilot projects, which demonstrated the benefits that these improvements brought about to the quality of life as well as to road user safety (Lviv committed to implement Vision Zero).
2. At the same time, despite difficult economic conditions, the growth and development of the city was extremely dynamic. It was characterized by a large number of building projects, primarily from private investors. These developments were located between the city center and the residential areas at the edge of the city. In an intensive dialogue with property developers, the city has managed to create urban, mixed-use neighbourhoods with attractive, car-lite public realm, whilst significantly improving the public transport connectivity of these new developments. At the same time, developers oriented themselves more and more on public transport axes and hubs. In such a way, a paradigm

shift towards integrated urban development was achieved, due to which the increase in traffic was minimized and the new transport needs are now mostly met by environmentally friendly and suitable-for-the-city modes of walking, cycling and public transport. This strategy was gradually rolled out to other parts of the city, for example, by densifying and diversifying neighbourhoods at the edge of the city truly mixed-use developments were created.

3. This transformation was possible due to initial and consistent orientation of political and planning processes at achieving the broadest possible consensus amongst key political stakeholders and the community. Through various formats, citizens were drawn into the dialogue as intensively as the key stakeholders and business representatives, other social groups and nearby regions. It was also important that in parallel to this dialogue an improved institutional framework was developed and established. For instance, the competences of urban development and transport planning were better integrated, and the formerly scattered competences in the field of public transport were combined so that it became possible to integrate timetables, networks and fares for the city and regional public transport, allowing for more customer-friendly services. Besides, the local self-government possibilities, acquired within the framework of state decentralization, were used purposefully to conduct effective lobbying work together with other cities for the sake of better legal and normative framework conditions.

Yet there is still a lot to be done. For the last 15 years, determinative strategic steps have been taken and a number of crucial processes were started, due to which the situation in Lviv has significantly improved compared to 2020. However, in order to achieve this an urban quality / quality of life consistently throughout the whole city and beyond the city boundaries within the region and to maintain these in the longer term, significant efforts will have to be made. Further new challenges emerge as a result of constant social changes and new technologies. But the city has already greatly advanced on its chosen path, and, as long as Lviv continues to use a realistic basis in terms of financing, deliverability and the continuous support of city community, it will also be able to continue to improve the quality of life, and thus its attractiveness and economic power in the future.

Negative scenario of Lviv Mobility Development

Over the ten years, from 2009 to 2019, the number of private cars in Lviv has increased several times. The car has become not only the most efficient way of transportation in the city in terms of comfort and speed and the only one that is not humiliated by other road users, but also a sign of social status. Once people started earning more than monthly maintenance, their goal was to buy a personal car. The traffic congestion increased, so the citizens of Lviv spent more time in traffic than in public and private transport. The city authorities were blamed for the streets being too narrow, without the possibility of a significant expansion of the roadway and lack of funds to implement the infrastructure decisions provided for by the City Master Plan.

The city authorities understood that the desire of residents to drive their cars will be increasing every year. Thus, in 2020, they started a large-scale development of transport infrastructure, using their own, loans and public funds. First of all, it was decided to complete the roads for the detour of the central part of the city and multilevel interchanges on the sites of the busiest intersections.

Feasibility studies for even more costly projects have begun - a chord highway that connects the northern and southern parts of the city with tunnels bypassing the congested center, as well as the construction of the metro / underground as a high-speed underground connection, which will make it possible not to be stuck in traffic congestion, unlike other public transport options. It was anticipated that if a metro / underground was to be operational, on-street public transport would become unnecessary, thus clearing more space for car traffic and parking.





Photo by: Volodymyr Karaim

Lviv was actively developing. Private investment was primarily aimed at housing construction in remote areas from the city center. This went in line with the requests from Lviv citizens: not to add any new buildings to the pre-war historical environment, not to put additional burden on the social infrastructure of the “sleeping” neighbourhoods of the Soviet period. Residents demanded 100% provision for parking lots at new buildings - 1-2 car slots per family. It is very expensive to lay engineering networks (water supply, sewerage, electricity) to new buildings on the outskirts of the city, so almost all the “infrastructure fee” - contribution of new construction developers to infrastructure development (4% of construction cost) offset these costs. Construction of the road and public transport extension remained a problem that the city had to tackle at its own cost. Cars appeared to be the only mobility mode at such new buildings.

The number of cars on the city streets rocketed. Whether it goes about getting children to kindergarten or school, getting to work, doing shopping, going to the cinema - every step required a trip by individual vehicle. Lviv citizens spent more time in transport, congestions became longer, and their number increased. The city authorities responded to the congestion by starting the construction of new roads and interchanges. However, the funding was lacking, and the throughput capacity demand was growing faster than the supply provided by the city. The quality of life in Lviv was declining. Air pollution and noise levels made life in the city uncompetitive compared to the suburbs. Settlements from single-family homes in the 50-kilometer radius of Lviv were actively growing, and agglomeration was

developing. However, to obtain most functions, except for residential ones, residents of the agglomeration were forced to travel to Lviv. And the car has become a means of accessing any service or opportunity.

Attention from urban public transport has shifted to the expectation to have the metro / underground as a solution to all problems. Investments in quality of rolling stock, maintenance and development of infrastructure have ceased. The public transport, crowded with passengers, stood in traffic together with private cars. For those who could afford to buy a car, it was obvious that it was more comfortable to stay in the traffic congestion with air conditioning and radio, than in a crowded public transport degrading every year. Therefore, the solvent passenger left the public transport. The rise in fares was accompanied by constant protests from residents who saw no reason to pay more as quality did not improve. The fare remained low and the quality of public transport declined ever more.

Not everyone switched from public transport to cars. Some people appreciated the speed of movement above all else. This is how more cyclists, motorcyclists and scooterists have appeared. Motorcyclists and some cyclists were able to quickly maneuver between cars in traffic, which

caused many accidents. Scooterists and less courageous cyclists have moved to the sidewalks, and together with people on electric scooters, Segway and gyroboards, they have created constant conflicts with pedestrians there. To resolve the conflicts, the sidewalks were divided into two parts - bicycle and pedestrian.

Drivers complained about too many pedestrian crossings. The number of crossings was being ceased, the intervals between crossings were increasing, so cars were able to speed up. Pedestrians began to cross streets in more unsanctioned places, so the number of accidents with serious consequences increased, formally for pedestrian fault. Initially, the number of traffic lights was increased because, due to the large number of people crossing in one place, the cars were almost unable to pass the pedestrian crossing. However, after realizing that the traffic lights were reducing the capacity of arterial streets, and it was decided to build underground crossings planned to be further connected to metro / underground stations in the future. Having no advantage in either speed, comfort, distance, or safety, pedestrian traffic became fragmented and of necessity. The number of pedestrians in the streets was declining.

As it became uncomfortable to walk on foot, every person going by car tried to park

as close as possible to the destination. The areas near significant points of attraction in the central part of the city started suffering from increasingly more cars.

As a result, residents started demanding the construction of parking lots, but at the same time required not to enforce illegal street parking around the area. Under such conditions, no investor wanted to take on any project for the construction of off-street parking. Thus, the city was forced to start construction of parking at the cost of city budget.

Large infrastructure projects for the construction of new roads, multi-level interchanges, parking and the metro / underground faced the unfeasibility issue due to lack of funding. At the same time, the existent road network has been declining due to shifting attention to the construction of a new one.

The number of cars on the streets continued to grow steadily, traffic congestion became longer and longer each time. The opening of several new interchanges actually shifted the congestion to the next intersection with lower throughput capacity and attracted more cars as drivers usually opt for infrastructure with higher capacity until its potential is exhausted.

Alternatives to car travel around the city have become ineffective, uncomfortable, and dangerous. In the daytime, the entire city sits in traffic. In the low hours when there are no traffic jams, the traffic speed increases, and consequently, the number of accidents and deaths grows, too. The city budget is overloaded with projects that are out of proportion to its capabilities. Thus, today it has no way of solving pressing issues.

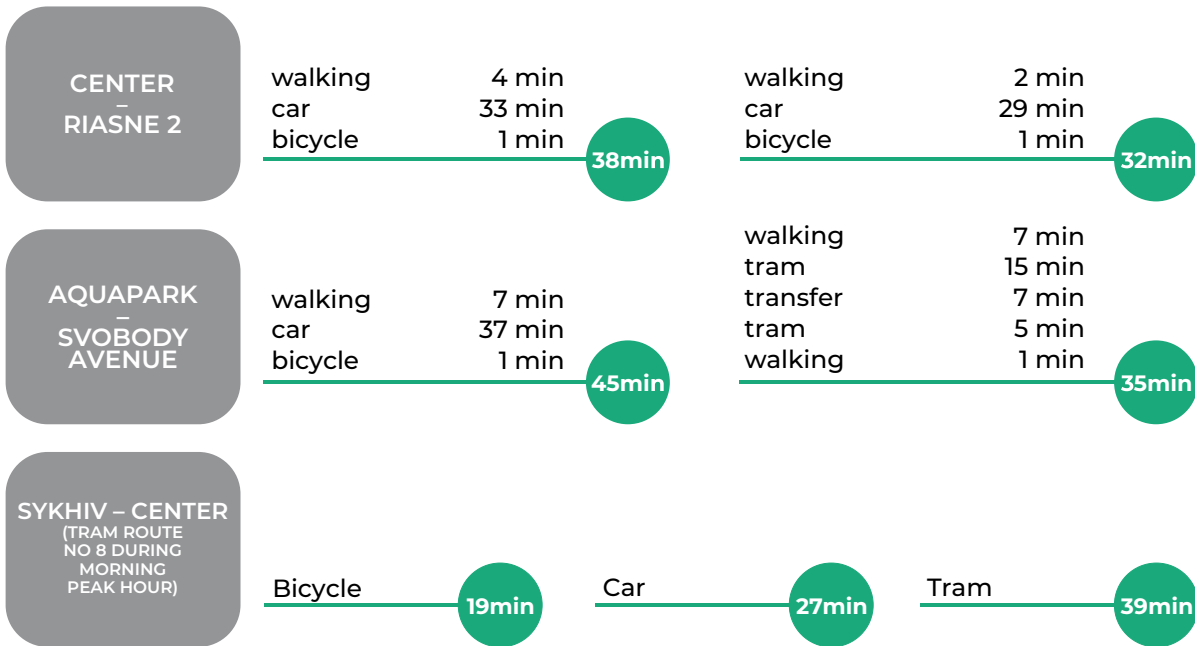
Photo by: Volodymyr Karaim



What would each citizen want?

Each citizen wants to have increasing comfort of staying, living and moving in the city. A large share of citizens are moving around the city every day in various directions, with different purposes, and taking different modes of transport. Everyone finds it very important to reach the destination safely, on time (within expected time), stress-free, and in comfortable conditions. At the same time, people always take not only one mode of transport, but rather their combination, even within one transfer.

To illustrate, one could refer to the data of experiments run to compare the speed of different mobility modes (experiment findings in a vlog by Oleksandr Shutyuk):



In a video, we can see dozens of conflict points between different road users. Some people sacrifice comfort for the sake of speed, while others give up speed for higher comfort. Each and every person believes their transportation is a priority.

Is it possible to create perfect conditions for all?

We do not imply different citizens, but rather different mobility modes. Comfortable conditions for each mode of transport are different.

Walking

For pedestrian mobility, perfect conditions include the sufficient width of the sidewalk, shade and coziness from trees, clean air, no high noise levels, no barriers, possibility to move fast, with no need to slow down to cross the streets, with pedestrian crossings without much mandatory deviation, the arranged comfortable places to have a rest, and with all routes within the same horizontal plane.

Public Transport

For passengers in public transport, perfect conditions would include the high technical condition of the rolling stock, clean and neat vehicles, fast movement without unnecessary delays, expected arrival time, clear schedule, comfortable number of passengers in the compartment, comfortable stops and access ways thereto.

Cycling

For a cyclist, perfect conditions include safe and barrier-free infrastructure for riding a bicycle that could provide for the fast uninterrupted transfer, possibility to safely store the bicycle throughout the day.

Car Driving

A private motor vehicle driver would require the sufficient number of lanes for uninterrupted movement, no traffic lights and speed calming facilities, high quality and clear road surface marking and signs, as direct routes as possible for fast movement, no other road users, accessible parking slots.

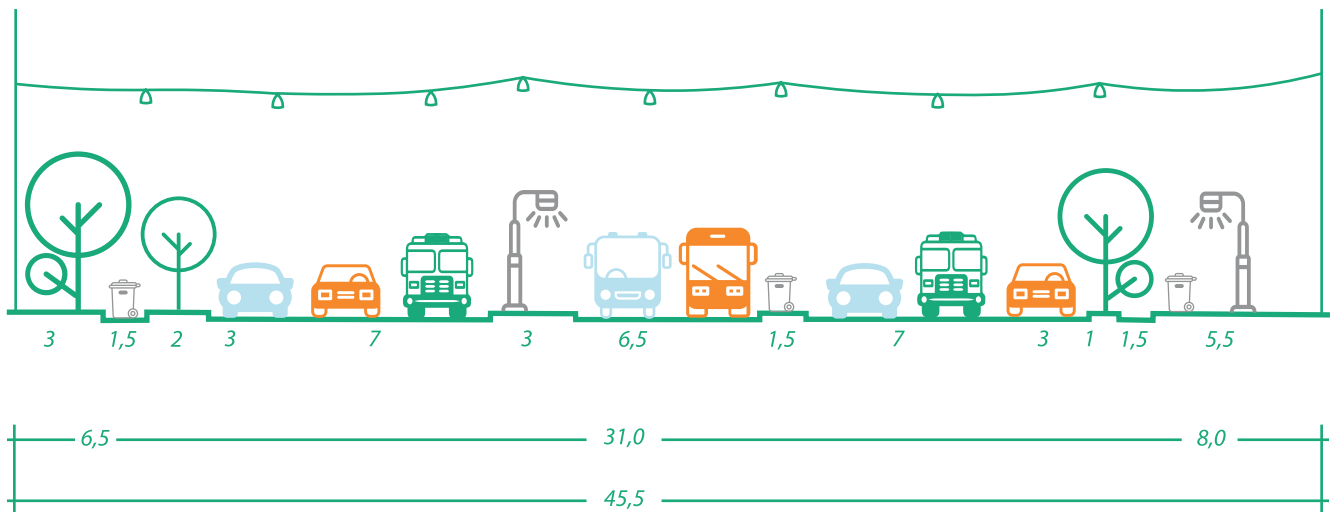
Freight Transport

A freight vehicle or a delivery vehicle driver would want the possibility to stop for unloading/uploading the goods as close to the destination as possible (stores, cafés, etc.).

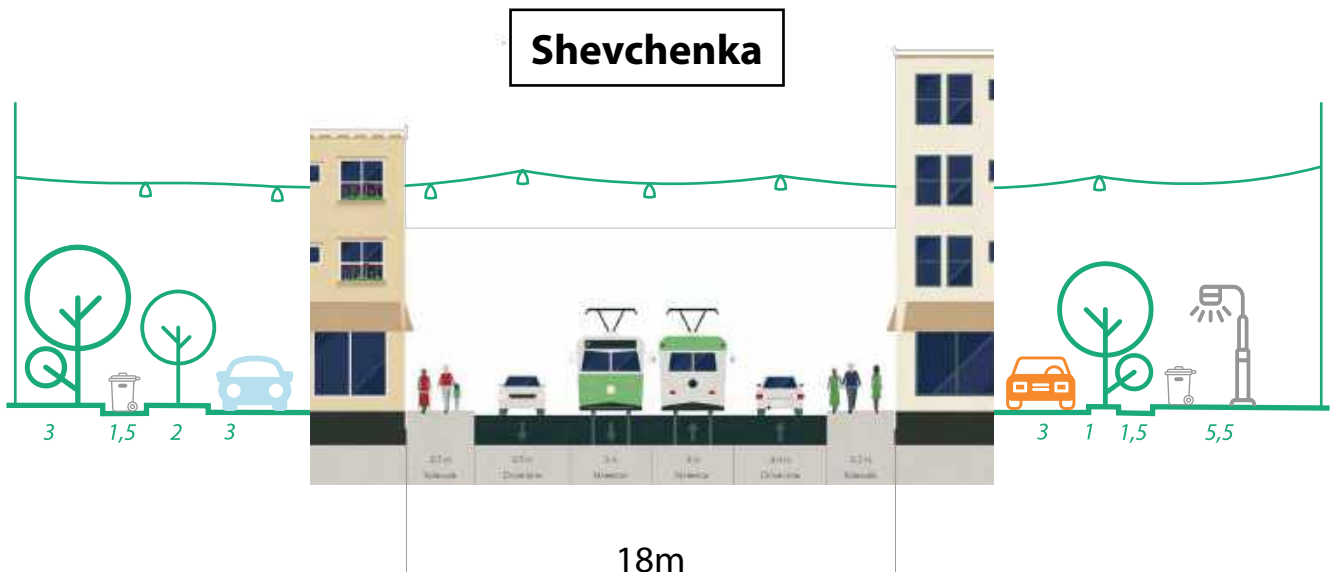
Taxi

A taxi passenger needs an uninterrupted movement between the points of interest, the possibility for pick-up/drop-off in a convenient location.

Each mode of transportation requires different approaches to spatial organization and to infrastructural solutions.



The above-listed needs for everyone clearly illustrate that it is unfeasible to satisfy everyone with perfect conditions within the urban fabric.



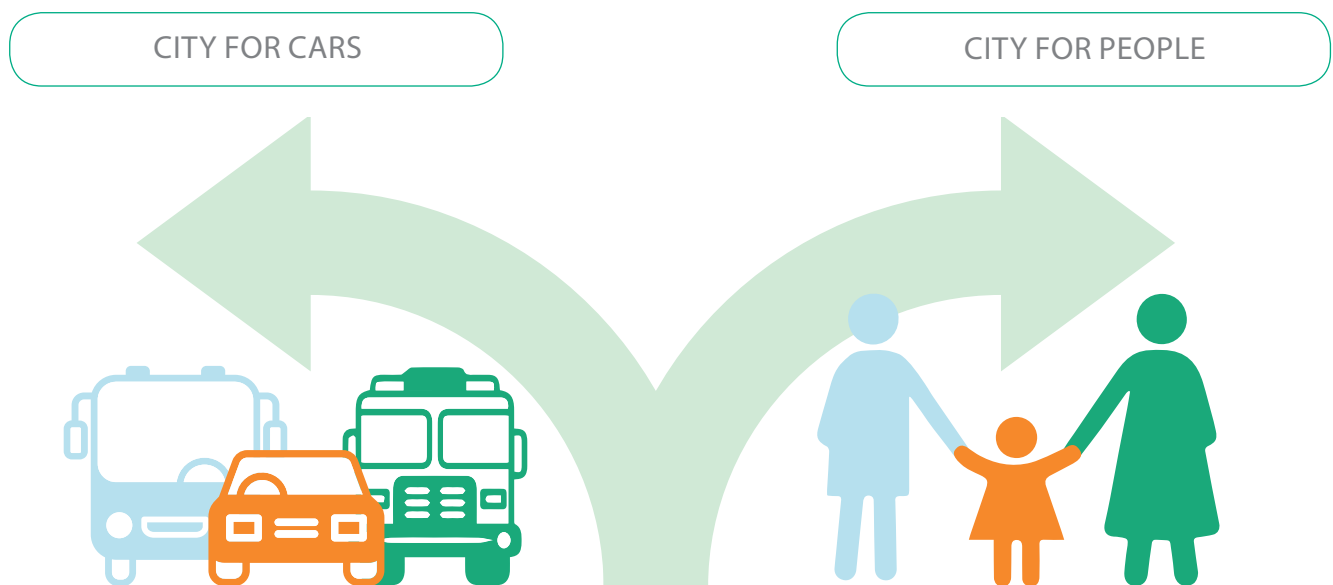
Further directions to develop the city shall be prioritized. Each infrastructure shall be consistent and meet the stated principles and priorities.

