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TRANSPORT SYSTEMS: EUROPEAN EXAMPLES AND DECISIONS ABOUT ODESSA

МІСЬКІ ТРАНСПОРТНІ СИСТЕМИ: ЄВРОПЕЙСЬКІ ПРИКЛАДИ ТА РІШЕННЯ ЩОДО ОДЕСИ

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Липинська О.А., Котлубай О.М, Міські транспортні системи: європейські приклади та рішення щодо Одеси. Науково-методична стаття.
У статті розглядаються основні форми та Концепції організації міського транспортного повідомлень. Виявлені стратегічні та практичні проблеми, пов'язані з організацією міського сполучення, виявлені основні проблеми, пов'язані з цим. Представлені принципи на основі яких має бути організованого рух міського транспорту приморського міста. Розглянуто варіанти організації міського сполучення, в різних містах світу, таких як Лондона, Ліона, Квінсленда, Сан Пауло, а так само Санкт-Петербурга. Наведені приклади організації взаємодії різних видів міського транспорту, а так само можливості застосування їх в Україні. Представлені, розроблені авторами напрямки і етапи організації міського транспортного руху в місті Одесі.
Ключові слова: міські транспортні системи, принципи організації руху транспорту, міський транспорт, організація перевезень в місті

Lypynska O.A., Kotlubai O.M. Urban transport systems: European examples and decisions about Odessa. Scientific and methodical article.
The article deals with the main forms and Concepts of organization of urban transport systems. The identified strategic and practical problems associated with the organization of urban communication revealed the main problems associated with this. The principles on the basis of which the organized traffic of the city transport of the seaside city should be presented. The options for organizing city connections in different cities of the world such as London, Lyon, Queensland, Sao Paulo, as well as St. Petersburg are considered. The examples of the organization of interaction of different types of urban transport, as well as the possibility of their application in Ukraine, are given. Presented, developed by the authors directions and stages of the organization of urban traffic in the city of Odessa.
Keywords: urban transport systems, principles of organization of movement of transport, city transport, organization of transportation in the city

As of today, the situation in Odessa is quite specific with the traffic organization and its implementation within the city. The passenger transport process reorganization, carried out in recent years, aimed at improving the traffic and passenger service organization, although it improved the situation, however, the fundamental issue has not been resolved. As a result, to date in Odessa operate:

About 80 routes in the usual mode (of which 20 tram and 11 trolleybuses):

— 90 in the route taxi (RT);

— 3 routes in express mode.

From 90 RT routes, 58 routes pass through the city centre, of which 42 are long ones ending on the city outskirts. Problems with the of urban passenger traffic organization are peculiar not only to Odessa, but to all major cities of the world, so the experience of their solution should be taken into account in our city.

First of all, it is necessary to address the European cities problems. It should be noted that this problem in Europe has long been resolved comprehensively. An expert working group was organized in the European Union, comprising 20 experts from different levels from the 12 EU Member States, as well as 4 European Commission members. When designing and planning urban transport systems in EU cities with a population of 100,000 or more.

Analysis of recent research and publications

Such scientists as Fyshelson M. S. [1], Xeit F. [2], Seo Yu. [3], Hou Kh. [4] Lester S. [5] have repeatedly raised important issues concerning the urban transport organization in their researches and publications.

The goal of the article is to consider the main existing forms of urban passenger traffic organization to propose basic provisions for the urban transport organization.

The main part

The work on the urban transport systems design and planning is based on the following basic principles:

— Territory use planning (City areas are planned so that, based on the number of people living on a given site and using that territory, a proportional ratio of roads, sidewalks, parking spaces, etc. of the total site area is determined);
— Restrictions related to car refueling (legislative prices determination, petrol station locations, etc.);
— Restrictions on entry into cities (entry fee, setting environmental standards required for entry into the city, etc.);
— Public transport promotion (Its positive image creation and aggressive displacement policy by public transport of private vehicles through fiscal measures and legislative norms);
— Road design (roads are designed in such a way that at the right place the car drivers reduce the speed, the road routes are constructed in such a way as to reduce the load on environmentally friendly urban areas);
— Parking management (real-time city parking management system, increased parking fees, etc.);
— Reduction of noise pollution;
— Low-emission zones creation;
— New cars using promotion , which emissions are minimal, by private car owners, freight delivery companies, companies engaged in passenger road transport, etc .;
— Old vehicles recycling and expropriation schemes;
— Cargo movement management (transit cargo, local transportations, long hauls, cargo for city life (products, clothes in shops, etc.);
— The city traffic management (the intelligent transport management system creation, creation companies' transport managers training, etc.).
— Space redistribution for private transport, cyclists, pedestrians;
— Improving conditions for cycling, pedestrians (both functionally and in recreational terms), safety and security guarantees through specialized infrastructure, good lighting and quality social control.
— -Noise-canceling pavement, noise shielding in urban areas using and technical support.
— Improving visual perception of road space.