Presently, Lviv is at the crossroads. On the one hand, the city extends the cycling infrastructure (Kniahyni Olhy, Sykhivska, Chornovola, bicycle lane to Briukhovychi) - streets, and develops public spaces (Rudanskoho, public spaces at Vernadskoho, Hasheka) - streets, upgrades public transport (in 2017–2019,

the city procured 150 buses, 50 trolleybuses, 30 used trams from Berlin, ten more new low-floor 5-section trams are coming). On the other hand, other projects are designed to incentivize motor vehicle traffic and complicate it for other road users (reconstructions of Mechnikova, Bohdanivska, proposed transit-way between Khotkevycha and Skrypnyka streets). It is an unhealthy behavior, that is why there is a need to define the kind of city we are developing and the objectives we wish to achieve.

Analysis of infrastructural solutions in European cities reveals that priority is given to the modes of transport with the highest passenger capacity such as a tram, a trolleybus, and a bus.

How to develop mobility in Lviv?

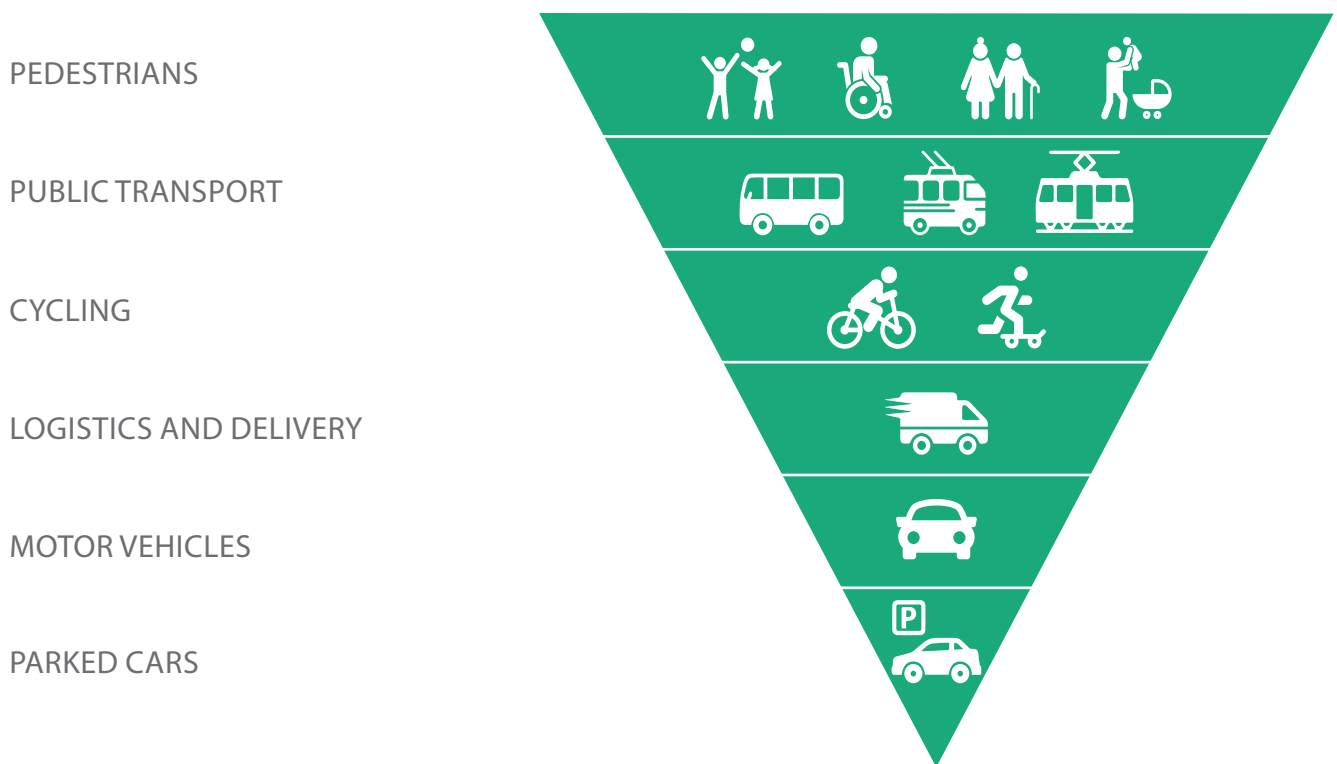


At the same time, a high-quality pedestrian infrastructure shall be provided to relieve the road network from extra short-distance car trips and to provide for convenient access to public transport stops. Experience of European cities shows that most car trips can be replaced with more environmentally-friendly, more efficient and healthy modes of transport, such as a bicycle and other small size individual vehicles (a standup scooter, a gyroscooter, a.o.). However, these modes of transport can actively develop only given there is available safe cycling infrastructure and barrier-free environment.

Practices from other cities show a significant decrease in using cars given the high quality alternatives, such as public transport, a bicycle, or walking for distances of up to 15–20 minutes ride or walk to the destination.

European cities pay more attention to issues of delivery/logistics. Delivery cannot be utterly restricted since it helps economic development. However, it shall be regulated not to interfere with city life. Delivery shall be provided by more environmentally-friendly modes of transport.

Priorities



Therefore, the following priorities have been identified for Lviv:

Each of us can move around on foot. Walking is good for your health, it is free of charge, and environmentally most friendly. That is why walking on foot is No 1. A survey showed that over 50% of residents take public transport for daily transfers – making it a priority No 2. Priority No 3 would rather be the mode of transport with high capacity such as cycling which is currently not popular enough due to lack of safe infrastructure. The following level in the priority pyramid includes vehicles delivering goods and materials.

It has been left out of focus, thus generating issues for all other modes of transport. Private cars follow. It is the least efficient mode of transport in the city. It requires much space, bears lethal risks, and pollutes the air. The last but not least priority goes for individual motor vehicles standing by. One parked car takes up to 9 m². It is the irrational use of street space. That is why many cities are trying to eliminate street parking, especially in the inner city.

Modes of transport alternative to cars shall become as comfortable and attractive as possible since it is hard to imagine what could happen if the current 23% to 52% correlation of private cars and public transport is going to lose 10% more from public transport to cars

Principles for Mobility Development in Lviv



Photo by: Oleksandr Shutyuk

SUMP principles – key statements which adherence will help to fulfill the SUMP as scheduled. It is a theoretical background to refer to in any decision-making on urban infrastructure or development.

1. Street – it is the public space, not the “road.”
2. Traffic safety has a priority over travel speed; human life and health are the highest values.
3. Quality pedestrian space is a key priority in street planning.
4. Public transport is the backbone of the city’s transport infrastructure.
5. A passenger shall benefit from taking public transport in terms of time and financial input.
6. Transport for passengers, not passengers for transport.
7. The city holds back the growth of private car usage.
8. Possibility to safely and comfortably ride a bicycle along all streets in Lviv.

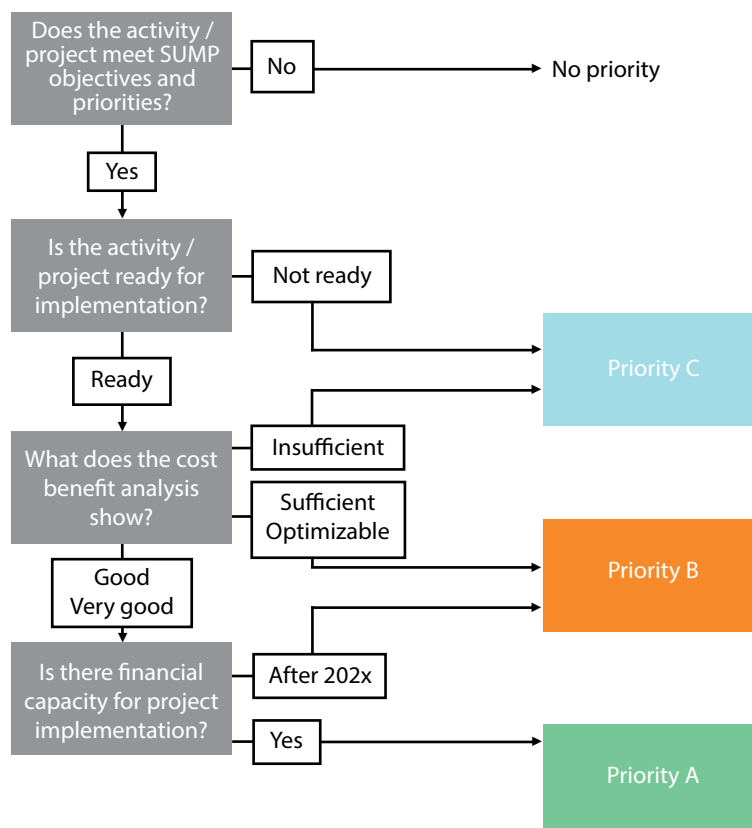
Planning principles for territory development (Integrated Urban Development Concept)

1. New developments shall use the existing reserves and heavily rely on the available infrastructure.
2. Development shall encourage ecological mobility.
3. Development shall support the old and create new spatial, social, and economic connections.
4. Public transport infrastructure and cycling-pedestrian links shall connect new neighbourhoods that have already developed.
5. New neighbourhoods in the periphery shall be planned only if good public transport infrastructure is available.
6. New development shall produce public and shared private spaces.
7. Public and green spaces shall be connected into a single network.
8. Partnership between the city and developers, and citizens engagement enhances the projects and activities impact, and makes their outcomes more sustainable.
9. Better perception of new development by the citizens can be possible due to new opportunities in mobility and improved quality of public spaces.
10. New neighbourhoods, as well as areas to be restructured and densified, shall be consistently planned under sustainable mobility principles and efficient use of available infrastructure.

The principles make it easier to evaluate investment projects, to forecast the consequences of each project idea, and show project efficiency enhancement.

Priorities in Implementation of Activities

Whenever there is a long list of activities, it is important to define the priorities in the context of limited resources.



CHALLENGES

IN TERMS OF MOBILITY PRIORITIES, DEVELOPMENT CAPACITY ANALYSIS OF LVIV AND THE IMPLEMENTED PROJECTS, SEVEN CHALLENGES HAVE BEEN IDENTIFIED THAT COME IN THE WAY TO SUSTAINABLE MOBILITY AND HIGH QUALITY OF LIFE STANDARDS IN THE CITY:



TRAFFIC SAFETY



DECREASE OF ATTRACTIVENESS OF URBAN SPACE FOR WALKING



INSUFFICIENT PUBLIC TRANSPORT QUALITY



INCREASE IN VEHICLE-TO-POPULATION RATIO (CONGESTION, TRAFFIC ACCIDENTS, HAZARDOUS EMISSIONS)



BICYCLE IS A MODE OF TRANSPORT, NOT ONLY THE MEANS FOR ACTIVE OUTDOOR ACTIVITIES



TRANSPORTATION INFRASTRUCTURE NOT PROVIDED INTO DEVELOPMENT AREAS



LOW INSTITUTIONAL CAPACITY OF THE MUNICIPALITY

Sustainable urban mobility plan includes a description of each challenge, justification of objectives, decision-making principles and list of activities to achieve the set objectives.

A solution to address the situation is suggested for each challenge.

SUMP MAIN OBJECTIVES

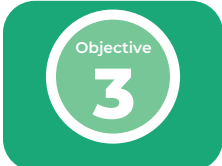
TO REACH ZERO FATALITIES IN ROAD ACCIDENTS



PEDESTRIAN FRIENDLY CITY



EFFICIENT, COMFORTABLE,
AND ECO-FRIENDLY PUBLIC TRANSPORT



TO OPTIMIZE MOTOR VEHICLE
TRAFFIC IN THE CITY



TO MAKE A BICYCLE AN ATTRACTIVE MODE
OF TRANSPORT FOR HIGHER NUMBERS OF CITIZENS



CITY OF SHORT DISTANCES



COORDINATED MOBILITY MANAGEMENT
AND HIGH COMPETENCE LEVELS OF THE STAFF



CHALLENGE 1: Traffic Safety





Photo by: Volodymyr Karaim

Traffic safety – is the definite and most important priority for each road user. The current “system” provides the main leverage to punish for breach of traffic rules. However, the most decisive factor is a street design and correct engineering solutions ultimately aimed at preventing breaches of traffic rules and minimizing consequences in case any road user made a mistake.

The survey conducted within the SUMP development, as well as the objective data on the traffic accidents involving casualties indicate huge issues with traffic safety. Over the recent decade, the number and severity of road accident consequences has tremendously increased in Lviv. Whereas, the higher numbers of cars is not the primary cause.

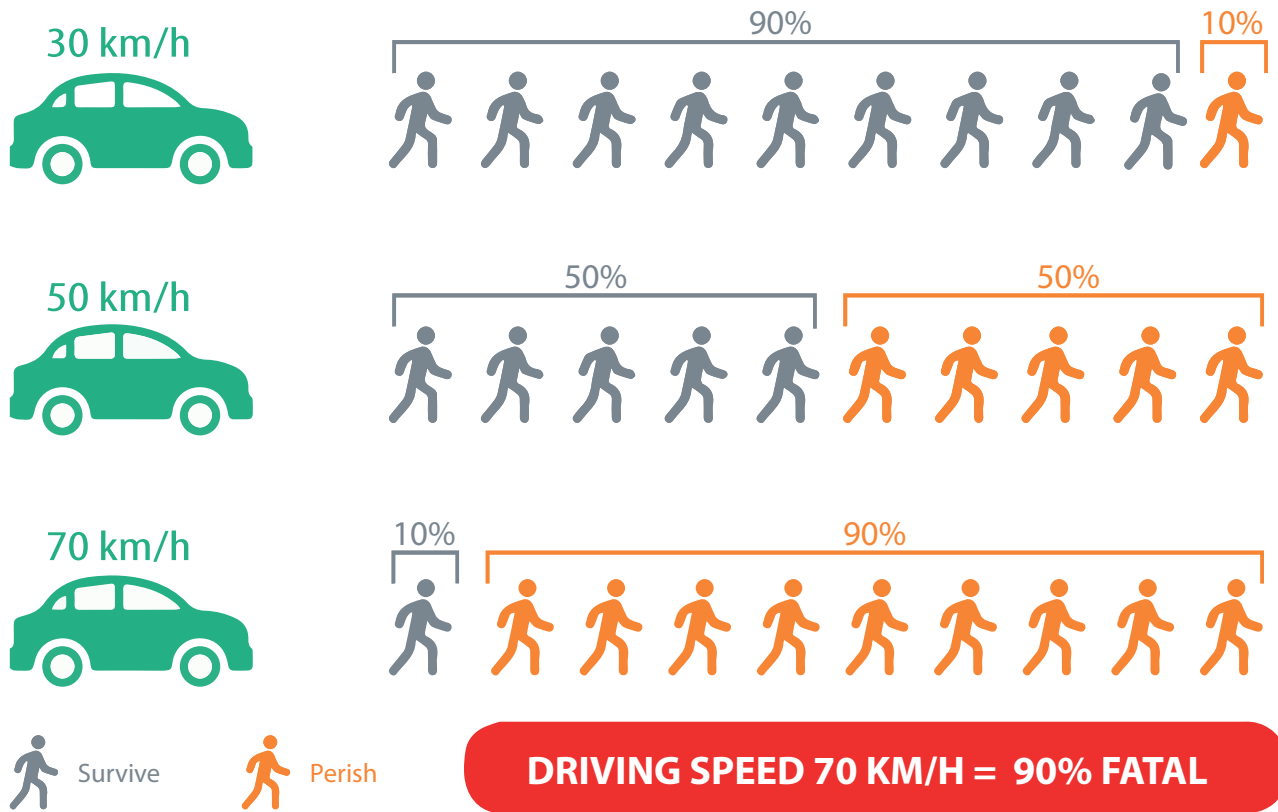
Traffic accidents data  **2018**  **Lviv**



 **32 - fatalities**
 **994 - injured**

25 of the 32 victims are pedestrians
 42% of road accidents with injuries occur during night-time

The prevailing cause for road accidents, injuries, and casualties is travel speed. Calming the travel speed leads to the reduced likelihood of road accidents, and lower probability for severe injuries and fatalities.



Source: "Rosen and Sander (2009). Pedestrian fatality risk as a function of car impact speed, Accident Analysis and Prevention 31, 536-542. 2009"

Vehicle-to-population ratio in the 1980s-1990s in Lviv was characterized by the fact that there were rather few cars in the streets. The owners safeguarded their vehicles very thoroughly, while technical specifics did not allow them to accelerate quickly. Road space of the streets had wide lanes with large curves. They were meant for comfortable passage of heavy vehicles that prevailed at those times in the traffic flows (over 50%), rather than today. Poor road surface condition in the 1990–2000s did not allow to develop high speed even when driving powerful cars that started appearing in the city streets. Thus, despite the increase in the number of private cars, the problem with traffic safety was not disastrous.

The situation started changing fast after the overhauling of the road surface, such as before the UEFA EURO-2012 football Championship, and the upon reconstruction of streets. After improving the road surface quality, cars started building up high speeds. Subsequently, the number of fatal road accidents grew. It may be noted that the road accidents rate in the unrepaired streets was much lower, while accident black spot sites appeared immediately after the opening of repaired streets for traffic. The situation resulted from the historically wide lanes and huge turning radii, as well as due to State Construction Standards that obliged road designers to design streets comfortable enough for exceeding the speed limits. In particular, many urban streets that are the city-scale arterial ways according to the Master Plan, were supposed to prospectively become uninterrupted traffic streets, so are designed for 100 km/h speed limits. Other streets outside the city center are designed for the 80 km/h, while in most streets in the inner city (district-scale arterial roads) the designed speed is 60 km/h. Even the residential streets, where no public transport or transit traffic was supposed to be allowed and the speed limits under the traffic rules was 20 km/h, have been designed for 40 km/h.

Thus, after a series of capital repairs leading to flat road surfaces and comfortable travel speed due to traffic organization, the number of road accidents with casualties and fatalities has rocketed. Due to frequent lack of road marking and common use of the street space against the design objectives (parking on the wide traffic lane, multiple options to cross the intersections), there increased the number of road accidents involving several vehicles during maneuvering. High numbers of cars in peak hour, unchanellised intersections, and not clear parking cause high frustration among drivers. The problem of transit traffic running across residential streets and the housing grounds to detour the congestions has aggravated, too. It poses huge challenges for quality of life and safety within residential areas.

Historically, there has been a habit in Lviv for pedestrians to cross the streets anywhere since there is no car approaching. Another historical practice is the lack of enforcement of traffic rules by drivers, particularly for speeding. With the rapid growth in the number of cars, and the repairs of the road surface, the average speed levels of cars have increased. It provoked a higher number of road accidents involving pedestrians. Breaking traffic rules by road users, combined with high speed of motor vehicles, lead to more often severe road accidents. Police and transportation planners responded to the bitter statistics by installing pedestrian railings (fences) along the sidewalks and by eliminating pedestrian crossings.

The city introduced a series of projects to install traffic calming facilities and the means to channelise the traffic. It prevented passing through the intersections and pedestrian crossings at a high speed, usually common for drivers. Such activities have a positive effect on safety levels but drivers often take them negatively. Critics to this approach claim that it is The State Police Office in Lviv who should manage traffic speed and intersection crossing violations enforcement through fines. This measures can help avoid the offense rather than punish for the consequences.

As to preventing such a heavy offense as drunk driving, a positive effect came from the public campaign developed jointly with the police initiated by responsible drivers.



OBJECTIVE 1

To reach zero fatalities in road accidents

Current “system” provides that a key incentive to follow the rules is the punishment in the form of fines charged by the police. Therefore, with no patrol team around, it is considered acceptable to make “minor” violations that assumedly have a weak effect on safety (slight speeding, entering the busy intersection, a “five minute” stop wherever it is prohibited, crossing the street wherever you find convenient, rather than using a zebra, etc.). However, these violations raise risk levels and foster people to stay out in the streets, outside the vehicle, as little as possible, thus increasing the number of car drives and the number of vehicles.

Global practices show that engineering solutions work best. Their efficiency does not depend on the presence or absence of the police officer around. However, a large number of streets repaired in recent years have not taken it into account. Consequently, we have wide roads comfortable to drive at 90-110, while the speed limit required is 50 km/h.

A key reason for injuries and fatalities in road accidents is the driving speed. Calming traffic speed also reduces the likelihood of severe injuries and fatalities among road users.