While developing all or most of these areas, the city achieves a synergistic effect in urban transport.

However, a number of measures have negative effects, primarily related to the social inequality of society members. In this situation, the municipalities undertake the task to counteract the negative impact on the citizens.

How are these principles implemented in European and not only European cities.

At the core of London's transport development concept is the passenger transport development - subways and buses. However, it also includes a number of other measures to reduce the burden on road infrastructure.

According to the developers, the capacity of the subway and rail, as well as the bus system in London, will increase by 40% over the next 10 years. In addition, in central London traffic will be reduced by 15% and the number of vehicles entering London will not increase. Despite the fact that by 2016, the City of London estimates that the city's population will exceed 8.1 million people.

The concept principles:

— environmental friendliness;
— comfort;
— social responsibility;
— demand matching and cost-effectiveness.

The basic concept ideas are:

— parking scheme in the city on the fiscal measures basis at significant discounts for locals, disabled people and other privileged ones;
— support for social initiatives aimed at creating free access to the city center, social infrastructure, recreation areas, creating hiking and biking routes;
— all transport should be accessible to all social groups (persons with disabilities);
— the fixed fares establishment for public transport with the electronic payment system simultaneous introduction, which is applicable to all modes of passenger transport, including taxis;
— private transport companies involvement into the small transport infrastructure development;
— creating a network of direct rail messages within separate areas
— the internal transport network integration with the state transport system (airport, railway station);
— buses positive image creation, their route reduction and strict regularity establishment;
— street construction;
— goods delivery system creation by commercial cargo companies under partnership conditions.
— Freight transport movement restriction;
— routes realignment, etc.

In London, a fee for entry into the city central part of private cars is introduced in the amount of five British pounds for a car a day. Paid entry mode is introduced on weekdays from 7am to 7pm. A fixed network with 688 TV devices automatically scanning vehicle numbers is installed in central London. This system implementation results have shown its success so far: – transport delays have decreased by an average of 17% in the city centre the regularity of bus traffic increased by 33%; – the average speed of buses increased in the centre during rush

hour from 10 to 12 km / h, in the area adjacent to the centre of London– from 12 to 14 km / h; – the number of car owners who pay for entry per day averaged 100,000 people [6]. All entry fee revenue, estimated at 130m pounds a year, is directed public transport.

Lyon's transport system reformation , according to the concept, cost the municipality 5.7 billion according to the concept, cost the municipality 5.7 billion French francs, of which 3.66 billion went to 11 new lines, 1.62 billion to renovate the transport fleet and reconstruct road infrastructure and 420 more million to upgrade other equipment. The transport system reformation term in the city with a population of 5.6 million people was 8 years, from 1998 to 2006.

The main target of the Lyon's transport system reformation concept was to maximize the balance between the need for mobility and the accessibility of any transport form on the one hand and the of citizens' health and the environmental protection on the other. In this case, the transport system must organically flow into the process of the city sustainable development .

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The means of achieving the strategy goals were:

— creation of special road routes for urban transport, including for rail vehicles, while increasing these routes capacity for passenger transportation;
— creation of intermodal connection between all types of passenger transport in the city (timetables, tickets, fares);
— special measures (such as changing the roads form to reduce drivers' speed), which allow to reduce by 40% the number of serious road accidents;
— creation of special tram lines for the certain population categories (students), etc.

The Zurich transport system development programme was designed for up to 12 years. Its implementation allowed to increase public transport passengers number by 35%. The increase in the subway passengers number was 24% - 87% annually.

Only about 60% of the city's population with driver's licenses use the car every day, with the average distance that motorists drive on private vehicles is only 10.2 km.

The programme goals were:

— the amount of private transport limitation entering the city center;
— redirection of private motor transport on roads, speed limitation.

To achieve these goals, the programme proposed the following measures:

— creation of an electronic system that allows the traffic lights to block private vehicles movement at rush hour and gives the green light to public transport (implemented with the help of special chips and a unified system of traffic lights and traffic signs in real time);
— organizing by electronic pointers and alert system through electronic devices, as well as by means of traffic lights routes for bypass traffic;
— creation of a highly efficient subway system;
— speed limit in the city of 30 km / h;
— tight fiscal and temporary restrictions for those wishing to park;
— of the urban transport system adaptation programme depending on the wishes of citizens, etc.

Forming the Queensland transport system has cost the municipality 3 billion Australian dollars.

However, these funds have managed to qualitatively change the demand for transport in the region from a population of almost 4 million people in such a way that the transport needs in the region correspond to the transport system capacity.

The system formation basic principles were:

— mobility of every society member;
— transport ecological safety assessment in its implementation;
— a region's transport positive image creation.

The following directions were chosen for the concept objectives realization:

— The transport system formation on the basis of the existing transport infrastructure by means of demand management, which in the future allowed to bring the demand for transport in each district to the transport system capacity level;
— linking social infrastructure to specific transport nodes or lines;
— creating transport sharing communities;
— a call for society to move more on foot or on bicycles;

— efficient and integrated system of public transport creation, including the infrastructure reconstruction of rail modes of transport, the bus transportation system reformation, the accessible system creation of information on passenger; tariffs integration for passengers carriage etc .;
— a special route creation for commercial transport, etc.

Prior to the programme implementation for the development of the Sao Paulo transport system traffic jams in the city reached a length of 240 km. With the development of population's port of 8.5 million people were able to increase revenues [6], and therefore the demand for personal transport increased, as a result, the city was practically standing.

The programme construction principles:

— Competitiveness;
— Health;
— Harmonization;
— Responsibility;
— Meeting the citizens' expectations.

The programme implementation main directions:

— Vehicles diversification;
— Effective management implementation;
— City districts routing;
— The implementation of programmes aimed at the air and water protection;
— Equal parts creation of different purposes of territories;
— The historical city centre exclusion from the transportation system, etc.

Thus, summarizing the existing experience, we can draw the following main conclusions that have some applied value for implementation in our city.

1. Most of the problems inherent in our city are not unique and are inherent in all or most major cities in Europe and the world.
2. The main cities' problems are ecology, traffic congestion in the central part of cities.
3. The main ways of solving the problems are the differentiation of public passenger transport flows in the city in accordance with the demand for transportation in its areas, a new generation of ATCS creation based on artificial intelligence systems, the historical city centre exception from the transport system in general or trunk transport systems.

The main distinguishing features of Odessa are the carriers fragmentation , the of the city location on the coast of Odessa gulf, two remote "dormitory" areas presence, private construction significant sectors, several satellite cities, lack of urban transport dominant mode of transport and as a consequence – the need for them.

The St. Petersburg transportation industry is on the verge of change. It is planned to restructure the route network from 2011. To solve this problem, the first step was the experts working group from the Committee on Transport, St. Petersburg State University (Organizer) and route carriers to develop a promising route network of land passenger transport. The main task of the working group is to develop such a route network, which will allow in the future to basically abandon the commercial transport and carry out passengers transportation at the regulated fare of the transportation organizer. In order to assess the shortcomings of the existing route network, the specialists of the Committee on Transport and St. Petersburg State University "Transportion Organizer" monitored residents' complaints and suggestions of our city concerning public transport work [6].