Despite the multiple causes for road accidents (drunk driving, driving with no driver’s license, etc.), and the fact that the city council is not able to address some of the issues without the police support, severity of consequences of the road accidents mostly depends on the speed of the vehicle. Therefore, even though the city is not able to reduce the number of drunk or unlicensed drivers it can still take measures to minimize the number of casualties or fatalities among citizens.



Photo by: Volodymyr Karaim

1.1. To impose the liability for traffic safety in the city to the level of local self-government.

It can be achieved by establishing an institution or a structural unit at the city council to analyze road accidents, and to take measures to prevent further road accidents.

1.2. To introduce traffic safety audit system in the city.

Presently, there is only the State Expertise system for construction projects to verify the conformity with the State Construction Standards of Ukraine and Ukrainian National Standardization System. Traffic safety audit shall take into account the actual behaviour of people, their mistakes, and responses.

1.3. To create a budget program to foster safe mobility for all.

Presently, there are no dedicated planned budget entries to promptly arrange various infrastructural measures to boost traffic safety.

1.4. To introduce a clear hierarchy of streets in terms of driving speed.

Infrastructure shall be in line with the speed limits, while the speed limits shall comply with the surrounding conditions.

1.5. To ensure traffic violations enforcement.

The punishment shall be irreversible even in cases of minor offense, such as a fine. Photographic evidence for breaking traffic rules is key to implement this activity.

1.6. Freight vehicles and special vehicles shall be safe for the city.

Large size vehicles moving around the city shall be equipped with pedestrian safety features. Procurement of new vehicles for municipal needs shall take into account the safety of other road users.

Demonstration measures:

1. Reduction of speed limits according to street classes.
2. Special features to enforce speed calming in residential and arterial streets.
3. Traffic regulation and management with the help of road marking, traffic lights, road signs, and other engineering solutions.
4. Safe trip to school.

Catalogue of activities

To create a structural unit at Lviv City Council in charge of traffic safety on the level of local self-government to develop and implement the Program for Improvement of Traffic Safety in the city:

- To establish an institution with the competent staff who could process, implement and achieve the identified traffic safety objectives.
- The unit shall have the resources to analyze road accidents.
- To analyze each road accident with severe consequences and high-incidence sites for possible infrastructure improvements.
- The newly established institution shall develop and implement the Program for Improvement of Traffic Safety in the city and coordinate it with other municipal programs and maintenance organizations.
- To review high-incidence sites for traffic rules violations by pedestrians for a possible arrangement of crossings.
- To review the needs to arrange traffic lights and safety islands at available crossings.
- Stock-taking of road signs and marking within the city, creating the respective GIS layers.

To introduce a system for traffic safety audit in the city:

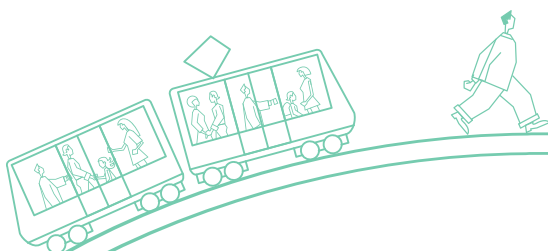
- To introduce a mandatory traffic safety audit for new projects for reconstructions and capital repairs.
- To introduce mandatory traffic safety audits for changes in traffic arrangement near new developments.
- To allocate budget for traffic safety audits.
- To determine the liability of project engineers for failing to account for traffic safety audit findings.

To create a budget funded program to enforce safe mobility for all

Infrastructure shall take into account the fact that all road users may make mistakes, and shall reduce to a minimum the likelihood of any consequences of these mistakes. The measures include:

- safety islands;
- elevated crossings and intersections;
- narrowing the roadway to standard lane width;
- mini-roundabouts, roundabouts and quasi-roundabouts (around the urban block);
- measures of shifting traffic trajectory;
- traffic calming measures, etc.

Suchlike measures shall have a reliable funding source. It is suggested to cover such activities partially from the funds collected from fines and fuel excise duty.

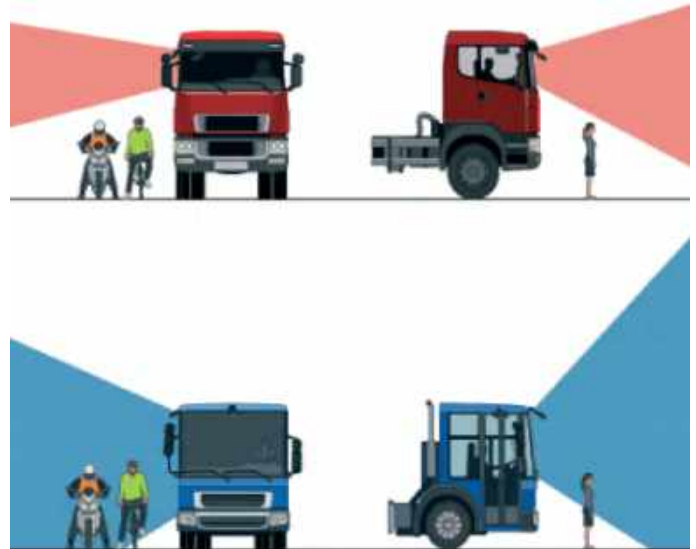


To introduce a clear street hierarchy in terms of speed limits:

- Taking into account the currently allowed maximum speed limit when designing projects for overhauling, reconstructions, and changes in traffic organisations.
- Development and implementation of traffic organisation schemes and traffic calming measures for residential streets and areas, transit restraints.
- Arranging traffic calming and improvement measures in arterial streets.
- Introducing speed limits of 30–40 km/h in the city center, enforcement with the guaranteed penal fines.
- Showing the maximum speed in GPS navigators.
- Traffic calming measures on streets with joint cycling traffic and other modes of transport.
- Analysis of speed limits at entry points to the city and formally municipal roads, increasing the speed limits to the traffic flow speed wherever possible.

To put in place the irreversible nature of punishment for breaking traffic rules:

- Implementing relevant measures (including also fines) in places of regular traffic rules violations, such as overtaking public transport on the counter (opposite direction) lane (police raids, cameras, infrastructure and communication through media) and blocking the intersections.
- Community works (not the penal fines) for regular breaking of traffic rules – an initiative to amend the law.
- Search for stolen bicycles and theft prevention measures.



Freight and special vehicles safe for the city

Despite the small share in the traffic flow and high professional level of drivers, large size vehicles have multiple times been a cause for fatal road accidents within the city. In order to make heavy vehicles traffic safer, they shall be equipped with special features to increase observability. It is important to procure the vehicles for city needs that would have maximum safety for other road users, with minimum blind spots (for trucks and public transport, it is the low-profile cabin, no long motor hood that could obstruct the view of a child, etc.). For light vehicles, the pedestrian protection shall be at least 50% under EuroNCAP, with an increase up to 70% in 2025.

To develop the program to incentivize delivery services and other providers operating within the city to shift to more environmentally friendly and safe vehicles (Euro-6, electric cars) and delivery modes (rentals of cargo bicycles in post offices / supermarkets; a shared network for different operators with post boxes for small parcels within walking distances).

Program “Safe Streets Near Schools and Kindergartens”

The primary objective is to analyze children school routes and implement traffic safety enforcement measures for pedestrians / cyclists along the routes.

CHALLENGE 2:

Attractiveness of Urban Space for Walking



Photo by: Demyan Danylyuk

People
~~pedestrian~~ **friendly city**

The following important element within the urban structure is public space and pedestrian links. Their attractiveness can be enhanced through easy-to-take specific infrastructure solutions within urban space:

- Barrier-free.
- Direct, convenient pedestrian connectivity.
- Environment comfort (lighting, shadow, green spaces, seating, possibility to buy things / have a coffee).
- Smooth sidewalk pavement.
- No parking on sidewalks.

After inventing the automotive industry together with modernist urban planning, street design over decades has become a very vehicle-oriented area of planning. Instead of the concept of a "street" it is usually used the "road". Thus, pedestrian traffic planning in the streets usually followed the "residual" principle, in spite of the fact that basically all citizens walk on foot. Even the persons who usually drive a car need to walk to the car to reach it.

Despite the fact that each citizen is a pedestrian to a certain degree and walking on foot is absolutely environmentally-friendly mode and efficient use of urban space, pedestrian right for high-quality space is the most infringed one.

Soviet urban planning failed to account for the people with reduced mobility since the concept was not existent. Thus, multiple barriers for mobility were created (high curbs, stairs)

Non-accessible underground crossings have become a common issue of big cities that once built it. In Lviv, underground crossings were constructed in the central part of city (Halytska square, and Mytna square) as entrances to stations of future underground tram line. In arterial streets, they were supposed to serve as part of the infrastructure of for big factories to prevent big flows of workers from blocking traffic for dozens of minutes in the beginning and the end of shifts. The enterprises were: Administration of Lviv Railways, Lviv Bus Plant, Kineskop factory (TV sets), Motozavod factory (bicycles and motorcycles). Closure of factories resulted in dilapidation of the underground crossings. To search for new funding and maintenance sources, commerce was welcome to the underground facilities. With the increase of vehicle-to-person ratio and driving speed levels, more cases were recorded with fatal

road accidents for pedestrians rushing through the street. People were doing it for various reasons. The most common causes included the shortest convenient way with a minimum of barriers, an intuitively more understandable way, lack of lighting and feeling of insecurity in night time in the underground crossing, health issues, going with baby strollers, or with luggage. Because it was not feasible to properly maintain underground crossings, most of them were duplicated by the on-street crossings. It had a positive effect on all groups of the population. New underground or overground crossings were not built, mostly due to lack of funding opportunities, rather than accessibility or convenience for pedestrians.

Level crossings are designed by transport engineers during reconstructions in locations where they least interfere with the traffic, rather than between the points of attraction, where they would be most needed for pedestrians. To prevent unsanctioned streets crossing, police and transport planners design to install the barriers. Cases, when the city's traffic safety commission consider options to change the traffic patterns and introduce level crossings, are less common.

Rapid growth of the real estate market in Lviv over the recent decade presented yet another challenge for pedestrian mobility. Improvement of the territory around new buildings, yards and surrounding sections of streets are mostly oriented to provide maximum parking capacity. Thus, many sidewalks are used for car parking. It reduces the sidewalk area, changes the walking trajectory and provokes people to -walk between cars. Many residential buildings and institutions decide to make fences around their premises. This also blocks regular pedestrian walkways and pushes people to bypass along the ill-fitted routes.

Yards of the multi-apartment buildings that used to host leisure and pastime facilities for children are transformed into parking lots with the small fenced areas for playgrounds. Thus, safe and comfortable public space is disappearing in many place.

Surveys taken during the SUMP development showed that residents who would often walk on foot usually complain about the following things:

- pavement in bad condition, barriers within the space, dirt, and puddles;
- insufficient sidewalks width for comfortable mobility;
- barriers on the walkway: cars parked on the sidewalks, poles, fences, road signs, outdoor café terraces, etc.;
- no shade, noise, polluted air;
- insufficient lighting.

In 2015 decentralization reform by the State Parliament and Government redirected large financial flows to cities. The funds were mostly used for repairs of sidewalks since it was rather easy to do due to no need to design projects, and also due to big demand coming from residents after large-scale repairs of the road surfaces just before Euro-2012.

During the repairs of sidewalks, were gradually identified unified standards for pavement of pedestrian areas. District administrations started to require a gradient (lowering) with no curb at pedestrian crossings. New shelters at public transport stops and the renovated public spaces created some places for rest breaks for citizens with reduced mobility.



Photo by: Volodymyr Karaim

Demand for cycling infrastructure largely exceeds the available offer. However, less confident cyclists use the sidewalk, thus causing inconveniences and posing a threat to pedestrian safety. In several streets, after cycling infrastructure was arranged, sections of the narrow walkway were cut off.

The “Green Line” project had a breakthrough idea to connect Sykhiv to the city center with the cycling and walking path. The project is underway to design the cableway to connect the city center with the High Castle and Pidzamche neighbourhood. These are the first two projects to develop urban mobility where the walkways are in focus rather than being a mere addition to the repairs of the roadway.

In 2006, the process was launched to create a pedestrian zone within the area of old city fortification walls. Since 2013, the entry to all cars was prohibited, except for those with special permits. Over five years, the pedestrian area has been filled with so many visitors and various events that the issue came up to expand the pedestrian area. In 2015, the first pedestrian street (Les` Kurbas Street) outside the central pedestrian area was arranged. It was noted that keeping partial traffic and car parking had a positive effect on the balance between residents and businesses. Therefore, it was decided not to expand the pedestrian area in analogy with the inner city, but rather exclude it from the transit traffic ways, or completely close certain streets for traffic, especially if they have the capacity for recreation and have no transit value. In this manner, Rudanskoho and Pavla Rymlianyna streets have been organized. The city started developing public spaces in the streets and adjacent squares. Reconstruction of the Mytna square had a significant impact on comfortable mobility and stay in the central part of the city. The site is an important link to connect the pedestrian area and one of the most significant recreation sites in the dense inner city.

The number of quality public spaces within walking distances has increased tremendously over the last five years. However, it is still insufficient for all city residents, in terms of high demand from them, especially coming from the remote neighbourhoods.

OBJECTIVE 2

People-friendly city

2.1. To raise comfort levels in pedestrian space of the streets.

To expand the sidewalks where possible, to eliminate the barriers, to expand green spaces in the streets, to make the crossings logical and convenient to use.

2.2. To develop the catalogue for organizing inclusive public space in the city.

The catalogue shall include ready-made solutions that meet expectations of both low-mobile citizens, requirements of State Construction Standards and the Ukrainian National Standardization System, and international best practices.

2.3. To organize green arterial links between different parts of the city.

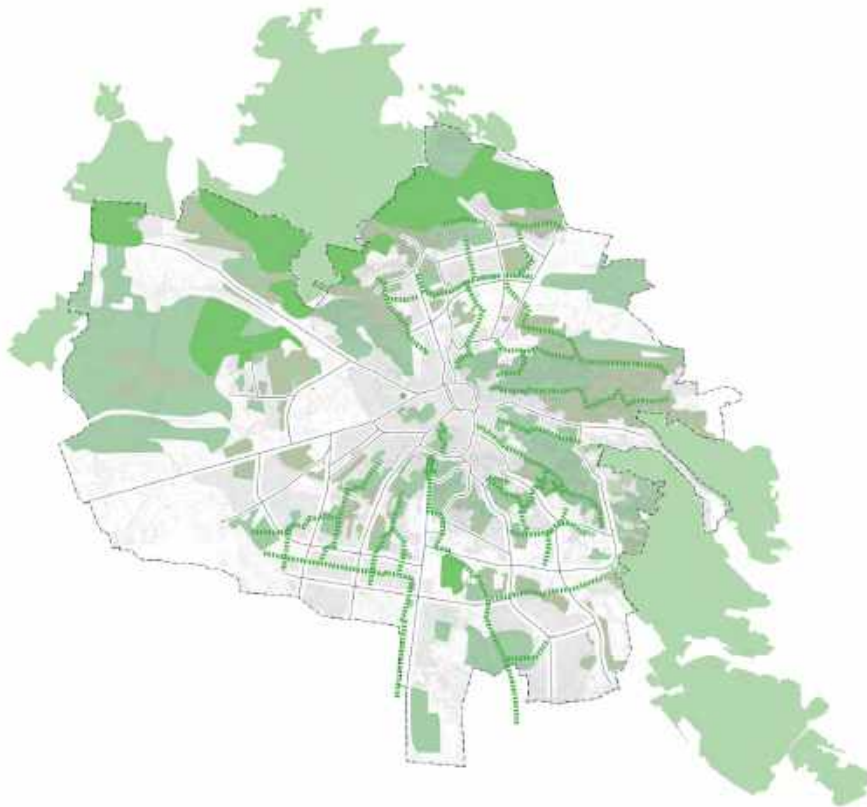
Cycling and walking paths completely separated from traffic will create new opportunities for comfortable urban mobility for citizens, and allow for new territorial development.

2.4. To develop city guidelines on tactic urbanism.

It would help the community check design solutions with minor interferences into public space at a low cost. Public participation projects are becoming of higher quality and professionalism with each year. Generalized best practices will help bring the average level of projects higher and highlight ways for improvement of urban space that citizens could implement themselves or in collaboration.

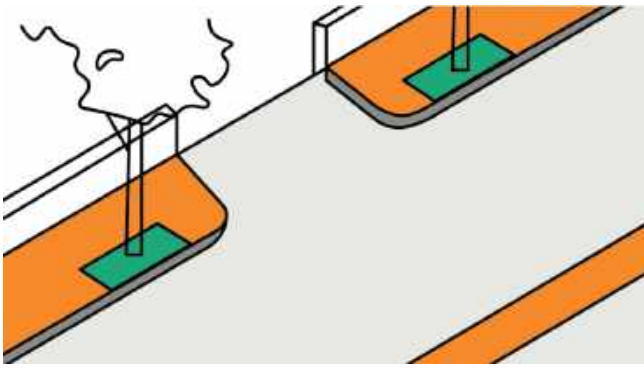
Demonstration measures:

1. Environment accessible for citizens with reduced mobility.
2. Barrier-free environment.
3. Comfortable environment.
4. Zoning of sidewalks.
5. Direct logical links.
6. Eliminating barriers from the transit area (poles, signposts, advertizing cases).
7. Green Line – an alternative to arterial streets.

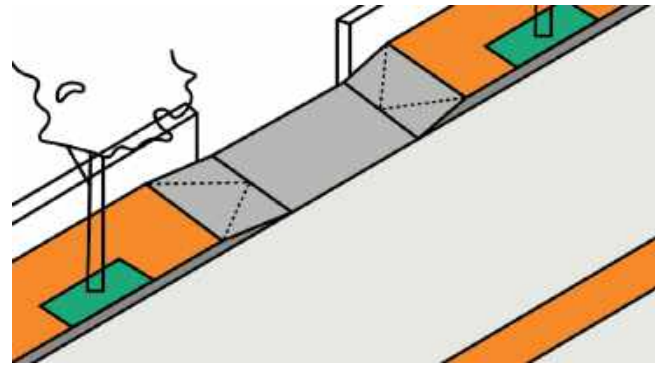


Lviv Green Connections Network, Integrated Urban Development Concept

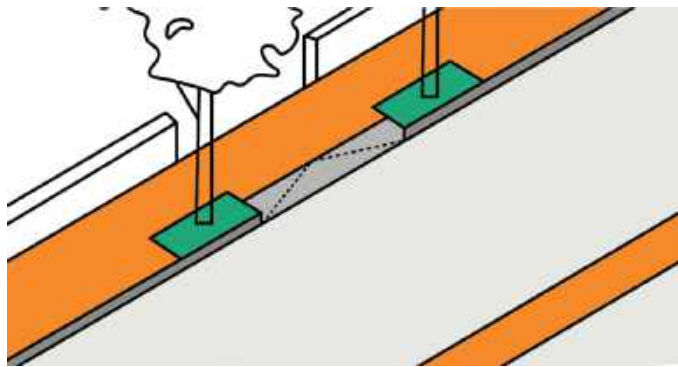
Barrier-free environment



✘ Road-level access way

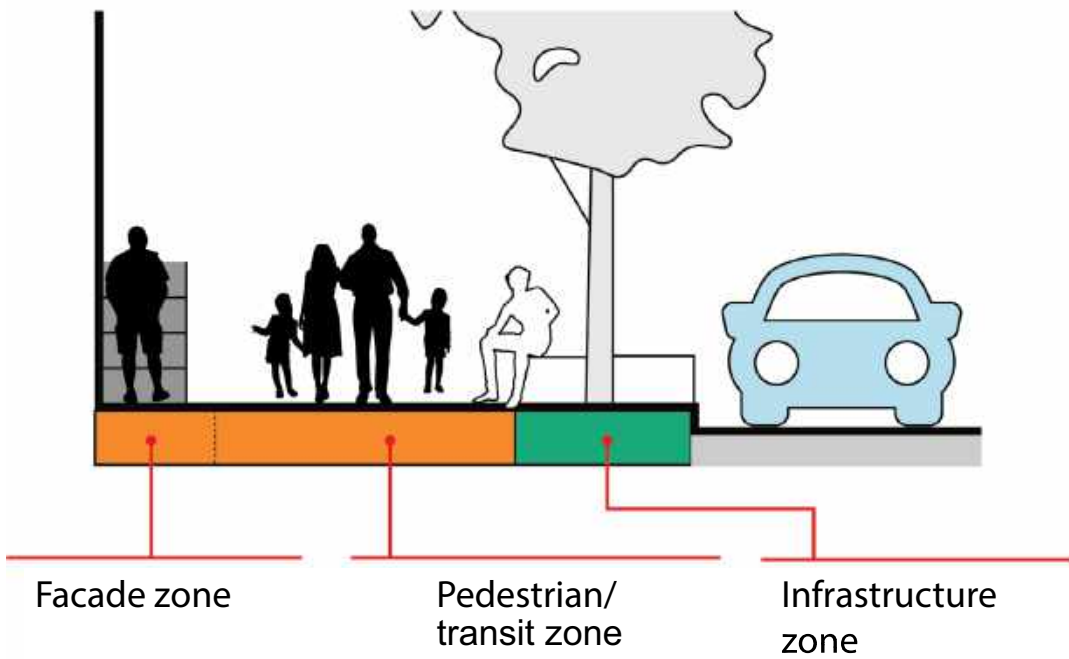


✘ Lowered sidewalk



✔ Sidewalk-level access way

Zoning of sidewalks



Facade zone

Pedestrian/
transit zone

Infrastructure
zone



Green Line Concept, NGO Group 109

Catalogue of activities

To develop the catalogue for arranging an inclusive public space.

Since citizens with reduced mobility are the most vulnerable category of urban space users it is suggested to create the reference book for typical solutions on accessibility in organizing street infrastructure elements. City comfortable for people with reduced mobility is comfortable for all people.

To develop a city reference book on tactical urbanism.

The reference book will tell about actions citizens and businessmen could take on their own to improve public space. The city shall support the initiatives with technical and financial support. Everyone shall understand the temporary nature of public spaces created on this basis. The reference book will include typical elements for organization of public spaces and traffic safety provisions with no need to run the capital construction works.

To ensure priority snow cleaning from cycling and walking paths.

Snow cleaning on cycling and walking paths cannot be done on a residual basis, following the cleaning of the roadway. Snow piles shall not narrow the transit zone of sidewalks less than the minimum allowed size (2.25 m for arterial streets). Cycling infrastructure shall be fit for use in winter time, too. Access ways to pedestrian crossings as high injury risk sites in wintertime shall be cleaned as a priority. It is important to prevent any puddles therein or the spots uncleaned due to ice-crusting ground.

CHALLENGE 3:

Insufficient public transport quality



Photo by: Volodymyr Karaim

Public transport is the main mobility mode in Lviv. Insufficient quality of public transport is one of the most pressing issues in the city. This should come as no surprise considering that more than half of the city residents use public transport daily for commuting purposes. Such a high share of using the public transport is a very good indicator for the city. However, this is the result of no realistic alternatives available for most of the residents rather than their conscious choice.

Public transport should be made attractive for all residents in the city

First of all, the residents complain about the overcrowded vehicles during the rush hours. It is aggravated by the discomfort during the traffic jams. During the non-rush hours, night hours in particular, public transport availability is crucially different in various city districts. In some areas, it is uninterrupted and runs till 11 p.m., while in other districts, the public transport is largely unavailable after 8 p.m.

The quality of the rolling stock on various transport routes is quite different. The share of routes served by the large-sized, accessible vehicles is up to 40% of all bus routes. Electric transport is gradually recovering and increasing its quality and quantity of rolling stock. Therefore, Lvivelektrotrans is steadily becoming the basic transport operator in Lviv. This is primarily confirmed by the increased reliability and predictability of the electric transport, as well as by higher comfort level due to the new trams and trolley buses procured, with some of them equipped with air conditioners. As a result, we are gradually getting rid of the stereotype that "public transport is meant for persons who cannot afford buying a car."

The topical issue for the public transport users is non-compliance with the timetable due to the competition between the buses for the paying passengers. The buses stay for a long time on the major bus stops picking up the passengers, as well as try to outrace each other (buses, trolleybuses, or trams) to arrive at the bus stops as quick as possible and be the first to pick up the passengers. It creates serious discomfort for the passengers. The insufficient quality of public transport and failure to meet transportation needs caused the large number of bus services provided by enterprises, in particular, those operating round the clock or located in the remote parts of the city, far from the major lines of the public transport or on the outskirts. The enterprises subsidize such transportations thus gaining the chance to operate. However, this reduces the efficiency of mobility around the city in general.

Down-time of public transport (especially, trams) is what the residents complain about most often. This is caused by traffic jams, illegal parking hindering the traffic, traffic accidents alongside transport routes not involving public transport, accidents with the public transport involved, as well as breakdowns due to the wear of the rolling stock. There are very limited and efficient ways to notify passengers notification on changes in the schedule, delays and cancellation is done in limited and inefficient ways.

Soon after low-floor transport appeared, it became increasingly popular among the people with reduced mobility, which conditioned a growing request for accessibility to the rest of transport. Most of the public transport-related complaints from people with disabilities are connected with the unwillingness of

drivers to help them or lack of opportunities to move closer to the edge of the platform. There is a substantial request for the arrangement of the bus stops accessible for the people with reduced mobility, but the views of how to implement this are quite different.

The analysis of requests from Lviv residents as to different parameters for public transport showed that the comfort, predictable timetable and reliability of transportations are of the highest-priority. The speed and price are relatively less important issues. The above-mentioned problems may be solved only through the systemic changes in public transport management.

Steady public transport system existed during the Soviet period when the tram and trolleybus lines were equipped for the purposes of commuting between the large enterprises and the corresponding residential housing estates. At those times, over 140 trams, 200 trolleybuses and around 200 buses were running daily. This system was destroyed by the drastic changes in the structure of the work places. The private operators bought mini-buses, and together with the city transport office started introducing new routes according to the number of potential passengers. Eventually, more and less profitable routes have been distinguished. For directions less popular among passengers that turned out to be unprofitable, the city budget needed to allocate the co-founding. Parallel lines appeared on the popular directions, that overlap with each other on a big part of the route. For lack of investment from the city, the municipal electrical transport degraded and turned into the transport for "social security beneficiaries". Drivers of regular and private operator buses did not wish to tolerate social security beneficiaries with preferential fares, while no restrictions were observed for them in the municipal transport. Social security beneficiaries amount to 1/4 population of the city and around 1/2 of all public transport passengers. The elderly people and schoolchildren become the objects of discrimination by bus drivers since the compensation for carrying such passengers were either not provided, or was situational, without relation to the real number of the persons carried.

In 2009, the municipal authorities acknowledged the necessity for rapid changes. Upon the request of Lviv City Council, the French Company Louis & Berger, along with the Transport Office, and Lviv Polytechnics drafted recommendations to overcome public transport crisis. As a result, the public transport itineraries have been entirely reconsidered, and implemented on January 01, 2012. Moreover, it led to a large scope of annual procurements of the comfortable buses, to strengthening of the role of municipal bus enterprise, to the improvement of procurement terms for passenger transportation services, and to the introduction of the so-called "electronic ticket".

The share of municipal transportations started to grow rapidly. The newly developed network has undergone multiple changes due to the operators intent to have their lines planned through more beneficial directions. However, in general, public transport approach has been upgraded to a new level. However, still the expectations of the residents who are able to travel around Europe more often and use public transport there, grow comparatively faster than the level of tax revenues into the city budget.

The opening of a new tram line to Sykhiv in 2016 showed an essential advantage of modern public transport. It turned out that the tram was the most efficient means of transportation in terms of time and price and quite a comfortable way to get from Sykhiv to the city center. Yet, on the part of the route with shared traffic (trams and cars move mixed), all transport modes are trapped in congestion. This generated the demand to prioritize public transport traffic.

Due to a substantial aggravation of the air condition in the city caused by the emissions from the cars, the issue of shifting to the electrical transport became even more topical. The electro-bus experiment showed that the limited autonomous range trolleybus (capable of running without being connected catenary network for a section of the route) might be a better alternative. Apart from the plans for the procurement of modern trolleybuses, the city also faced the need to review the relevance of the existing trolleybus network. It turned out that in case of renovation of the trolleybus network in the central part of the city, which was disconnected in the early 1970s, the capacities of this mode of transport will reach a whole new level. Large-scale procurement of a new vehicle stock revealed two more challenges: without a high-quality operating and maintenance equipment, as well as qualified technical personnel, new vehicles would degrade quite soon. These issues have not been in a priority before, since they were not that obvious for the ordinary citizens. As the issue persisted, they started receiving more attention, and gradually, more investments. The new vehicles need a large number of drivers. However, people with the corresponding specialization level would often go for

work abroad. Most of the drivers are of pre-retirement age. Therefore, the issues with the severe shortage of the personnel will only aggravate as time goes on. To keep the drivers on positions, it is necessary to increase the level of salaries and improve working conditions.

The e-ticket becomes an increasingly popular topic for discussion among the city residents and in mass-media. There are high expectations as to this investment project in Lviv. The electronic payment systems have been already introduced to the electrical transport network of the city. The season tickets for electro-transport have been also introduced, which enables transfers between the lines. However, this system operates independently of the bus transport. In case of bus transport system, the drivers are still interested in picking up as many paying passengers as possible rather than running in compliance with the timetable. Public transport will be able to achieve a new level only when the driver's sole interest will be related to the compliance with traffic rules, timetable and performing work duties. This can be reached in case the money flow process is managed by the city. In this case, the city will be in charge of making payments to the public transport operators, according to the quality and quantity of services rendered. The separation of processes would provide the opportunity of an objective assessment of passenger flows at different parts of the city, enable the optimization of timetables, and could help eliminate the overlapping and competition between the bus lines. Having paid the fare, the passenger will be able to get to the destination in a faster and more comfortable manner due to the minimization of the waiting time and comfortable transfers.

The need for comfortable transfers is actualized. However, there are no possibilities for them at the moment - each type of transport usually developed independently, and there is not much space and places for the potential transfer points or nodes.

The introduction of the electronic ticket will launch a truthful assessment of the city needs for the passenger transportation. It will help the city procure transport services in market of operators, have a transparent co-funding mechanism for the subsidized subsidized routes and compensation for social security beneficiaries.

OBJECTIVE 3

Efficient, comfortable and eco-friendly public transport

3.1. Quick and comfortable movement by public transport.

The priority for public transport (PT) helps to accelerate its movement, thus reducing the trip duration. A passenger may accurately anticipate the travel time, while public transport could carry more passengers with the same number of the vehicles, due to the shortened turnaround time.

3.2. The predictable public transport, convenient intervals around the clock.

First of all, the public transport timetable should be predictable. It is especially important to know the arrival time to the stop when the route's interval is longer.

3.3. Positive image of public transport and its user.

With the implementation of the priority measures and procurement of the high-quality rolling stock, the public transport becomes a convenient and predictable way of moving around the city. However, it keeps the reputation of the transport for students, retired and poor people. It is important to debunk this stereotype.

3.4. Extensive public transport network, convenient transfers between the lines and modes of transport.

Well-developed network allows getting from any part of the city to the desired destination. However, it is impossible to make the intervals between all these points short. Thus, the transfers improve the network efficiency and comfort of moving around the city. In addition to public transport as such, the intermodal stations shall also include other mobility elements (taxi, short-term bicycle and car rent, charging stations, services, delivery service boxes, etc.).

3.5. Convenient walking access to public transport stops.

The path to the stop needs to be of a good quality, have the appropriate lighting, convenient and safe crosswalks, and be barrier-free.

Photo by: Oleksandr Shutyuk



3.6. Public transport accessible for people with reduced mobility.

All public transport shall be accessible for people with reduced mobility, rather than some lines and stops only. The drivers should provide aid to passengers on the wheelchairs. If the special transport or taxi are needed to transport the low-mobility person, these services shall be provided and they have to be of good quality.

3.7. Better connection of the city with suburban areas and external transportation systems through public transport.

The car usage in agglomeration grows much faster than in the city. Thus, on a daily basis, during the morning rush hours, more and more private cars enter the city, park near their work places, and exit the city at evening. This creates huge congestion and has a negative impact on the air quality.

3.8. Decent working conditions of the transport enterprises staff, good technical equipment of the depots.

Technical equipment directly impacts the reliability of the vehicle stock. Working conditions define the quality of the personnel who agree to work at the company, and, finally - the quality of services rendered to passengers.

3.9. Acceptable public transport fares.

High-quality public transport is always subsidized. If users have to pay full costs, the price will be too high and will distract most of passengers. If the price is too low, substantial amounts will have to be provided from the city budget. It will claim budget's significant part, while users would not value the low-cost service.

Demonstration measures:

1. The priority of public transport at the traffic lights and prioritized public transport lane (especially in the places of traffic jams concentration).
2. The high-speed tram No. 8: traffic priority from Chervonoyi Kalyny Ave. to Soborna Square.
3. Introduction of the electronic ticket.
4. Promotion of the convenience of transfers and use of different modes of transport in different situations and for various purposes.
5. Unification of the trolleybus network in the city center to launch the diametric lines through the city center.
6. Re-establishment of 300 meters of the tram line on Kopernyka St. to provide the opportunity of routes optimization and to avoid the excessive mileage.

Catalogue of activities

To provide quick connection with remote parts of the city:

- Elaborate and develop the structural axes of the city.
- 4-5 quick prioritised connections with the remote parts of the city: Sykhiv - city center (public transport lane on Franka Street), Naukova Street - city center (Kniahyni Olhy-Sakharova, tram line (tracks) on Kopernyka Street, Vitovskoho Street), Riasne - city center (reconstruction of Shevchenka Street), railway station - city center (Bandery Street), north part - city center (bus lanes on Chornovola Avenue, reconstruction of Mazepy and Hrinchenka Streets).
- Reconstruction projects of the city center squares that are most important from the point of view of transportation efficiency, and which can prioritize public transport (Franka Square - Stryiskyi Market, Kropyvnytskoho Square, crossing of Sakharova and Vitovskoho Streets, Rustaveli - Petrushevycha Square, Soborna Square, Mytna Square).

Introduction of the E-ticket

The concept of the "electronic ticket" should be understood in a broader context rather than the electronic fare collection system, or even a single ticket allowing transfers. The main advantage of the e-ticket system is that the city would be able to procure transport services and have economic levers to ensure its high-quality performance. All the revenues from fares would go to the city. Based on the quality-related transport services indicators, the city would pay to the transport operators, who would consequently pay the drivers. The scheme where the driver is only interested in driving with the sufficient number of paying passengers on board would be ended. Such system reboot would provide the opportunity to extend the working time of public transport, to strictly adhere to the traffic timetable, to optimize the route network due to fast and efficient transfers, to increase the carrying capacity of the network with the available

rolling stock. Consequently, the electronic ticket will allow to completely get rid of "marshrutkas" (private route buses) in favor of high-quality vehicle stock and sustainable transportation services. It is necessary to introduce a single pervasive public transit route numbering system to logically replace the type of rolling stock during repairs (e.g. replace trams with buses).

To increase and prioritize public transportation:

- To prioritize public transport at traffic lights and dedicated lanes for public transport, especially in the areas where traffic jams occur.
- To launch a program for the stage by stage implementation of all the public transport prioritizing.
- To accelerate passengers boarding (in / out) at the stops. To get rid of bus bays, except where required. To arrange comfortable platforms.
- To organize consistent trainings for public transport drivers so they could provide high-quality transportation services. Training to approach the curb with control system (the bus and trolley bus approach lines to stops).
- The high-speed tram No. 8: Traffic priority from Chervonoyi Kalyny Ave. to Soborna Square.
- Placement of PT timetables at the stops and online, and compliance with them, including digital timetable boards at the stops.
- Minimization of traffic delays caused by accidents.
- To prevent public transport obstruction during mass events.
- Urban squares reconstruction projects in terms of making public transport priority No.1 (Franka Square - Stryiskyi Market, Kropyvnytskoho, Sakharova – Vitovskoho, Rustaveli St. – Petrushevycha Square, Soborna Square, Mytna Square).
- Increasing network flexibility, i.e. turnarounds, additional turns not used in daily traffic but allowing to organize route changes in case of an accident or repair works.
- To allow bicycle riders to use public transport lanes in places where there is no bicycle infrastructure nearby.

The system of quality communication with residents about public transport:

- Announcements and clarifications in the mass media regarding current information on transport and infrastructure.
- Efficient notification of passengers about changes introduced to public transport routes.
- Promoting the comfort of public transport through personal stories.
- Awareness-raising campaign "There is no reason for speeding over 50 in the city".
- Organizing car-free days / a day without car.
- Promotion of intermodality.
- Awareness-raising campaign on safety and comfort of walking, prevention of traffic accident involving pedestrians.
- Training park for children on traffic rules (with markings, signs, bike rental of small scale).
- Annual organization of the European Mobility Week.

To increase the comfort of transfer points and nodes, encourage multimodality.

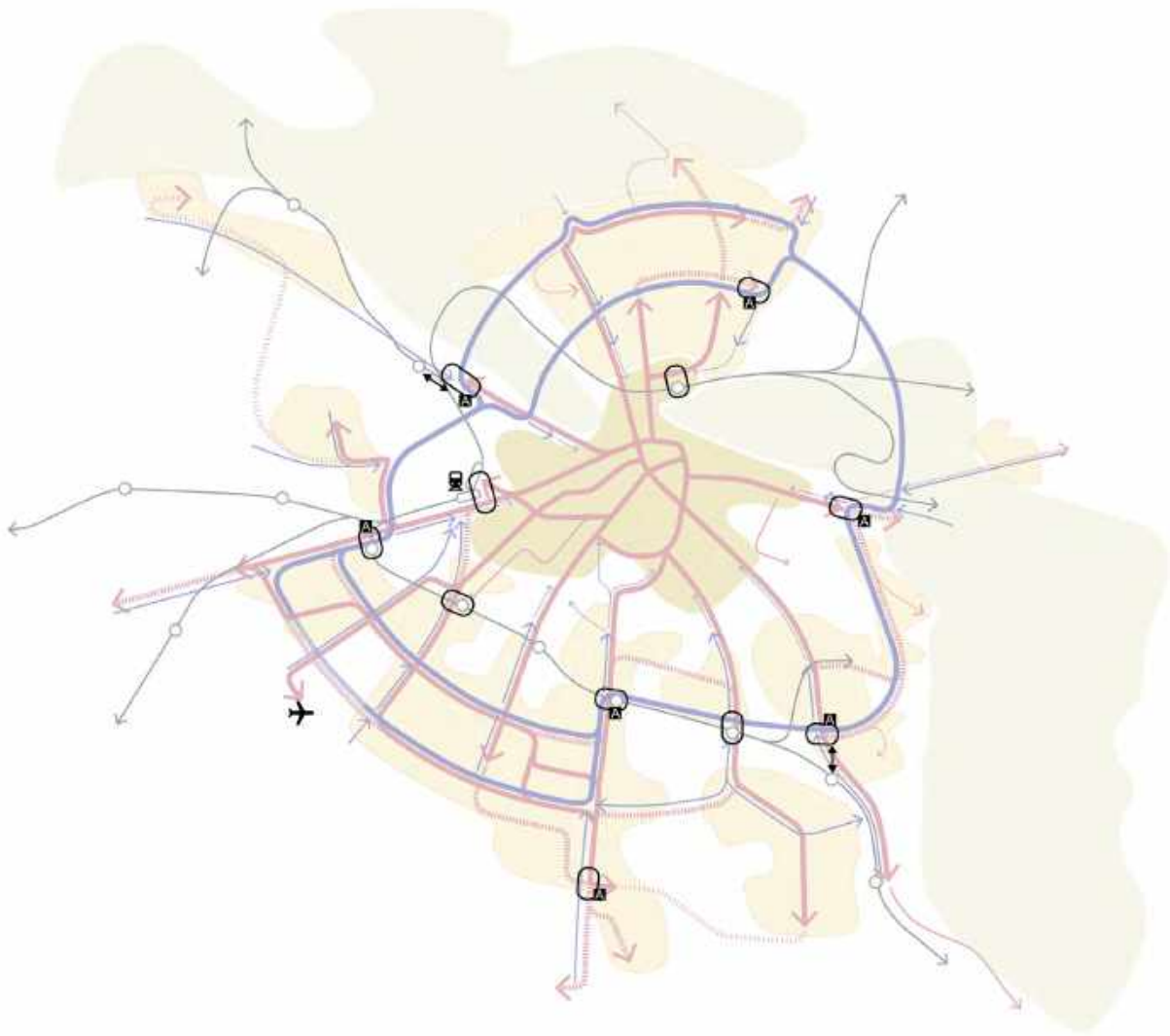
Transfer nodes can significantly improve the efficiency of the city's transportation system. Such stations should be convenient not only in terms of the interchange between different public transport routes, but also in terms of changing public transport types.