It also provides:

1. Transport links provision of peripheral areas and mass housing construction zones by high-speed passenger transport modes of high carrying capacity with the St. Petersburg centre, among themselves, with the labour applications placement main areas with the increase in the length of the St. Petersburg Metro lines for the estimated term of the General Plan of St. Petersburg – until 2015 –for 40– 42 kilometers.
2. Ensuring priority in the development and operation of mass public transport over private transport.
3. New types of passenger transport developed network creation (hereinafter referred to as NTPT).
4. Reducing the average cost of travel time to the workplace to 40–45 minutes (maximum – up to 60 minutes) one way.
5. Reducing the filling of mass passenger transport rolling stock during peak hours to 4-5 people per 1 sq. m of the salon floor.
6. Traffic intervals reduction for all types of land passenger transport during peak hours and during other periods.
7. Reconstruction and development of the urban passenger transport technical base (depots, parks).
8. The St. Petersburg personal road network development, taking into account the forecast for the estimated term of the Master Plan of St. Petersburg – until 2015–increase in the number of cars to 350 cars per 1000 inhabitants of St. Petersburg.
9. Development of high-speed and continuous movement road network.
10. Ensuring the unloading of St. Petersburg historic centre from passenger cars with the diversion of transit traffic, incentive parking system creation at the entrance to St. Petersburg historic centre of, near subway

stations, the of administrative and economic methods introduction of restricting cars entry and parking in St. Petersburg historic centre.

11. Highways - doublers establishment main enter the city directions, the most congested areas of the network.
12. Creating full-fledged mainline communications of mass housing construction areas with St. Petersbur centre between themselves and workplaces.
13. Increasing the road network capacity and the traffic and pedestrians safety.
14. Completion of the formation of the city mains and transport systems of the city-wide purpose.

Comparative characteristics of different types of urban transport

One of the urban transport system major drawbacks is the misuse of different transport modes. As a result, the transport services continues quality to be low, and the funds allocated to the transport development are inefficiently spent. Below is a transport modes brief description and the conditions of application for each of them, based on scientific research in the field of passenger transport.

A bus has the lowest carrying capacity and the highest transportation cost. It is the most environmentally hazardous. In Western countries, buses (through diesel engines) are considered to be the loudest transport mode, provide the least smooth ride (acceleration with shifting), have a strong vibration, and in the aggregate of characteristics belong to the lower quality category. The benefits can be noted only slightly lower capital costs, but this advantage is excessively overestimated in everyday thinking (the organization of a 1km route is only 1.4 times cheaper than for a trolleybus route). The use of bus transport should be restricted only to low-traffic lines with a passenger flow of less than 1 thousand people at rush hour.

A trolleybus has all the electric transport advantages: environmental cleanliness, continuous smooth acceleration and braking, quietness, relatively low maintenance costs. However, a trolleybus carrying capacity is only a tenth higher than a bus (due to better dynamic performance than a bus), so the trolleybus does not cope with the traffic (more than 5-7 thousand passengers per hour). The ability to use the existing roadway is both an advantage and a disadvantage of a trolleybus: it seems to reduce the capital cost of building the line (although it must be remembered that the presence of the trolleybus takes up the bandwidth of the car lane), but is the cause of trolleybuses downtime in traffic jams. When constructing a dedicated lane for a trolleybus, this is found in comparison with the construction of a dedicated tram line.

In modern conditions, when the parking order is not actually controlled, it is unrealistic to prohibit the entry of personal vehicles on public transport lanes (physical restraints are required). Thus, the use of a trolleybus (bus) on congested streets or requires dedicated lanes (which is manifested in comparison with the construction of tram lines), or does not fundamentally solve the passenger traffic problems (through "traffic jams"). The trolleybus is used on moderately loaded routes or on a dedicated canvas with passenger flows of 2-5 thousand pas / h (physical limit with violation of comfort requirements - 8 thousand pas / h).

Subway has a maximum speed (average train speed of up to 40 km / h) and a carrying capacity (up to 65 thousand people per hour) [7]. At the same time, in terms of environmental performance and comfort, inferior terrestrial transport modes: lack of natural lighting, low air quality in tunnels, dramatically increased noise. The metro has an increased risk of natural disasters and accidents: passengers are unable to leave the vehicle immediately.

However, the main subway disadvantage is the excessively high capital investment, so the a subway should construction be considered a forced measure for passenger traffic of more than 30–35 thousand passengers an hour at which other transport modes no longer cope with the load.

Traditional taxis do not reduce the roadway usage (the area occupied by the passenger on the road, the same as for private transport), but reduce the number of car parking. This transport is intended to replace a private car in all city trips of increased comfort, but it will be able to work effectively (to carry out high-speed transportation) only after 90% of passenger traffic is transferred to mass public transport [8].

The route taxi has an extremely narrow sector of activity: continuous routes on small but steady passenger flows. The route taxis traffic along intensive public transport routes, disorderly stops and parking lead to roads congestion, create chaos in traffic, can lead to a delay in the flow, complicate the environmental situation.

The high-speed and traditional tram (with its work appropriate organization) is recognized as the most promising urban transport mode in the world. Wide range of carrying capacity (thanks to work on the system of many units (SME), ie in the train–up to 30 thousand people per hour), high average speed (up to 30 km / h), all advantages of electric transport (environmental friendliness), smooth running, quiet, low maintenance costs).

The highest comfort is supported by the ability to operate rail types on the SME, which allows to maintain the standard load for a wide range of passenger capacity (at values greater than 5–7 thousand pas / h. Non-rail modes don't physically cope with transportation). For rail traffic requires energy minimum of, the work on the media repeatedly reduces the number of required staff drivers.

All of these qualities are inherent in the subway, but its development is restrained by ultra-high investments, which delay the subway appearance for 10–30 years even in the most necessary directions and completely exclude it for lines with flow up to 25–30 thousand pass / h. With some organizational measures, tram quality can be closely approximated to the subway level, reducing the severity of the traffic problem at very large passenger traffic (before the subway appearance) and finally solving it at flows up to 30 thousand pass / hour.

The need to develop a tram in cities is confirmed by the 340 largest professionals and transportation scientists around the world in the “Results of the 5th Conference of the International Union of Public Transport (UITP) on light rail”. As defined by the UITP Commission, "light rail (LRT) is a rail transport that, in stages, develops on the modern tram basis, transforms into a high-speed transport system that operates on a separate path at ground level, underground and at the trestle." The document also shows the numerous advantages of a tram that cannot be fit into this text format. The fact of the need for the high-speed and traditional trams development must be accepted, as is any science-based law. However, it is necessary to clarify the terminology in connection with the appearance of the so-called "new transport modes".

The light subway is in fact an ordinary subway, for which the requirements of the Subway CSR are reduced by the minimum radii in the curves, and the dimensions of the wagons (short wagons) are also allowed to change [9]. Systems with similar tolerances overseas operate as a regular subway (the Chicago subway, one-third of the New York subway lines, some in Boston and many other cities –usually the oldest, inferior to the modern subway in speed and capacity). The basic differences between light rail transport (LRT) from subways are:

Table 1. Differences between light rail and subway

Indicator	Subway	LRT
Axle load	147 kN / axis	73,5kN / axis
Токознім	lower (contact rail)	top (contact wire)
Platforms	high	usually low: sidewalk level

Source: own elaboration

Existing CSRs were designed based on years of experience and testing. They clearly regulate the rail modes scope (for flows up to 15 thousand pass / h–tram, 15–30 thousand – high speed tram, more than 30 thousand – subway).

Light Subway (LS) does not have a single advantage over a high-speed tram, but it is inferior in all qualities:

— increased load on the axle requires the construction of a more difficult and durable path and ballast, which greatly increases the construction cost;
— for the same reason there is increased noise and vibration (their increase is directly proportional to the increase in the axial load – twice);
— the contact rail requires complete isolation of the "light subway", its lines are solely on the overpasses or tunnels. It also leads to more expensive construction;
— the landing and transplantation time (rise to the trestle or descent into the tunnel) increases, which causes the average speed of the trip to fall;
— LS flyovers around the world are recognized as ugly and loud. Flyovers built at the beginning of the twentieth century tend to replace underground areas or completely close them. Areas with overpass tend to be in the lower price range (Harlem, South Chicago, West Philadelphia, etc.);
— tram’s inherent flexibility disappears: the ability to work both in high-speed areas and in pedestrian zones at ground level.

Thus, the so-called light subway has nothing to do with light rail transport, the word "light" presence in its name only confuses officials and the public.