This purpose in mind, it is necessary to provide for the following:

- Convenient transfers, transfer nodes arrangements.
- Comfortable stop shelters, convenient and safe approaches (walkways).
- Information about transport schedules, routes and possible transfer points.
- Bicycle storage facilities at the transfer points and nodes and bicycle rental stations.
- Combining important transport stations with car parking facilities.
- Availability of charging stations for electric bicycles, scooters, cars, and taxis.
- Public transport accessible for people with reduced mobility - in all parts of the city.

Transport nodes

AT THE INTERSECTION OF DIFFERENT MOBILITY MODES (RAILWAY, SUBURBAN AND INTERCITY BUSES)



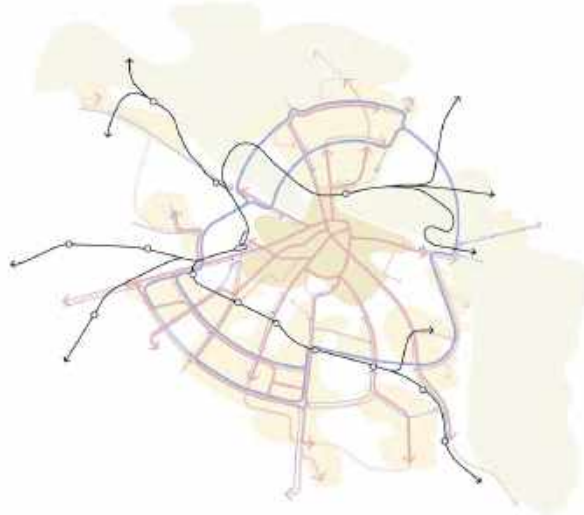
Potencial transport hubs, Integrated Urban Development Concept

To develop and improve the efficiency of trolleybus network

Pre-project studies and planning implementation of city train.

Commuter urban train

FEASIBILITY STUDY



Urban railway network, Integrated Urban Development Concept

There are thoughts that all problems with movement in Lviv could be solved by building of metro. But it all depends on economic opportunities. The function of the metro is to efficiently transport a large number of people without delays in movement, regardless of traffic. An alternative to the metro in Lviv can be a city electric train using existing railway tracks.

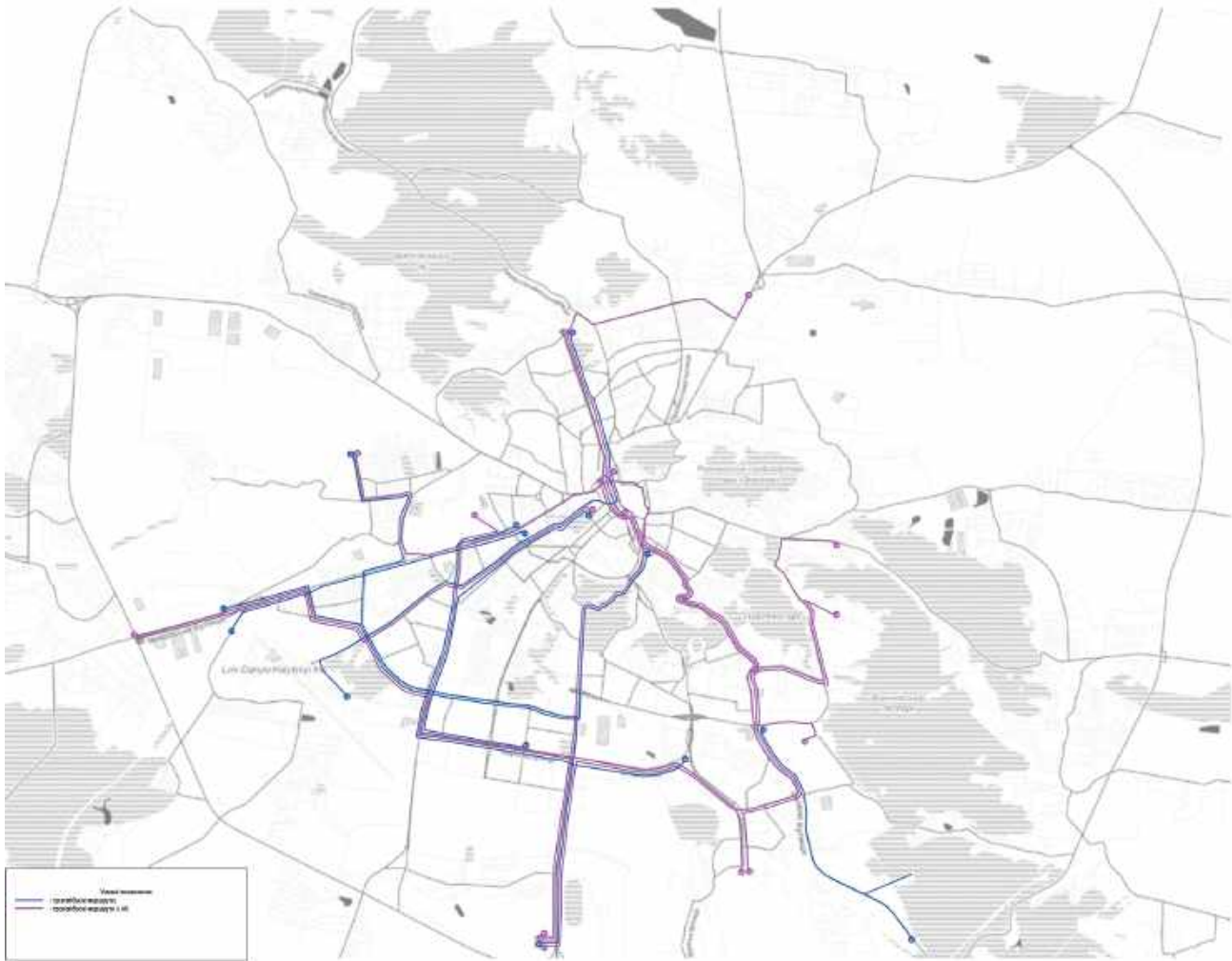
To develop and improve the efficiency of trolleybus network

The trolleybus network is quite long in the city (129.3 km as of 01.01.2018) but is extremely worn out. The problem with current trolleybus network is that trolleybus routes, except route No. 33, do not reach the city center. Although construction of a trolleybus catenary network is the cheapest way of arranging electric transport per capita, finding money from the city budget is very difficult. Instead, a solution has been found that will enable the electric transport network to expand rapidly without the construction of new contact lines - the purchase of autonomous trolleybuses that can travel a certain distance without catenary.

For the trolleybus network to be efficient, it is important:

- To update the existing catenary network.
- To integrate (unify) three parts of the network in the city center.
- To develop the trolleybus network in accordance with the Development strategy of Lvivelektrotrans: Halytske Perekhrestia, Santa Barbara, Anhelovycha, Stryiska, Vyhovskoho, Horodotska (Metro), Riashivska (planned), Hutorivka, Chervonoi Kalyny, Volodymyra Velykoho, Levandivka - Riasne-2, Chernivetska, Novyi Lviv, Pasichna, Medovoi Pechery, Trakt Hlynianskyi, Orlyka, Varshavska, Antonycha.
- Prioritized development of the network in the following areas: Kulparkivska St. (Antonovycha St. - Horodotska St.), Vyhovskoho St. (Horodotska St. - Patona St.).
- Procurement of autonomous trolleybuses (with trolley poles for In-Motion charging).
- Proper repairs and modernization of rolling stock.

Development of trolleybus network



Concept of trolleybus network development, "Lvivelectrotrans" LCE, 2018

To develop and improve efficiency of the tram network

The tram is the most efficient means of on-street public transport that can provide high carrying capacity. It is difficult to imagine Lviv without a tram, and it is good that the city managed to keep its tram network. Further plans are related to the improvement of tram transportation:

- Repair of tram lines on Kniahyni Olhy, Bandery and Vitovskoho streets.
- The top-priority task of re-establishment of 300 meters of tram line on Kopernyka St. to provide the opportunity for routes optimization and to avoid the excessive mileage.
- The step-by-step program of restoration of the power supply network with modern special parts (contact and feeder lines, track elements). Whenever possible, to carry out running repairs and maintenance of the tracks during the night time.
- To develop the network in the following directions: Bus Station-2, Shchurata street, Linkolna St., Shevchenka St., Kniahyni Olhy St. - Truskavetska St and later on to proceed with Avtovokzal and Sykhiv districts, "Halytske perekhrestia", Pasichna St., to Riasne through the Main Railway Station.
- Procurement of the rolling stock.
- Proper running repairs and modernization of rolling stock.

To increase the level of working conditions, technical equipment and maintenance of public transport

The public transportation network is efficient when it is properly maintained and equipped. It involves large investments that are hardly visible to the residents but they indirectly determine the quality of transport services:

- The arrangement of restrooms and resting places at the terminuses of public transport.
- Ensuring public transport is clean by arranging modern car washing facilities at the depots.
- Upgrading of service equipment for public transport and electric transport care: trucks, utility vehicles, other equipment.
- Proper running repairs and modernization on a regular basis.
- Reconstruction of depots by installing modern equipment, creating the appropriate working conditions for workers and purchasing required equipment and spare parts.



Photo by: Volodymyr Karaim

CHALLENGE 4:

Increase in the number of cars

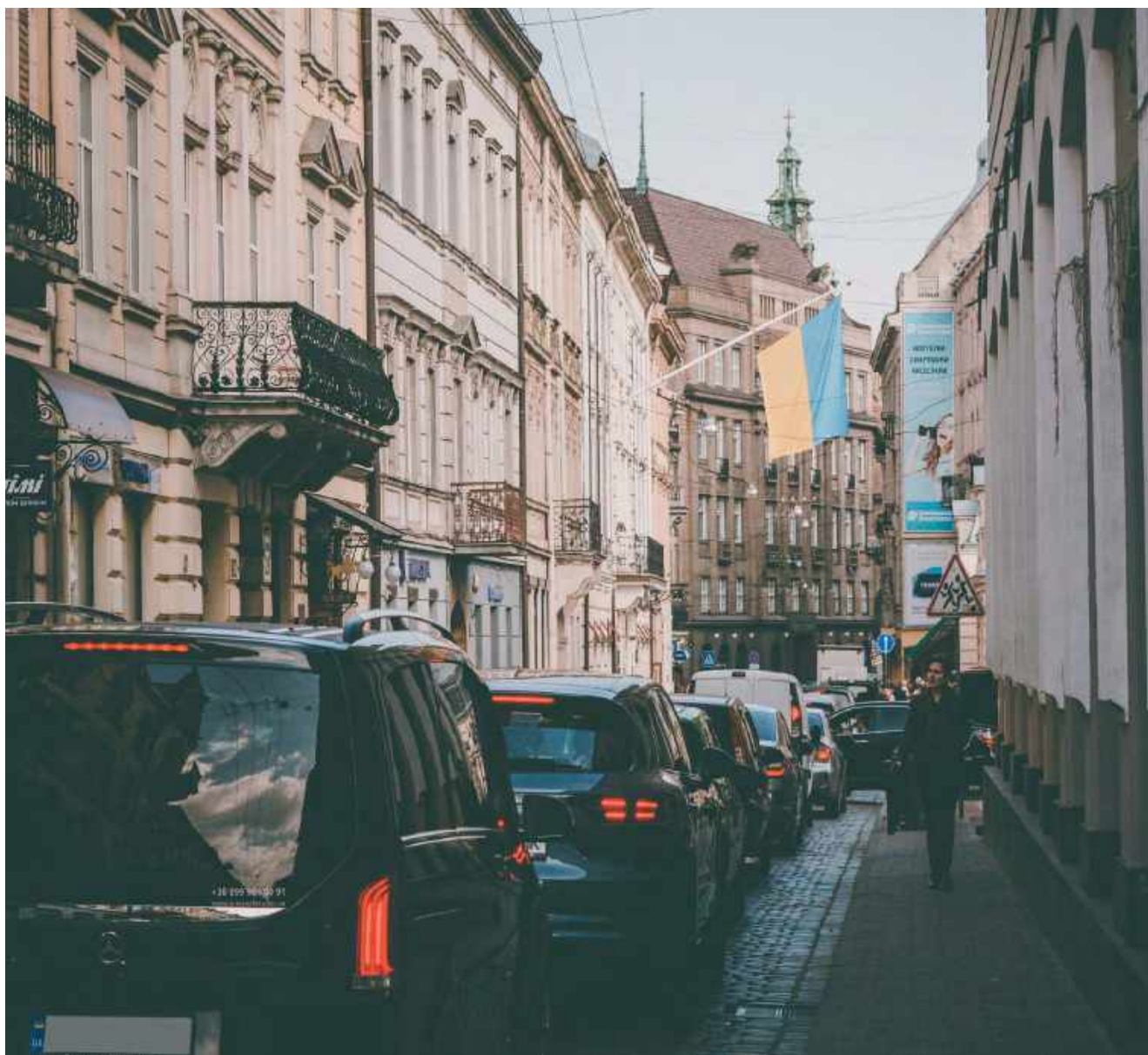


Photo by: Volodymyr Karaim

Traffic congestion – is the problem that all Lviv citizens relate to. The users of private motor vehicles spend increasingly more time in traffic congestion. Public transport passengers in peak hours not only stay in the traffic jams but also travel in overcrowded vehicles. Persons who walk and go by bicycle also suffer from highly polluted air and noise. 96% of air pollution in Lviv comes from the exhaust gases from motor vehicles.

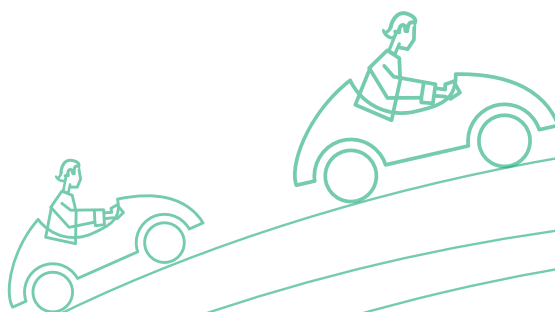
Continual growth in car use leads to more cases and scale of congestions. According to the State Statistics Service of Ukraine, the number of families owning a car has increased from the stable 13% in 2000–2008 up to 27.5% in 2016, and keeps growing. The average household in the Lviv region includes three persons. The higher number of owned private cars is a common phenomenon stemming from higher-income of citizens. Driving a car in Ukraine is mostly treated as a sign of certain social status. At the same time, for persons who need to make multiple trips within the city in one day, the car is often the only means to efficiently manage their errands.

The period of 1990–2000 was the “golden age” for car users in Lviv. It was due to the fact that the streets were relatively empty. The number of car trips was much lower than the throughput capacity of the streets. One reason, among others, was the need to leave your car in guarded parking at some distance from home due to risk of damage or theft from cars. That is why a big number of Lviv citizens had to make their choices everyday: to take a 5 to 15 minutes walk either to the parking lot or to public transport stop. However, over the recent decade, the number of car trips has been growing fast, also because of the possibility to safely leave your car near home. On the other hand, you needed to walk to the public transport stop taking the sidewalks that were not always convenient or even unavailable. It exhausted the capacity of the central part of the city and several most important intersections. In the first place, it was Stryiska-Naukova intersection, followed by the ring road, and also all other major roads.

With the growing welfare and living standards of Lviv citizens, it was natural to have an increase in the vehicle-to-person ratio. Consequently, it fostered traffic congestion in the city streets. The practices common in the European cities show that is much more difficult to reduce car usage than to keep it on the current low level. The creation of the high-quality alternative shall be started as early as possible to encourage urban mobility by more efficient mode of transport. It has a positive effect on air quality, noise level decrease, reduction of traffic congestions, thus making the city more comfortable to live in.

In most European cities in 1970–1980s, and in 1990–2000s in US cities, there was a peak in vehicle-to-person ratio. As a result, the streets and roads network failed to manage the number of cars. However, even though cities increased the capacity they faced a similar problem several years later, but on a larger scale. The number of cars increased proportionate to the road network capacity. However, the quality of urban public space, and subsequently, the quality of urban life dropped tremendously. The problem was also aggravated by increased relocation of citizens to the suburbs while keeping their workplaces in the city. It fostered daily commuter’s migration. It was the time when cities realized priority in urban development should be shifted. They needed to restrict the road network capacity for private cars for the benefit of more efficient mobility modes in terms of space and emission level (electric vehicles in the first place), cycling and walking. Additionally, other methods included the regulation of parking slots numbers, and restricting access to vehicles with high emission engines.

Since income levels of most citizens are still relatively low, the number of cars in Lviv is not big compared to most European cities, both in terms of owning and driving the car. Presently, only 23% of trips in Lviv are made by private cars. According to the 2017 data, in Warsaw, the number was 32%, in Berlin- 33%, in Vilnius - 50%.



General comparative data about cities

CITY	AREA	POPULATION	POPULATION DENSITY	NUMBER OF CARS	TRAFFIC INDEX*
	km ²	thousand	persons/km ²	per 1000 cit.	(place / index)
Lviv	182	724	4.000	250	n/a
Helsinki	213 (excluding water area)	650	3.041	411	278/+20%
Amsterdam	165 (excluding water area)	872	5.135	273	199/+24%
Leipzig	297	601	2.021	379	222/+22%
Stuttgart	207	634	3.062	544	108/+30%
Lyon	47	516	10.781	н/д	119/+29%
Copenhagen	86	623	6.607	247	241/+21%
Zurich	87	415	4.700	328	89/+31%
Krakow	326	774	2.371	633	26/+40%

* average annual rate (2018): position in the world in TomTom ranking, and traffic index (additional time to cover the distance)

For example, in Zurich, you need to spend +31% of additional time on average to take the usual distances: if the trip on an “empty road” takes 30 min, the +31% makes ~ 40 min. Average traffic congestion time is 9-10 min. With the increased number of cars in the traffic, the congestion time grows. The goal is to achieve the lowest possible car usage in the city’s modal split (see Tabl.: modal split) to reduce the traffic congestion, emissions, road accidents, etc..

The most “congested” cities in Europe in 2018: Moscow (1), Istanbul, Bucharest, St. Petersburg, Kyiv(5), Dublin, Lodz, Novosibirsk, Krakow, Edinburg, Athens(10), Rome – traffic congestion index in these cities is from +39% (Athens) to +56% (Moscow). Kyiv is the fifth most congested European city, and 13th most congested city in the world, with the index +46% (2018).

Modal Split / Mode share

CITY (YEAR)	WALKING, %	CYCLING, %	PUBLIC TRANSPORT, %	CAR, %
Lviv (summer, 2019)	18	6	52	23
Helsinki (2013)	32	11	34	22
Amsterdam (2016)	29	32	17	20
Leipzig (2015)	25	17	17	39
Stuttgart (2015)	26	5	24	45
Lyon (2015)	34	2	19	44
Copenhagen (2017)	19	29	18	34
Zurich (2015)	26	8	41	25
Krakow (2013)	29	2	39	30

The higher is share of cars in the modal split of city, the higher are the traffic congestion levels, hazardous emissions, road accidents, etc

Nevertheless, even with this moderate number of trips, the city center within the 3 km radius is overcrowded with cars during morning peak hours (8:00 – 9:30), and in the afternoon until evening (both weekdays and weekend). At the same time, while during the week most people are trying to avoid transit through the city center by car, this situation is opposite during the weekend.

North and south part of the city are asymmetrically developed, and separated from one another with the natural landscape barriers, railway, and industrial areas. The connection between the north and south parts is mostly provided through the city center, such as Svobody Avenue, the streets of Pidvalna, Vynnychenka, and Honty, even though they do not cope with the demand for a long time. There are alternative bypasses via the streets of Omeliana Kovcha in the west and Bohdanivska in the east. The streets are located at a certain distance from the city center (when travelling southward, the difference if using the bypass is 7–10 km, compared to crossing the city center). Other options are the streets with restrained road capacity – Yeroshenka and Kryvonosa (when traveling southward, the difference in distances is 3–4 km, compared to crossing the city center).

The districts remote from the city center have a large road capacity, and it is decreasing closer to the center. At intersections, where road capacity is lower than in the approaching streets, traffic congestions develop. With the growing number of trips by private cars, a demand from citizen grows for expanding the available transport infrastructure. Consequently, pressure is increasing on city authorities to implement car-oriented measures.

The city is in the early stages to reconsider the approach from the car-oriented development of the transport system to sustainable mobility. In the first place, it is caused by limited financial resources allocated for the ever-increasing mobility demand. The development and large scale street reconstruction in the city are managed by the “Lvivavtodor” municipal enterprise (as a commissioner not as a construction company). It was established to develop roads but its current key functions include construction and reconstruction of tram lines, streets, coordination of traffic lights regulation. The enterprise is also operating the system of paid parking and electronic ticket in PT.

Organization of paid parking and minimizing of free parking are the primary activities for control of demand by price (in the situation of limited offer such as the limited urban space), and for reducing traffic pressure on the central part of the city. Existence of free parking in areas with lack of parking (high demand) makes the paid parking senseless. Over 30% of car traffic in the central part of the city includes cars looking for the vacant parking slot. It aggravates the situation with

traffic congestion and polluted air. With the recent introduction of the legal possibility to penalize drivers for parking rules violation, it is finally a possibility to regulate the number of cars in the city. Therefore, after some time, with the operating efficient enforcement mechanism, many people working in the city center would be opting for a taxi or other alternatives, instead of parking their car in the city centre during the eight working hours. On the other hand, delivery vehicles and special vehicles currently suffering from a total lack of parking would eventually find conducive conditions for their work.

In other words, the cost of using a car for urban mobility should be less attractive than other modes of transport. Moreover, it should take longer to travel on the overloaded directions than by public transport, due to the traffic priority of public transport. Thus, the number of people opting for private car trips will eventually drop to the level physically manageable, allowing car users to go across the city without delays or congestions.

During school vacations, the congestion in the morning peak hours is almost disappearing. It is related to the fact that the share of trips delivering children to schools and kindergartens increases disproportionately to other mobility types. Presently, the number of children driven to schools and kindergartens exceeds the number of children getting to school by all other modes (walking, public transport). It can be explained by the attitude of parents who believe that the urban environment is unsafe for children.

Decisions of city government to restrict access to individual cars are necessary but very unpopular. Communication with citizens and deputies shall be systematic and comprehensive. It should refer to the argument that traffic calming will automatically create better conditions for public transport, cycling, and walking.

OBJECTIVE 4

To optimize motor vehicle traffic in the city

4.1. Efficient system of parking management, primarily in the central part of the city.

Everyone who decides to go by car to the city center and park there shall have a certain possibility to do so. However, it is the price that regulates the demand for such a service. The price shall be high enough to always keep at least 15% of slots vacant. In particular, free of charge and illegal parking shall be eliminated. It is the only precondition of having the parking market working and investors interested in the construction of off-street parking.

4.2. Enhancing alternative mobility modes and demonstration of their efficiency.

Development of public transport, creating favourable conditions for cycling and walking will motivate more people to use these alternatives. Therefore, persons who would really need to go by car will have a chance to get wherever they want fast, within a reasonable time, and not waste any time to search for parking slots.

4.3. Promotion of reasonable car use.

The car shall be used whenever it is needed in terms of time and convenience. The city may also encourage shared car usage, such as carpooling services.

4.4. Reliable and efficient conditions for emergency vehicles and delivery.

Delivery and emergency vehicles are vital for urban economy. Their traffic and stops to perform their services shall be provided and duly organized in terms of time. The number of trips for delivery vehicles can be reduced by developing the network of delivery boxes shared among delivery services to leave the parcel within the walking distance to the addressee.

4.5. Significantly reduce the transit of private motor vehicles via the central part of the city.

Transit via the city center is definitely the shortest route. However, the city center fails to manage such transport pressure and has many other functions that are affected by heavy transit traffic.

Demonstration measures:

1. To arrange the system for gradual motor vehicles restraints on approaches to the city center, batching car access to the inner city with the help of traffic lights and traffic management.
2. To define the most important through-going axes, and prioritize public transport; to define the cars only entrances to the city center, with organization of park-and-rides.
3. To encourage rational car use (including also car-sharing).
4. To review the sites (land plots) allocated for bus stations and locate them on the most important intermodal nodes in the city.
5. Construction of the planned Subotivska street, final section of the ring-road.
6. To analyze cost-effectiveness to construct the planned streets of Riashivska, Luhanska, and Vernadskoho.
7. To encourage children getting to schools and kindergartens on foot, by bicycle, or by public transport.



Photo by: Volodymyr Karaim

Catalogue of activities

To re-organize traffic in the central part of the city:

- To manage traffic within the “small transport ring”.
- To reconsider the traffic role of Svobody Avenue.
- A network of pedestrian areas in the central part of the city.
- Commuting hub "Dobrobut" (in the city center): scheduled tourist destination buses, bicycle rental, multi-level parking, commercial facilities, electric transport.

To develop the Urban Car Traffic Concept

To develop and implement Urban Car Traffic Concept, with the defined street hierarchy, principles to manage major arterial roads, various options to pass through the city, to show and compare the consequences of their implementation. Due to adjustments in the transport model, and due to implementing activities for Urban Car Traffic Concept, driving through the city shall last as expected.

- Arranging the system of gradual car restraints on approaches to the city center, batching car access to the inner city with the help of traffic lights and traffic management.
- Defining the most important through-going axes, and prioritizing public transport therein.
- Arranging operations of the medium transport ring, transforming the former industrial ring and the respective infrastructural corridor for transit traffic.

Navigation for transit traffic, signage on arterial streets, directions to industrial areas to avoid transit of large freight vehicles through residential streets and city center.



Photo by: Volodymyr Karaim

To encourage rational car use(including car-sharing)

A person buying a car would often use it even when it is not advantageous either in terms of time, or comfort. It is important to have people use their cars only when actually required. The following activities will help to largely simplify car use and parking density in the urban space:

- Introducing a car-sharing system, having the respective operators enter the market.
- Encouragement to go by taxi and ridesharing services instead of driving your car.
- Proposal of changes to the law on transfer of licensing and control over taxi to the city authority.
- Promotion campaign on the rational car use.

To support the construction of the north section of the Lviv ring road

In the north part of the city, there is a missing section of the ring road. It generates the large scale transit traffic through the city. Completion of the road section will help relieve the load from the streets of Hrinchenka, Mazepy, Shevchenka, a.o. Besides, the throughput capacity of the entire ring road of Lviv shall be increased to reduce the share of transit traffic in the city. Lviv Region State Administration is preparing the construction project since they are in charge of the entire ring road of the city.

To manage parking

To incentivize investors' interest in the construction of the off-street parking under the following activities:

- To take the stock and mark possible parking areas all around the city, starting with the central part.
- To introduce paid only parking in the areas where demand exceeds the offer, with the growing parking fares approaching to the central area.
- To adjust the efficient parking rules enforcement system.
- To allocate land plots near the mobility hubs dedicated to off-street parking.



Photo by: Volodymyr Karaim

To raise the efficiency of unpopular but much-needed activities for the city, the following actions shall be taken:

- To provide for preferential parking fares for residents of adjacent buildings.
- To manage due maintenance of parking area.
- To develop the notification system on vacant parking slots available, to avoid additional traffic in search for the parking slot.

To provide a convenient connection with suburbs by public transport

To come to the city from suburban areas, citizens are using their private cars increasingly more often. It creates a large additional load on the transport network. Presently, the city does not have any influence on the quality of suburban connections by regular buses and suburban trains. The stations for suburban buses planned by the city are located on the city boundaries, with the limited number of public transportation routes to its different parts.

The following preconditions are required therefore:

- To review the identified sites (land plots) to host bus stations, and locate them at major mobility hubs in the city.
- To reorganize entry points for suburban routes to Lviv, providing for priority of public transport in these areas.
- To increase accessibility and quality of railway/bus stations, to plan their connection to the future urban railway.
- To create the network of park-and-ride stations (P+R) at entry points to the city near the arterial routes of public transport.

To prioritize delivery services vehicles and to regulate their operations

Delivering goods within the city is an important factor for the urban economy. However, the vehicles do not have available places to unload the goods. That is why they get on sidewalks or stop on the traffic lanes blocking private and public transport, or pedestrian mobility. Delivery shall be regulated by infrastructural means, and by regulating the time.

To avoid the risk of traffic accidents involving large size vehicles, there is a need to zone the city by the maximum allowed size and weight of delivery vehicles.

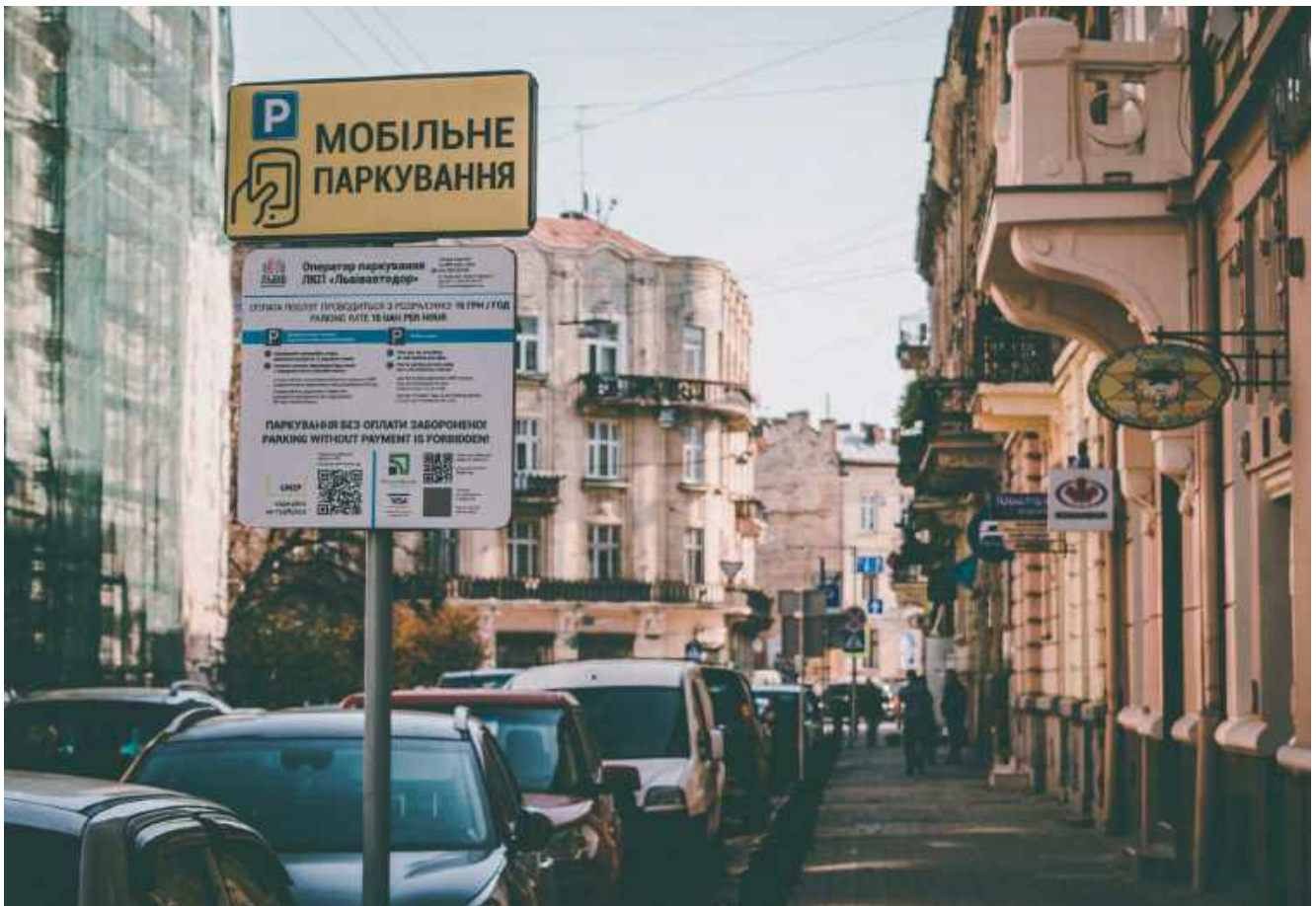


Photo by: Volodymyr Karaim

To encourage children getting to schools and kindergartens on foot, by bicycle, (and) by public transport

The use of cars to bring children to schools and kindergartens adds a critical load on roadways in peak hours. Presently, over 50% of children are taken to school and kindergartens by car. It is suggested to support and develop the alternatives:

- Improving the quality and capacity of schools in all districts of the city to reduce the number of long transfers between home and school.
- Implementation of the program "Safe Streets Near Schools and Kindergartens".
- Analysis of routes children take to schools (actual, rather than suggested by teachers) and increasing safety of pedestrians / cyclists on these routes.
- Running the campaigns "walking to school day", or "cycling to school day".
- Introducing school bus routes.
- The program for the organization of bicycle parking near schools.
- PR-campaigns, leaflets with illustrations for driving parents, lessons on traffic safety for school pupils, guidelines for teachers on traffic safety.



CHALLENGE 5:

Bicycle as Urban Transport



Photo by: Volodymyr Karaim

One of the alternative modes of mobility that has a high potential in Lviv, due to the relative compactness of the city, is a bicycle. Presently, a bicycle is perceived as the means for leisure activities rather than as a convenient and fast mobility type. Some other modes of transport that are getting to be increasingly more popular include the electric scooters, gyroscooters, and other individual mobility devices that require the cycling infrastructure for usage.

Many cities in the world focus largely on their transport strategies on the development of cycling. It is not without reason. Bicycle is considered to be the most efficient mode of transport in the city for trips under five kilometers. It is a proven fact that riding a bicycle improves health condition and well-being, it does not produce any hazardous emissions, it needs a little space, it fosters social interaction and it is economically beneficial for cities. In Lviv, bicycles also has high chances to become a popular mode of transport and pastime.

However, there are both mental and physical obstacles in the way. The physical barriers include a complicated landscape. Ground elevation differences between most of the densely populated neighborhoods in the suburbs and the city center are from 60 to 100 m. The city center paved with cobblestones with the limited space available is another barrier. However, the obstacles can be overcome with the help of the proper design of street spaces and infrastructure management. In terms of cycling mobility, the most favorable neighborhoods of the city are the areas in the north. They have a rather flat landscape and are located close to the city center.

Lviv has never had an urban cycling culture. That is why most residents are skeptical about the idea itself. The time is needed to make more people feel the advantages of cycling as a mode of transport.

Another obstacle for cycling for many people is the problem of storing and parking their bicycles, directly related to a high theft risk. It is often the key reason why people refuse to buy bicycles or stop cycling on a regular basis.

Lviv is one of the first cities in Ukraine that started implementing various elements of cycling infrastructure. It was happening within the context of increasing interest in cycling. Moreover, public initiatives developed promoting the cycling. In 2010, the city of Lviv approved the "Concept for the Development of Cycling Mobility and Organization of Cycling Infrastructure in the City of Lviv". It was supplemented with the "Concept for Cycling Network Implementation." The construction of 268 km of the cycling infrastructure by 2020 was foreseen in the documents. Concept implementation started in 2011. However, the implementation pace for the Concept

largely lagged behind the schedule. As of 2019, 85 km of cycling infrastructure was constructed (bicycle paths, bicycle lanes, etc.). In other words, it makes 32% of the scope planned by 2020.

By 2015, the City hardly implemented any single cycling projects. The cycling infrastructure was constructed along with the reconstructions of entire street sections. Lack of experience in designing cycling infrastructure and the priority focus on the motor vehicles resulted in having the first bicycle paths constructed on a residual basis. They caused conflict with pedestrians and were not convenient enough for daily cycling. Moreover, it caused heavy fragmentation of the cycling network. The first fully-featured cycling path was completed in 2016. It connected the northern area of "Halyske Perekhrestia" with the central part of the city. Introduction of this bicycle route and the flat terrain fostered cycling in the northern part of the city. According to estimates, cycling is most active in this neighborhood. The share of cycling trips is increasing each year. In 2018, it reached 1.5% in the warm season.

An important stage in the development of cycling in Lviv was the introduction of public bicycle rental by Nextbike company. As of 2019, 24 rental stations were operating. Since 2017, no new rental stations have been added in Lviv even though the bicycle rental keeps growing. Bicycle rental allows you to ride a bicycle and not be concerned about its repairs and possible theft. Since 2018, the Nextbike clients who buy season passes also additionally receive the electric transport pass. However, due to the insufficient number of rental stations, the Nextbike rental is interesting only for limited number of citizens.

Trends from the recent years show the growing spread of individual electric mobility devices, such as electric scooters, gyroscooters, electric mono-wheels, etc. Cycling infrastructure is most adaptable for their usage. The city shall be prepared to appearance of rental electric scooters market. Such services are already overflowing in many cities in the world. Specifically, charging stations are going to be in high demand.

OBJECTIVE 5

To make a bicycle an attractive mode of transport for most citizens

5.1. Possibility to safely and comfortably ride a bicycle along all streets in Lviv.

Not every street requires a separate cycling infrastructure but each street shall be comfortable, safe, and understandable for cycling. After all, the starting point and the final destination of the trip may be located on any street.

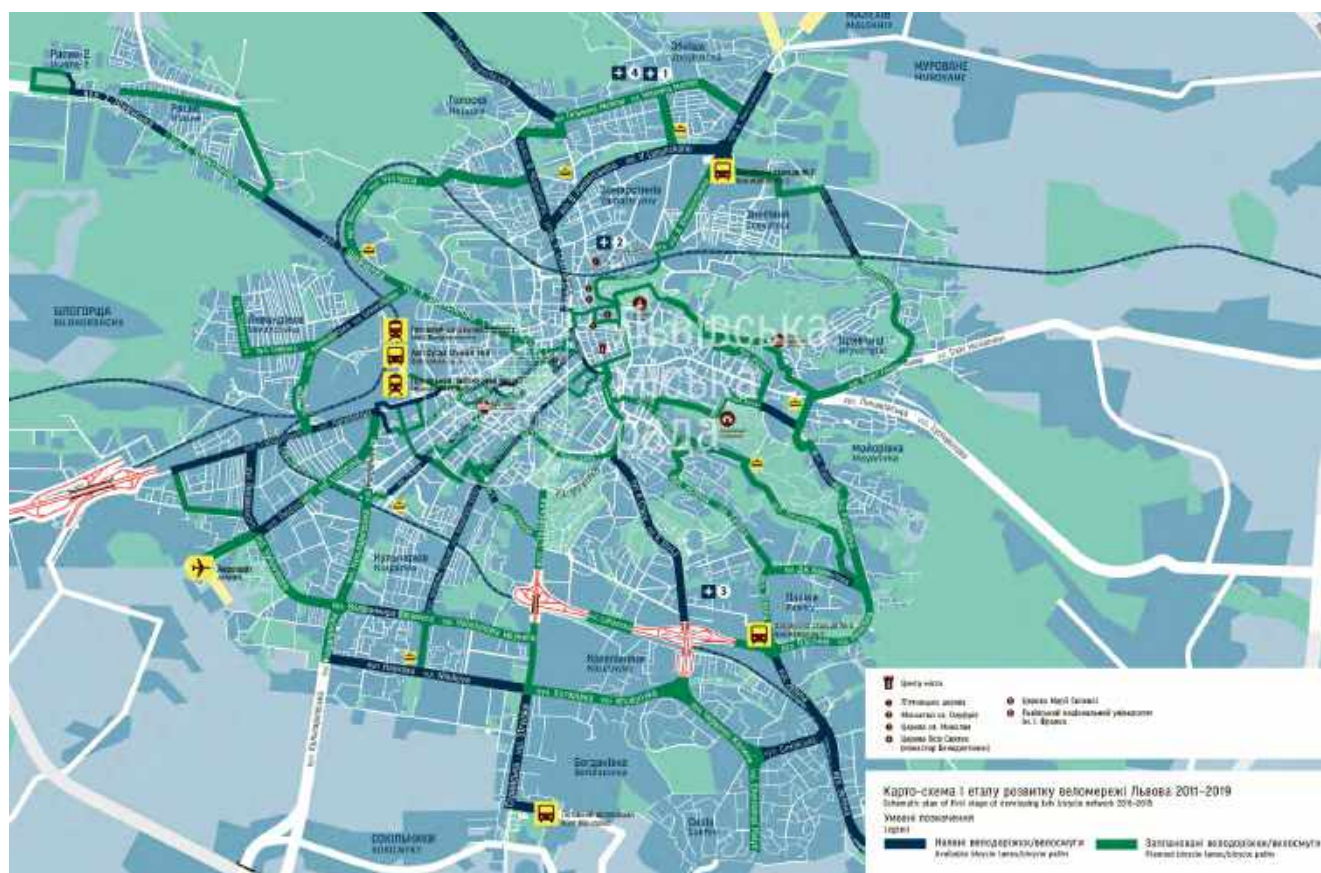
5.2. Network of fast cycling routes that connect all parts of Lviv.