Monorail transport in 90% of cases is used as park (leisure), zoo (zoos with open space for animals), in amusement parks, for transfers between airport terminals. Its application is due to the following factors:

— transportation is not related to commuting;
— transportation is impossible (zoo), inappropriate (amusement park) by other transport modes or easily compensated (airport, short distances);
— monorail flyovers do not pass in the residential area and do not disturb the city appearance.
— The only exceptions to these rule are the Wuppertal monorail, built in 1901 and preserved for historical reasons, as well as several monorail lines in Japan, where they are built because of the world's most acute shortage of living space. And in this case the conditions are mandatory:
— impossibility of laying any part of the line on the earth surface (for example, the whole route is laid above the production area or at the territory of the airport);
— route traffic absence (each monorail – one line).

Monorail is characterized as expensive (the construction cost is comparable to ground and trestle subway, and operation is 30–50 times higher than in traditional transport modes), slow (speed does not exceed 40–50 km / h), environmentally dirty (the presence of rubber covers Wheels cause significant energy overruns), inconvenient to use (prolonged transplants, poor ground transportation and subway), hazardous in emergencies (inability to leave rolling stock on submarine). Finally, monorail existing in the world only works at temperatures above zero.

Maritime transport operating in the public transport mode or in excursion mode in cities or on nearby suburban routes can be represented by different types of vehicles. These include marine (river) trams, ferries, catamarans, water shuttles, water taxis, etc. This type of transport is of route traffic set along the city's waterways

(or nearby suburban routes). The idea of water transport development is made with the purpose of unloading other types of public transport, and at the same time has an excursion and recreational function. "Average" characteristic of the river (sea) tram is as follows:

Passenger capacity: up to 150-200 people

• Speed: 20-60 km / h. More rapid hydrofoil vessels are not usually called river trams, their daily name is "Rocket" (in this case all small hydrofoil vessels are called, and not only ships of a particular type "Rocket").

In Western European cities urban and suburban passenger water transport mainly occupies a niche, but in some cities there is also public water transport. So in London there is a whole network of passenger water routes known as London River Services. Some routes are aimed at tourists, others are more often used by Londoners themselves as regular public transport, such as commuting. Although London River Services is licensed by Transport for London, it is operated by private companies, and buses and subways are not operated on London's waterways (although they may provide discounts). In the Netherlands, the concept of "Openbaar vervoer te water" was introduced as part of the development of the public transport system. In Finland there is a "water bus" (Fin. Vesibussi). Scheduled water taxis operate in New York, Boston, Baltimore, Toronto, Oakland and other cities. The most popular is the yellow catamaran taxi, which offers a variety of trips. In New York there is a taxi ferry between busy Manhattan and the Stetham Island sleeping area. The trip cost is $ 20. In Venice, water taxis are called small boats that operate in the same mode as ordinary, "car" taxis. Vessels carrying a greater number of passengers on certain routes in this city are called "water buses" (Vaporetto, Italian. Vaporetto). In Poland, water trams operate in Warsaw, Bydgoszcz, Gdansk, Gdynia, Sopot, Szczecin and other cities [6].

Ferries can be used to carry passengers and vehicles. Ferries are similar in function to bridges. However, some sea ferries ply along the shore, thus taking on the passenger liners function. Although the journey on such a ferry takes longer than on land transport, it is a great advantage for car travelers to take a car with them. In addition, such ferries sometimes help to avoid formalities related to transit through the third countries territory (for example, the Kaliningrad – Saint Petersburg ferry). In some countries, such as the Netherlands, ferries operate the highway service. Ferries across the rivers are often free of charge (but transportation of cars and heavy cargo is charged). For example, the free New York ferry Manhattan–Staten Island, which is very popular with tourists.

Small vessels may not be used for passengers transportation, which were not built specifically as ferries. For cars transportation a ferry must be equipped with a rather large deck and entry ramp. Ferries for short distances usually have two such ramps (thus, they do not need to be deployed) and they can travel at both speeds at the same speed. Larger ferries are more like ordinary ships, with an evident nose and stern, this form is better suited to the navigational requirements. Large ferries have several car decks.