In peak hours, the intensity of cycling increases (as it is becoming a sound alternative in terms of the trip duration). However, the risk related to the interaction with other road users increases, too. Safe and fast-moving cycling routes are designed for big amounts of cyclists. They provide safety and comfort of rides. At the same time, they lessen the load on public transport and help to decrease the number of cars.

5.3. Extensive network of reliable parking and storage for bicycles (near home, near work, in public spaces).

The restraining factor for taking the bicycle is the lack of possibilities for safe storage near the destination. There needs to be more encouragement for developers, for condominiums, for management companies, businesses and other organizations to arrange due conditions for safe bicycle storage. In response, the city shall provide funding for the organization of parking lots near municipal institutions, transport junctions, points of attraction, and in the streets.

Completion of cycling network



5.4. Flexible season passes for bicycle rental, convenient combination with public transport.

More people could join cycling if it could be combined with other mobility types. Bicycles or personal mobility devices are perfect to tackle with the last mile. Combining bicycle rental with the car parking or public transport hubs increases the number of users.

5.5. Promoting bicycle as a mode of transport.

Bicycle is often considered to be one of the pastime activities. However, this type of use has nothing to do with mobility. SUMP interprets a bicycle as an alternative to public transport and cars.

5.6. Training and developing cycling skills from childhood.

Skills acquired in childhood and the teenage years stay throughout the lifetime. The earlier you start using a bicycle the better and safer you can ride.

Demonstration measures:

1. To complete construction of integral cycling network in Lviv.
2. To develop the network of bicycle parking at park-and-ride hubs.
3. To provide for priority snow clearing on the bicycle paths.
4. To approve the municipal standard for cycling infrastructure construction.

Catalogue of activities

To update and supplement the Lviv Concept for Cycling Infrastructure Development

The Concept for the Development of Cycling Infrastructure was developed for 2010–2020. The concept needs to be summarized, reviewed, and extended for the next decade. To assess the efficiency of activities, it is also important to regularly collect the data on cycling dynamics in Lviv.

To provide for priority snow cleaning on cycling and walking paths

Snow cleaning on the cycling and walking paths cannot be performed on a residual basis, after cleaning the roadway. Snow piles cannot narrow the transit zone of sidewalks to the smaller size than allowed (2.25 m for arterial streets). Cycling infrastructure shall be fit for use also in the winter-time. Access ways to pedestrian crossings and cycling crossings as sites of high injury risk in winter time shall be cleaned as a priority. It is important to prevent any puddles therein, or the spots uncleaned due to ice-crusted ground.

Adopt the municipal standard for cycling infrastructure construction

Cycling infrastructure is created as part of various projects, in different ways, and with different approaches. Some methods proved to be efficient enough, others are non-functional. Some streets are arranged with absolutely no account for cycling needs. The construction standards for different street types are intended to normalize this process.

To complete the construction of the integral cycling infrastructure network in Lviv

The city already has about 100 km of cycling infrastructure available but it has not yet developed into integral cycling routes. It is important to create the rapid cycling connections on major axes in Lviv and to regularly upgrade the road marking on bicycle paths and bicycle lanes to prevent conflict with other road users.

To create the network of bicycle storage stations

A restraining factor for the development of cycling mobility in Lviv is still the lack of accessible and safe bicycle storage.

To overcome this, the following actions need to be taken:

- to develop the program for installing bicycle garages as co-funded by the citizens;
- to introduce a mandatory requirement to arrange bicycle parking and storage places in new construction projects. The places could operate on the paid basis and rented by residents, to get the developers interested;
- to facilitate the expansion of the public sharing network for bicycles and electric scooters.

CHALLENGE 6:

Urban Development and Transport Infrastructure



Photo by: Oleksandr Shutyuk

Urban development extension is formally relying on the planned transportation infrastructure included in the Master Plan, with no account for sustainable mobility priorities. The Master Plan provides a series of high-cost measures to enhance the capacity of car-oriented transport infrastructure. When considering project designs for new residential and commercial development, there are mostly discussed methods to reach the maximum possible number of parking lots. Whenever the question is about how to have this amount of vehicles run, it is referred to the decisions of the Master Plan on the new highways and junctions under design. The issue of other mobility types is mostly left out of attention, at the developer's discretion.

New construction of housing not supported with transport infrastructure provokes the growth in the vehicle-to-person ratio since no other convenient modes of transport are available to get to workplaces, kindergartens, schools, shopping centers, recreation sites, etc. Traffic congestions are the consequence of non-balanced land use planning. Lviv citizens are concerned about the traffic congestions in peak hours but a key reason to this phenomenon is daily migration (commuting) when a big number of people travel in one direction in the morning, and in the evening they are coming back. It is related to the Soviet model of urban development with the "sleeper" neighbourhoods. The model was also widespread in the USA and Western Europe in the middle of the previous century. Today, urban development requires integrated approaches, spread and equal distribution of functions around the city. For example, residential development is combined with offices, commercial and other facilities to satisfy all basic needs of citizens. It can help largely reduce the pendulum migration (commuting) and the pressure on infrastructure, thus relieving the streets and public space from vehicles.

From an institutional perspective, expansion of building development in the Lviv city is managed by the Office for Architecture and Urban Planning. They are not related to other entities in charge of transport in the city and its development. During street reconstruction, the architectural component is left at the discretion of transport engineers, whereas the new developments and their connection to available street infrastructure are managed by private investors such as construction supervisor, and architect of building. Usually, they have limited knowledge of mobility and street structure. As a result, planning often produces illogical and sometimes unsafe traffic patterns for vehicles and pedestrians, the arrangement of visitor parking lots instead of green spaces on the pedestrian section of the street, including the future conflict between car drivers searching for parking lots or driving on the sidewalks and the pedestrians.

A slogan of the Integrated Urban Development Concept of Lviv (IUDC) is "City of Short Distances." Sustainable Urban Mobility Plan is an integral part of IUDC. SUMP received from IUDC the key principles on urban development and its correlation with infrastructural capacity.



Photo by: Oleksandr Shutyuk

OBJECTIVE 6

City of Short Distances

6.1. To foster development of real estate which makes neighbourhoods more self-sufficient and reduces the need for mobility.

It is important to explore the guiding function for citizens on most trips outside the neighbourhood, and try to incorporate these functions into the new development.

6.2. To direct private investment on new construction projects to the "belt of opportunities" and closer to existing public transport infrastructure.

The city disposes of few lands available for real estate development. Therefore, it is important to interact with owners and users of the land plots. Investments into the "belt of opportunities" and land plots located close to structural axes of the city will help optimize mobility and reduce the need for trips by private cars.

6.3. To ensure that development of real estate provides for the comfort of pedestrian, cycling and public transport mobility.

It is often the case that in pursuit of fulfilling the standards on the number of parking lots, investor turns the entire adjacent area into parking, demolishing green spaces, and keeping awkward sidewalks and bicycle paths. Eventually, they are also transformed into parking spaces. It is a huge problem for the city, much larger than the lack of parking space as it encourages citizens to shift into cars.

6.4. To develop a network of walking and cycling paths between higher educational establishments areas to be used by students.

Lviv is the third-largest student city in Ukraine. During the student school breaks, traffic congestions do rapidly decrease, not to mention the overcrowded public transport. Thus, alternative mobility options for students might bring some positive effect for all users.

6.5. To avoid new car-oriented developments remote from the transport and social infrastructure of the city.

New real estate development is linked to using private cars without any alternatives. It poses problems both to future residents and to the city. This kind of development bears a high load on the city budget since it implies the construction of new transport infrastructure. That is why new real estate shall be developed wherever the infrastructure is available, rather than relying on hypothetical infrastructure projects in the future. European cities build the infrastructure at first, and later sell the land around at a very high cost, for residential and commercial development.

6.6. To encourage private-public partnerships for infrastructure development.

The city does not yet have any sufficient number of budget revenues to be able to develop infrastructure in advance or maintain the available facilities in good condition. Investors wish to invest their funds as soon as possible. Investing municipal and private funds into infrastructure development will allow to raise project quality and return on investment.

6.7. To encourage shared infrastructure use.

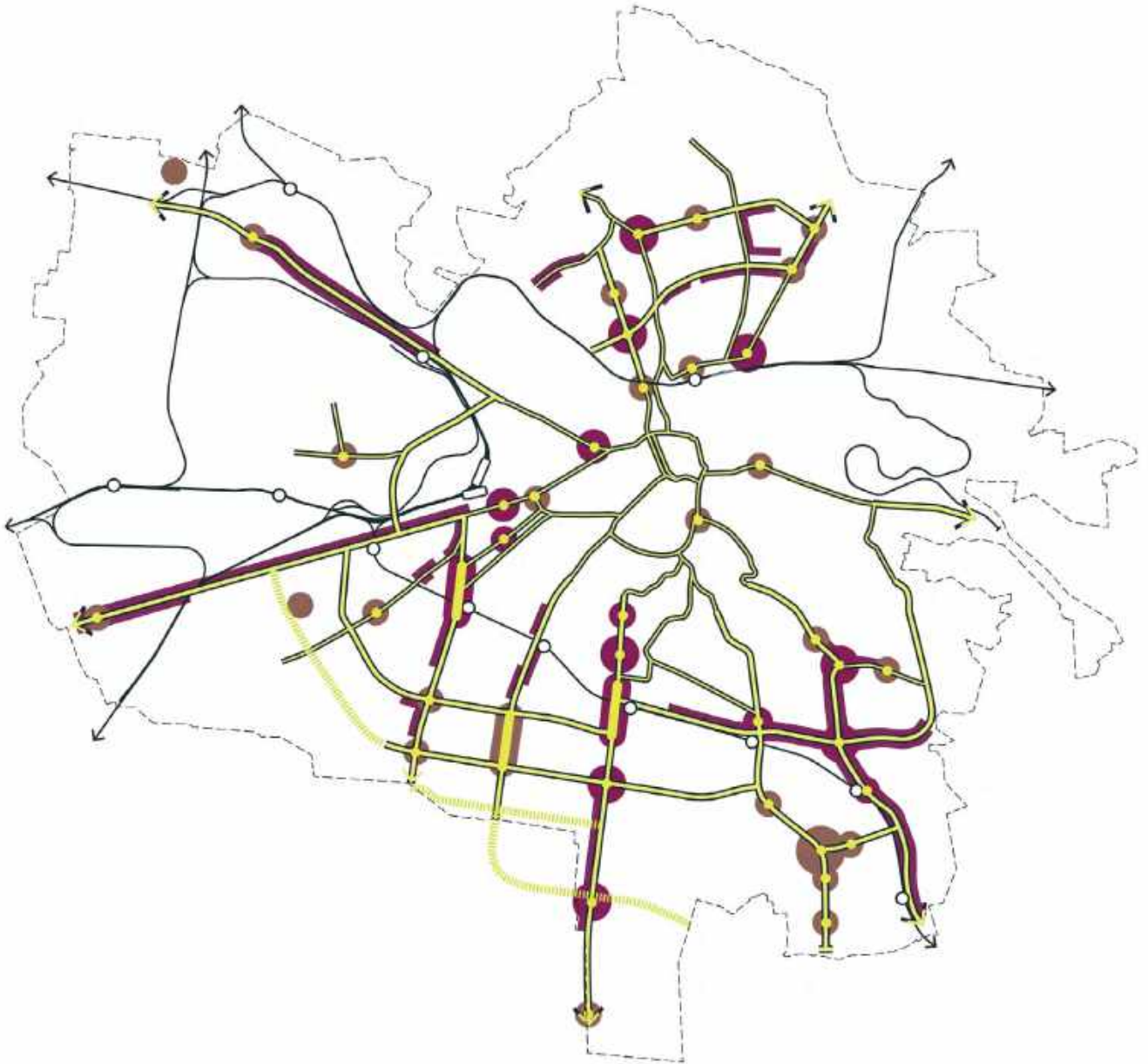
For example, shared parking lots for residents overnight and on weekends, and for office staff in the work days, public charging stations for electric cars and electric scooters. The projects help optimize costs and avoid inefficient land use.



City of short distances

DEVELOPMENT OF CENTERS AND SUB-CENTERS

It is very important that every district in the city develops and is function balanced so that residents can meet in it all the everyday needs. Formation of sub-centres and public spaces with the concentration of business and social activities around transport axes and nodes outside the historical center.



Schema of sub centres development, Integrated Urban Development Concept

New residential estates shall be constructed in harmony with points of attraction and available transport / pedestrian infrastructure, as well as combining various functions such as housing, work, entertainment, and commerce.

New housing development needs to improve living conditions of the established environment, to supplement it with the lacking functions such as barrier-free environment among the new housing development, shared land use.

Since 2014, Lviv has faced a proactive growth in development and residential property market. The housing construction implemented since that time mostly

focused on areas within the existing urban environment, especially within the area along the railway. The latter is located in between territories developed before the start of the motor vehicles era, such as the Austrian and Polish periods. They are dense and mostly well connected with tram lines, and new microrayons of Soviet and post-Soviet period. Change of functions and reconsideration of former industrial areas can give a significant impetus to urban development. In the following two decades, their growth is going to change not only urban development but also the transport infrastructure. At the same time, the structural basis will continue to be supported by the available axes and arterial streets. They are not only transport arteries. Moreover, due to accessibility and enhanced functional density, they are also popular public spaces and meeting places with the capacity to evolve.



Transportation aspect

COMPACT CITY = LITTLE CAR USE



Economy aspect

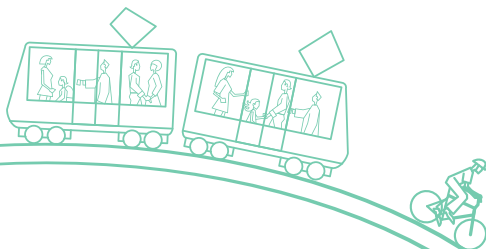
NEW INFRASTRUCTURE ON NEW TERRITORIES = NEW EXPENSES



Environment aspect

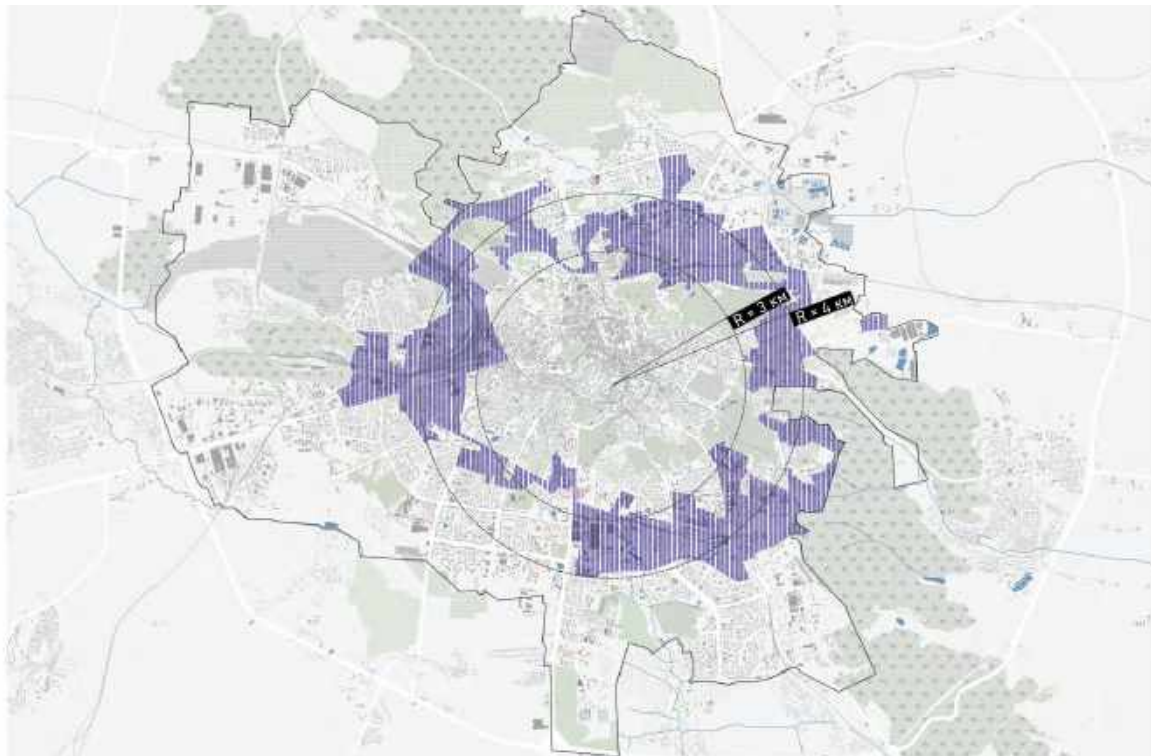
COMPACT URBAN DEVELOPMENT = LOW ENVIRONMENTAL IMPACT

Thus, the initial development trend of a “compact city” by reconsidering former industrial areas, along with restructuring and enhancement of key traffic arteries, will enable coordination of residential development with the public transport network and create better background to cover short distances on foot or by bike.



Demonstration measures:

1. The territory adjacent to real estate development projects is accommodated as commissioned by the city, in line with sustainable mobility principles.
2. Fast cycling connections between university buildings and dormitories.



Belt of opportunities for area development, Integrated Urban Development Concept

Catalogue of activities

To support better functional self-sufficiency of neighbourhoods

To continue peripheral city areas development transforming them into neighbourhoods with more mixed functions, with well developed local public centers. Create new PT stops and routes (lines) within the closest possible proximity to points of attraction. To develop the most comfortable walking and cycling connections within neighbourhoods. To encourage shared infrastructure use, by different users at different time (e.g., parking lots).

The territory adjacent to real estate development projects shall be accommodated as commissioned by the city, in line with sustainable mobility principles

The city shall implement sustainable mobility principle through accommodating the street space adjacent to new construction sites and developments. The city shall be the only possible purchaser and supervisor of construction for developments on municipal lands. It is suggested to delegate the functions of design works purchaser to the Office for Architecture and Urban Planning so that developers could accommodate the territory within the red lines. In an ideal scenario, one of the sectoral departments shall have a specific unit for integrated urban space planning. Special focus shall be attributed to the protection of pedestrian and cycling mobility, as well as green spaces and public spaces.

CHALLENGE 7:

City's Institutional Capacity



Photo by: Oleksandr Shutyuk

A strong team well-established processes in the city council and subordinate structures are necessary for the qualitative and consistent development of the city. Priorities in this direction:

- Integrated street and space planning.
- Street reconstruction and upgrades regulations that take into account space and mobility priorities.
- Clear and personalized responsibility for current urban development and mobility sectors.

It is not possible to achieve the vision and all of the above objectives without a co-ordinated collaboration and quality management of all sectors that ensure sustainable mobility. Today, there is a lack of coordination in the city. Not all the components of mobility management are present. Most of infrastructural, transport and spatial development processes are chaotic and uncoordinated. In the absence of a definite vision for development, each head of a unit develops own area of responsibility at their discretion, following their ideology. This state of affairs often leads to conflicts between different structural units of the city council that should work jointly to achieve common goals.



TRAFFIC SAFETY

CURRENT SITUATION

Traffic safety is managed by two entities: The National Police and The City Commission on Traffic Safety (Traffic Safety Commission – TSC).

Police is a key unit in the field of traffic safety, accountable to national authorities. Any decisions or proposals coming from Local Government have only an advisory role for police. Police is the only authority approving traffic organization schemes and their each element. Police is the only authority to enforce traffic rules. In case the police believe certain sections in the city or types of violations out of priority, it is highly probable such offenders would not be punished. Parking is the exception. Since recently, Local Government have been granted powers to enforce traffic rules in case of parking violations. In Lviv, the authority in this field is given to the Office for Municipal Security.

City Commission on Traffic Safety is a collective body that includes representatives of district administrations, police department, experts in traffic safety, and NGO's representatives. Operations of the commission are coordinated by the Parking and Traffic Organization Unit within Transport Office.

Projects that imply changes for traffic during the capital repairs or street reconstructions shall be commissioned by property operators and developed by project design organizations that have a chief project engineer. They shall be approved by the police during the state expert evaluation of the project. Thus, the project largely

depends on the experts' traffic safety attitudes and mobility priorities of the project manager, area owner, designer, and on the willingness of a police officer examining the project to comply with certain construction standards but ignore others (standards have significant controversies and largely depend on personal interpretations).

There has been no reported case where a customer, a design engineer or developer was prosecuted because of an infrastructure decision that led to a road accident with injuries or fatalities. During the analysis of the road accident with the affected persons, no analysis of the traffic management scheme is carried out on-site where the accident took place. Usually, the cause of road accident is cited as a violation of traffic rules by one or more road users. The review of the existing traffic safety infrastructure is random, upon the request from district administration (at the request of residents, institutions, and deputies), from police or Office for Transport to the TSC, where issues are considered and decisions are taken by the majority.

Street repairs are often done without any comprehensive vision for their development. It was especially true of the streets repaired for the Euro 2012 football cup, as well as on non-arterial streets. The repairs are carried out in parts, by separate sections of the roadway, sidewalks, construction of bicycle paths, etc. They are performed by different designers with formal coordination among each other in geometrical terms, but without any coordination for conformity with requirements to create integrated mobility systems.

SOLUTIONS

To introduce a position responsible for traffic safety within the Transport Office of the city. The person shall issue recommendations on traffic safety before each street reconstruction or capital repair. The recommendations shall be sent to the project designer to be taken into account in the project. They shall also issue their opinion on the conformation of street designs for reconstructions or capital repairs with traffic safety before and during the drafting process. Only afterwards shall drafts be passed to the state experts for evaluation. They shall oversee the development of a program on traffic safety, based on the Vision Zero concept. They shall initiate activities to enhance traffic safety in the city, also using tactical urbanism, that shall be submitted for consideration to the TSC.

There shall be established a separate position within the Transport Office to enforce the provisions of the updated Law "on Traffic Management", with changes under the Law "on Introduction of Changes to Certain Legal Acts of Ukraine on roads safety management". The functions shall include the analysis of each road accident with casualties in the city of Lviv, to identify causes for the road accident, to draft recommendations, jointly with persons in charge of traffic safety, on how to enhance traffic safety.

Results of analysis shall be further submitted for consideration of the TSC. The person / unit shall also take a detailed record of the road safety statistics in Lviv, in close cooperation with the National Police of Ukraine.

Introducing an independent audit for street and road safety to analyze the project for traffic safety rather than blunt adherence to the standards. Safety audits shall be implemented on the municipal level for big projects. It shall be procured from specialized organizations, the certified auditors. The project designer shall either take into account the auditor's suggestion or justify its rejection. It is an additional safeguard against the possible adoption of erroneous solutions by the project designer.

Photo by: Demyan Danylyuk





PEDESTRIAN MOBILITY

CURRENT SITUATION

Walking is not treated as a separate mode of mobility. There are no institutions that would monitor the condition and renovation of pedestrian infrastructure. Renovation of the pedestrian infrastructure is mostly performed within the current repairs at the cost of the city, commissioned by district administrations. Pedestrian infrastructure is an integral part of any street reconstruction project. However, there are no institutions that would regulate the quality of pedestrian infrastructure. Thus, it is all left at the discretion of the commissioner and the designer who would often rely on their mobility habits in the city. In the context of the intersection of traffic flows, a pedestrian is treated as the necessary but unwanted interloper, while traffic safety measures are vehicle-oriented.

Arranging green spaces in the streets remains a big challenge. Green areas are supposed to create shadows and create a favourable climate for walking. Management of street trees (except for decisions to cut them) is entirely under control of territory owners, mostly district administrations. Utility networks and municipal services prevail over street trees in terms of priorities conforming with the National Construction Standards.

Photo by: Oleksandr Shutyuk



SOLUTIONS

To introduce a position within the Office for Transportation in charge of pedestrian mobility. The authorized person in charge shall advocate for pedestrian rights during project implementation within Lviv urban space. The person shall issue recommendations on creating a high-quality urban environment before each round of capital repairs or street reconstruction. The recommendations shall be submitted to the project designer to be taken into account in the design. The person shall also issue the conclusion on securing pedestrian needs in the projects of street reconstruction or capital repairs before starting to develop the final draft; initiate projects and activities to improve environmental quality for pedestrians; closely cooperate with district administrations and other land owners in the city.

Environment Unit shall be returned into Environment Office, and a structural unit shall be established in charge of green spaces in the city. It includes not only planting the greenery but also their due maintenance. The staff of this unit shall issue recommendations on how to create a high-quality pedestrian environment before every street reconstruction or capital repair. The recommendations shall be taken into account by the project designer. The unit shall issue its summary with recommendations on the creation of proper green spaces and conformity with requirements to keep green vegetation in projects street reconstruction or capital repairs before starting the design work.



PUBLIC TRANSPORT

CURRENT SITUATION

Public transport is under control of the Transport Office of Lviv City Council. Transport Office conclude contracts with private operators for fixed-route transportation that municipal transport is not able to cover, and also into districts which electric transport cannot reach. Private transport operators treat passenger transportation as a profitable business. Thus, the condition and number of vehicles, meeting the timetable, and the running time generate a continuous conflict of interests between fulfilling contract terms and the wish to gain profits from transportation. Transport Office has very limited leverage to control and sanction the operators for breaching on contract terms. Due to lack of drivers and route managers, private operators presume they can ignore contractual commitments.

Urban municipal transport is managed by large municipal companies: LME "Lvivelektrotrans", and LME ATP-1.

Municipal operators have advantages over private operators because procurement of the vehicle stock is done from the city budget. Companies render transportation services as they can, due to various factors. All operators carry many privileged passengers free of charge. Differences between company losses and revenues from passenger fares are partially covered from city budget on a residual basis.

An institutional problem with public transport is the lack of calculations and procurement of transportation services by the city. There is no vision on how many passengers the city shall transport, how many vehicle-kilometers public transport shall run, or how much funds are needed to provide for this amount of transportation per year.

On the level of city authorities and deputies, there is no understanding about which mode of transport to develop, either electric transport or regular buses. Parallel to trams and trolley-buses, large buses are running on the same directions. They significantly reduce (steal) passengers (patronage) for electric transport. Another problem is the wear and tear of electric transport infrastructure since despite the announced upgrades funds are invested into bus procurement.

Taxi is a private business, self-regulated, and mostly in the shadow. City authorities do not interfere with this business, there is no leverage available, but it leads to reputational losses due to low level of services.

SOLUTIONS

To empower the Transportation Unit within the Transport Office with more responsibility for public transport development. In close cooperation with the LCE "Lvivavtodor" and public transport operators, it will deal with planning of public transport development, changes in the routes, temporary changes, quality control and contractual conformity, and act as commissioners of public transport services.





AUTOMOBILIZATION

CURRENT SITUATION

The city is currently in the transition in development of transport infrastructure from car-oriented approach to sustainable mobility. Development and large-scale street reconstructions in the city are managed by LCE “Lvivavtodor”. The company name implies that it was established to develop roads, but its present functions are the construction and reconstruction of tram lines, street reconstruction, coordination of traffic lights regulation, organization of paid parking, and the e-ticketing. The company has most of the leverage available to impact the traffic regulation in the city. Moreover, it lays the foundation for the future functioning of the city’s transport system with the help of reconstruction of arterial streets.

At the same time, Lviv does not yet have any program for managing motor vehicle traffic with the help of traffic lights. Introduction of private transport calming at one intersection causes a thunder of indignation, even from other municipal institutions.

Photo by: Oleksandr Shutyuk

SOLUTIONS

There is a need to draft a priority table for street repairs to be performed in line with actual needs, rather than based on competing deputies influence and pressure from residents.

There is a need to identify the gradual procedure to draft projects of street and space reconstruction in the city with mandatory engagement of stakeholders, on the basis of conclusions from the MI City Institute. Participation levels shall be different depending on the significance and peculiarities of the territory.

Terms of reference for street and space reconstruction shall be developed by more than one person, and approved by officials in charge of each of the elements available within the street or space.

Unit for Parking and Traffic Management in the Transport Office shall have more functions and powers. It shall closely cooperate with municipal parking inspection and prioritize the inspection’s operations.

Solutions on traffic lights shall be adopted based on the data and suggestions provided by LCE “Lvivavtodor”. It shall shape a vision for the development of traffic lights infrastructure in the city.





BICYCLE INFRASTRUCTURE

CURRENT SITUATION

Development of bicycle infrastructure is a result of persistent lobbying of one person who used to be appointed as an advisor on bicycle infrastructure to the city mayor. A comprehensive scheme was elaborated to develop cycling infrastructure. Under the scheme, certain sections of cycling infrastructure have been provided, either as part of reconstruction projects or as individual projects. However, the quality of cycling infrastructure largely depends on the project designer. The city established the municipal enterprise "Institute for Spatial Development." It is by far the only design organization developing project designs for cycling infrastructure of good quality, and street design priorities are decided in line with the sustainable mobility principles. However, whenever the project is designed by another institution, sustainable mobility principles are neglected if the commissioner did not draft and approve the draft design.

Photo by: Yuriy Kobernyk

SOLUTIONS

To introduce a position at the Transport Office to deal with cycling mobility and infrastructure, as well as with the development of mobility on individual electric mobility devices. The authorized person in charge shall advocate for the rights of cyclists in projects within Lviv. The person in charge shall issue recommendations on the creation of comfortable and safe conditions for cycling before each round of street overhauling or reconstruction. The recommendations shall be provided to the project designer to be taken into account in the draft. The authorized person shall issue a summary about providing for the needs of cyclists in projects of street overhauling or reconstruction before starting to develop the final draft. They shall closely cooperate with district administrations and other territorial representatives.





SPATIAL DEVELOPMENT

CURRENT SITUATION

The new development is formally taking into account the transport infrastructure planned in the Master Plan without consideration for sustainable mobility. The Master Plan foresees a series of costly activities to develop the capacity of car-oriented transport infrastructure. When considering projects for new residential and commercial development, it is mostly discussed how to accommodate the maximum number of parking lots. Whenever it is about how this amount of traffic is going to run, it is referred to the decisions of the Master Plan on the new planned roads and junctions. The issue of other sustainable mobility elements is mostly left out.

From an institutional perspective, building development of Lviv is managed by the Office for Architecture and Urban Planning. It is by no means related to other entities in charge of transport and its development in the city. During street reconstruction, the architectural component of streets is left at the discretion of transport engineers, while the new building development and its integration to the available street infrastructure are left at the discretion of a private investor as a commissioner of works, and of the building architect who usually has a very limited knowledge on mobility and street structure. As a result, parking lots are located instead of green spaces, narrowing the sidewalk and leaving no way to allocate any cycling infrastructure.

SOLUTIONS

To develop mechanisms for deeper engagement of the city into the process of development of detailed territorial plans. Office for Architecture and Urban Planning shall directly initiate the creation of detailed territorial plans. The persons in charge from the Transport Office and Environment Office shall be engaged into creation of detailed territorial plans. Whenever the territorial development requires additional investment into the development of transport infrastructure, the investor shall co-fund the infrastructure to be completed before building in the territory.

Decision needs to be approved to ban the developers from building or designing facilities at their discretion within the red lines. Such works shall be commissioned by the city, implementing projects according to the vision for urban development and accounting for developer's or investor's needs. The works shall be funded at the developer's cost.



OBJECTIVE 7

Coordinated Mobility Management and High Competence Level of the Staff

7.1. Integrated planning in the upgrade of urban infrastructure.

Each project for the upgrade of transport infrastructure shall be integrated – taking into account walking, cycling infrastructure, green spaces, and historical heritage. Besides, its impact on social sphere, local economy, and environment shall be analyzed.

7.2. Integrated planning of real estate and mobility / transport development in the city.

Urban development and mobility shall be planned and developed jointly but not only on the level of the Master Plan. Each project for real estate development shall be analyzed and adjusted with account for SUMP principles.

7.3. Raising the efficiency of project management.

Clear responsibility and no overlapping powers and functions. Every urban project shall have a manager having all the information about the project. The manager shall make decisions and be accountable for project implementation. In the process of managing an urban development project, all the data sets available in the city shall be used. The data shall be accessible to all relevant employees in the easy-to-use format. Whenever required, the employee in charge shall have a possibility to order an additional analysis or survey in case the available data is not sufficient.

7.4. Raising efficiency in the management of operational changes in infrastructure in the city, and infrastructure maintenance.

A structural unit in the city shall be allocated to be in charge for the on-line information update for all street users entailed by temporary actions such as related to sports, religion or construction activities, etc. This information update shall include the development of temporary traffic schemes for public and private transport, cyclists, and pedestrians; the installation of temporary notification elements (time-tables, schemes, temporary road signs, and markings), as well as the efficient

communication about the changes for local citizens and visitors. The unit shall be provided with all necessary things for rapid response cases using own resources (in case of, for example, emergency repair works). It shall engage external organizations to perform planned works (such as seasonal changes in traffic time-tables for public transport).

When constructing a new infrastructure, in addition to the construction cost, the maintenance cost shall also be calculated. The same calculations shall be performed for the existing infrastructure, too. To cover the maintenance cost, the infrastructure owner shall allocate funding as needed, rather than on a residual basis.

7.5. Regulation of activities on upgrades within the city.

To arrange the processes for street upgrade, to provide for accessibility, and to engage the citizens, regulations need to be developed to standardize processes and enable faster and better implementation of new practices.

7.6. Efficient organizational structure.

Organizational structure of Lviv city council needs to enable the integrated planning and efficient cooperation between the units.

7.7. Efficient system for training the staff of Lviv City Council and municipal enterprises whose operations are related to any mobility issues.

Demonstration measures:

1. To add positions in the relevant Offices with functions to directly manage traffic safety, cycling, pedestrian infrastructure, public transport, and parking.
2. To identify the procedures of infrastructure development projects performance and criteria for their quality assessment.
3. To implement the plan for street maintenance as a component of projects for capital repairs and reconstructions.

Catalogue of activities

To add positions within the relevant Offices with functions that would directly engage with traffic safety, cycling, pedestrian infrastructure, public transport, and parking.

An authorized person in charge is a person competent in the sectoral field, who is representing a city council and is in charge of securing the rights of the respective users group. Authorized persons shall find best solutions in complicated cases, and provide for the integrated planning process. Before approval, the infrastructure projects shall be considered by all authorized persons who provide an independent opinion on the extent the interests of the respective users groups are taken into account in the project.

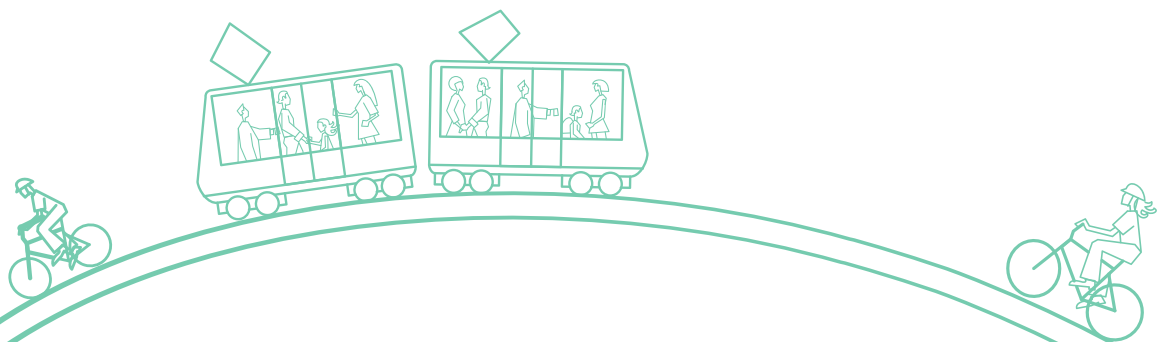
To improve the process of drafting projects for infrastructure development:

- to identify processes, sequence of project development and criteria for designs quality assessment;
- to standardize objectives and establish a hierarchy of priorities to update infrastructure, to introduce the respective monitoring;
- to submit proposals on changing concepts within the budget classification, such as replace “roads” with “streets” implying urban streets;

- to introduce the training on basics of urbanism for the staff with functions to commission infrastructure projects;
- to develop priorities in responses to ‘municipal hot line’ calls;
- to continue the practice of discussing the reconstructions of streets and public spaces with citizens.

To implement the street maintenance plan as a component of reconstruction project

Experimental implementation of innovative solutions to arrange street space poses new challenges for the street maintenance system. Cleaning, winter maintenance, taking care of the vegetation, monitoring the surface condition and infrastructure elements, and current repairs require a clear action plan and maintenance cost estimate for several years in advance. When the plans for maintenance and the cost of the works to renovate spaces and streets are anticipated, it can help simplify the maintenance process, and the process of alternative evaluation of various reconstruction concepts in terms of maintenance cost in the future.



Implementation and Monitoring

Implementation and monitoring of projects shall be exercised by the working group as a follow-up to finalize the Sustainable Urban Mobility Plan. Composition and functions of the working group are defined by this document and detailed by the resolution of Lviv city mayor.

Members of the working group shall be:

Representatives of sectoral units of Lviv city council in charge of project implementation. The group shall include representatives of the Department for Housing and Infrastructure, Transport Office, Department of Urban Planning of Lviv City Council, LCE "Lvivavtodor", LME "Institute for Spatial Development", LME "Lvivelektrotrans", MI City Institute, or their successors, and from "Integrated Urban Development in Ukraine" project run by the GIZ German Office for International Cooperation. The working group may include representatives of community / NGOs, deputies of Lviv city council.

The number of working group members shall not exceed 15 persons, and the composition shall be approved by the resolution of Lviv city mayor. The resolution shall appoint the head and the deputy head of the working group authorized on behalf of the working group to maintain communication with city council units, steering committee, and other stakeholders.

The tasks of the working group are to monitor activities implementation under sustainable urban mobility plan, to track their outcomes, to check projects for conformity with sustainable mobility principles, to adjust them, and to introduce amendments. The working group shall be accountable on their activities to the deputy city mayor on housing and infrastructure.

The working group shall convene regularly and as required, but at least once in two months. The agenda shall be suggested by the working group head, and shall be notified to other working group members not less than a week before the meeting.

The working group shall report on their performance at least twice a year, and shall submit proposals on their activities to the integrated urban development steering committee.

The steering committee on mobility shall include the following members: Lviv city mayor, deputy city mayors, directors of involved departments, heads of applicable deputy commissions, deputies of Lviv city council, representatives of the community / NGOs. Persons included as the working group members cannot be members of mobility steering committee at the same time.

At meetings of the steering committee, they listen to the progress report of the working group for the last six months, and consider proposals developed by the working group. Executive team may submit proposals to amend the Action Plan and the Sustainable Urban Mobility Plan, upon submission of the working group.

Project implementation for the current year shall depend on the amount of allocated funding.



Photo by: Volodymyr Karaim

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