There is a number of difficulties for the inland waterway transport organization, primarily related to the availability, condition and efficiency of the relevant infrastructure functioning. This is the presence of the vehicles, berths, navigational equipment and systems, security technical implementation, transportation and passengers quality , and cargo, route optimization and more. In addition to the above, it is necessary to take into account the region's natural and climatic characteristics, winter duration, low temperatures, freezing of waterways and, as a consequence, the navigational duration, the inflows and outflows frequency, the possibility of servicing vehicles and related infrastructure in the non-operational period of modernization, availability service, technical staff and qualified managers and many other issues.

Odessa's geographical location along the Black Sea coast, the availability of both the appropriate infrastructure and qualified specialists opens up good opportunities for small tonnage maritime transport usage for the passenger and road passenger transport organization.

The urban transport mission is to fully meet the needs of the city's population in passenger transportation on the principles of:

— accessibility for all segments of the population;
— safety in all respects;
— maximum convenience and high quality;
— compliance with environmental requirements of international standards;
— the entire transport system economic efficiency.

These principles implementation implies the creation of not less than 20% reserve of capacity, maneuverability and mobility of vehicles and provides:

— organizationally – the presence in the city of the only responsible carrier – the Passenger Transport Pool, which receives concession the transport and passenger infrastructure of the city on certain conditions;
— removal from the railway station of the city's central part of the main mass of passenger trains (except there can be only company and or even only "Chernomorets") with their distribution at the stations of Odessa–East and Odessa-Zhytomyr on which modern terminals with road junctions should be built ;
— of existing railway tracks usage in the city for the implementation of long-distance passenger transportation (rail bus);
— a network system for the passenger traffic organization in the city with certain elements of the main and network organization (27 networks in total, which cover the city along the perimeter, the city centre (19,

20, 24, 25, 26), and are located in separate city's transport centers of (Tolbukhina) - two passenger rings formation – external and internal routes (which will link the centers of the respective bushes) and route links between the centers of the large and small rings of passenger electric transport network formation in the central (historical) part of the city.

Conclusions

Thus, the primary tasks of forming the road traffic optimal organization and the Odessa transport network formation are:

- a city-wide automated centre of operational traffic management organization, new elements of transport infrastructure organization − landing nodes in the places of different transport modes interaction, common standards of information service for passengers introduction, integrated programmes implementation for the development of transport systems as part of the urban development master plans.
- integration tendencies development between different types of public transport in the of transport process organization, quality of transport service improvement, the latest information technologies and automated control systems introduction, use of alternative energy sources, development of partnerships between transport enterprises and private companies in the implementation of investment projects in public transport.
- withdrawal of all existing ST and long-distance routes from the city centre, approximately restricted to the streets including Pushkinskaya, Bazarna, Preobrazhenskaya, Prov. Mayakovsky, Sabaneev Bridge, Catherine Square, Primorsky Boulevard, Pushkinska;
- existing preservation, as well as the maximum possible development and improvement of new "green zones", which will ensure the cleanliness of the surrounding living space of city dwellers and a high level of living quality for the urban population as a whole;
- preservation in the specified city's central part the only the currently operating electric transport with the perspective modernization of tram and trolleybus routes and the movement mode intensification by increasing and improving the rolling stock, as well as by eliminating parking lots;
- organization of one / two ring routes around the center on highways of small and large high speed traffic.
- Big Ring: The centre of network around the city.

It is also necessary to arrange and intensify to the subway mode (standard travel interval = 5-7 minutes) one through route of the North - South speed tram.

Final stops of all routes of ST from "dormitory districs", dispersed around the formed circular routes, taking into account the formed places of mass landing-disembarkation (interchange nodes): Peresypsky Bridge, Bus Station, Railway Station, Shevchenko Park.

Prohibit end-to-end transit through the city centre by suburban, long distance and freight transport. Allow suburban and intercity traffic only for medium and large rings, and for freight only for large ring routes.

In the city centre to preserve the existing ones and in the future build only capital (mainly–underground parking lots), and remove all open and arena campsites and parking lots from the centre at the ring border: Preobrazhensky Park area, Sakhalinchik, Shevchenko Park area, Peresypsky Bridge north side, Bus Station / Old Market Square area, II Zstava, Serednya, Babelya (district of Mikhailovskaya Square), Zankovetskaya (district of Alekseyevskaya Square), etc.

Leave only routes that serve agricultural producers at the Privoz bus station. Transfer other routes to the main bus station "Odessa" and other local bus stations taken from the city's central part .

Provide parking spaces for residents of the city's central part when building multi-level parking lots outside Odessa's central part.

Increase the number of rolling stock in all directions where tram routes are outside the traffic lanes, thereby increasing the traffic frequency.

Abstract

As of today, in Odessa there has been a completely specific situation with the motor transport the organization and implementation within the city. In recent years, passenger transport process reorganization, carried out in recent years, aimed at improving the traffic and passenger service organization, although it improved the situation, however, the fundamental issue has not been resolved.

Problems in organizing urban passenger transportation are not only Odessa's characteristic obut also of all major cities of the world, so the available experience of their solution should be taken into account in our city.

The goal of the article is to consider the main existing forms of urban passenger traffic organization to propose basic provisions for the urban transport organization.

Conclusion. First of all, you need to address the European cities problems. It should be noted that this problem in Europe has long been solved in a comprehensive manner.

Thus, the primary forming tasks of road traffic optimal organization and Odessa's transport network formation. Provide provision of parking spaces for residents of city's central part in the construction of multi-level parking lots outside the central part of Odessa.

In all directions, where tram routes are carried out beyond the lanes.

Список літератури:

1. Фишельсон М. С. Городские пути сообщения. / М. С. Фишельсон– М.: Высшая школа, 1980 -202 с.
2. Хейт Ф. Математическая теория транспортных потоков/ Ф.Хейт [Пер. с англ.] – М.:Мир, 1966.– 288 с.
3. Seo Y.U., Jang H., Park J.H. A Study on Setting-Up a Methodology and Criterion of Exclusive Bus Lane in Urban Area. Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, 2005, 339-341.
4. Gow H.W. Transit Priority: Putting Buses First. Ottawa, Ontario, 2002, 7-9.
5. Lester S. East London Transit. Transportation research, London, GB, July 2001, 40-42.
6. База статистической информации Международного союза общественного транспорта - UITP Millennium Cities Database for Sustainable Transport . URL – Режим доступу: www.uitp.com.
7. PIARC: priority for public transport and other high occupancy vehicles (HOV) on urban roads. Reference : 10.07.B Routes/ Roads special issue II-1995, 1-51.
8. Хомяк Я. В. Организация дорожного движения./ Я. В. Хомяк– Киев.: Высшая школа, 1986. –.. – 271 с.
9. Розвиток транспортної інфраструктури України на засадах державо-приватного партнерства: монографія / Н.М. Бондар. – К.: НТУ, 2014. – 336.

References:

1. Fishel'son M. S. (1980) Gorodskie puti soobshcheniya. [City communications], Moscow.: Vysshaya shkola, 202 s.[in Russian].
2. Xeyt F. (1966) Matematicheskaya teoriya transportnykh potokov [Mathematical theory of traffic flow] – Moscow.: Mir,.–288 s.[in Russian].
3. Seo Y.U., Jang H., Park J.H. A Study on Setting-Up a Methodology and Criterion of Exclusive Bus Lane in Urban Area. Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, 2005, 339-341.[in English].
4. Gow H.W. (2002) Transit Priority: Putting Buses First. Ottawa, Ontario, , 7-9.[in English].
5. Lester S. East London Transit. Transportation research, London, GB, July 2001, pp. 40-42.[in English].
6. Baza statisticheskoy informatsii Mezhdunarodnogo soyuza obshchestvennogo transporta [Statistical Information Base of the International Union of Public Transport] UITP Millennium Cities Database for Sustainable Transport. URL: www.uitp.com.[in Russian].
7. PIARC: priority for public transport and other high occupancy vehicles (HOV) on urban roads. Reference: 10.07.B Routes/ Roads special issue II-1995, 1-51. [in English].
8. Khomyak Ya. V. (1986) Organizatsiya dorozhnogo dvizheniya.[Traffic organization], Kiev.: Vysshaya shkol, 271 s.[in Russian].
9. Bondar N.M. (2014) Rozvitok transportnoї infrastrukturi Ukraïni na zasadakh derzhavo-privatnogo partnerstva: monografiya [The development of transport infrastructure of Ukraine on ambushes of private-private partnership: monograph], Kiev: NTU, – 336. [in Ukrainian].

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