Problems of Organizing Year-Round Urban Pedestrian Spaces in Vladivostok

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Abstract. Vladivostok is notable with significant limitations in arranging pedestrian spaces in the traditional way, namely along highways. Therefore, the most essential task is to develop those pedestrian spaces that connect areas separated by a significant difference in terrain, highways, and railways along the shortest distance. The article discusses the experience of national and foreign design of pedestrian spaces formed independently of city highways and assuring a comfortable traveling for pedestrians under any weather conditions. Studying the experience of using technical means and mechanisms will allow outlining the main ways of the architectural and spatial arrangement of year-round urban pedestrian spaces in the conditions of hostile terrain and monsoon climate.

1. Introduction

A person and a car have different capabilities in overcoming terrain. The more pronounced the terrain is, the more significant the difference. Therefore, the arrangement of urban pedestrian spaces on hostile terrain has its specifics. Such spaces are most often routed independently of city streets and highways. Depending on the specific forms of terrain, various elements of landscaping are created to arrange pedestrian routes going through slopes, terraces, retaining walls. Such elements include stairs, ramps, bridges, and walkways. The solutions for overcoming hostile terrain can also include mechanized tools such as funiculars, cable cars, escalators, travellators, elevators, and lifting platforms.

Vladivostok city is located on the narrow territory of the Muravyov-Amursky Peninsula, with indented coastline and harsh terrain. Vladivostok developed according to the principle of "pioneering development" of the territory when everything that was not directly related to the construction of buildings and objects was formed according to the left-over approach. And the budget of any construction project undertaken on the most complex terrain and under the city’s exotic nature and climate conditions invested little money into arranging the landscape. At the end of the 20th century, permanent underinvestment in the improvement of territories resulted in the inadequate arrangement of pedestrian routes, which was aggravated by the uncontrolled explosive automobilization of the city. As a result, the average city resident would rather spend an hour in a traffic jam than walk a couple of
kilometers. Walking around the city is not just uncomfortable, but also dangerous, even the city center and bedroom districts cannot be considered as a model in terms of improvement and comfortable environment. The city development strategy, which was developed at the beginning of the 21st century, is primarily aimed at the development of the transport component, namely roads, bridges, junctions, multi-level parking lots, VKAD (Vladivostok ring road) [1, p 13]. At the same time, no one paid attention to the development of pedestrian spaces. As Jan Gale said, “The desire to walk in an environment designed for a speed of 60 km/h is caused by a lack of emotions and boredom” [2, p 44]. Pedestrian access to the urban infrastructure is extremely low, even in the districts located close to the city center.

Natural and anthropogenic specifics of the terrain can become an insurmountable obstacle. It includes scarps, ravines, slopes and retaining walls, as well as railway transport lines, which are most often laid in recesses or fills in Vladivostok's conditions. Large-scale construction at the beginning of the XXI century did not lead to significant progress in the arrangement of a comfortable urban environment despite the multi-billion dollar investments, since it did not take into account the possibility of pedestrian routes. These are the Mariinsky Theater, the Fetisov Arena, both automobile bridges. Even the idea of placing a modern cinema and concert complex on the Orlinnya Sopka hill did not enhance an incentive for designing pedestrian routes to connect this object with the rest of the city. In addition to the hostile terrain, the problem of creating comfortable pedestrian spaces is aggravated by a recurrent combination of unfavorable weather factors such as low temperatures with a strong gusty wind in the cold season and high temperatures with high humidity in the warm season [5]. If thrill-seekers can follow along a number of routes under good weather conditions, then even insignificant snow or rain makes this task impossible for them. Taking into account the increasing flow of tourists, including the foreign ones, the arrangement of a comfortable walking environment is extremely important for developing the city’s tourist environment, as it is a Russian landmark on the Pacific coast.

2. Methods

In most cities, the pedestrian environment is formed along transport routes and through green zones, namely parks, public gardens, embankments. Besides, the most radical way to organize pedestrian traffic is to completely close the street to traffic. It is difficult in Vladivostok for a number of reasons. There are no a lot of green spaces in the city, the streets of the central part are narrow and overloaded with transport that cannot follow an alternative route. Jeff Speck who is one of the prominent theorists of pedestrian movement believes that “There are many health benefits from walking, it allows people to communicate, but it is also useful as it helps to strengthen the vitality of the city itself and is its most important indicator” [3, p 16]. Therefore, for a further strategy targeted at the development of urban spaces, it is necessary to consider alternative options for arranging the pedestrian environment.

As for an object to analyze urban planning, we selected those urban districts where the problem of connecting urban space parts is most acute. These districts can be conditionally divided into two types. The first type includes the districts where the vertical pedestrian connectivity of the urban space parts is challenged by a significant difference in the terrain between them. The second type includes the districts where the horizontal pedestrian connectivity of the urban space parts is challenged by railways and highways (fig. 1).
3. Results

While analyzing the selected districts, it was revealed that the basic tool for arranging pedestrian environment between districts located at different levels is a staircase, it is the most common and easily implementable approach in the city. However, in conditions when the terrain difference reaches 60-80 m, it is not enough to use only stairs. The design of open stairways is not able to provide comfortable year-round exploitation, they are ineffective in winter, and cannot help people with limited mobility by default. Apart from examples of widespread staircases, the only alternative example of vertical urban transport in Vladivostok is the funicular. It was built in 1961, and it is outdated nowadays. Even though Vladivostok is famous for its bridges, there are no comfortable pedestrian bridge structures in the city to walk obstacles over railway lines and highways. The existing pedestrian viaducts, bridges, and walkways do not assure a comfortable experience for pedestrians.

In the city, you can find examples where the distance between two bus stops located at different levels can differ significantly depending on the travel method. The examples include such pairs of stops as Funicular and Tsirk, Tolstogo and Dalzavod (fig. 2, 3). The distance between the selected bus stops, located at different levels, is as follows. The travel way between Tolstogo (elevation +136 m) and Dalzavod (elevation +29 m) bus stops is 5.35 km / 30 mins by public transport, 3.6 km / 7 mins by private transport, 1.1 km / 14 mins on foot. As for Funicular (elevation +110 m) and DVGTU (elevation +21 m) bus stops, the travel way is 4.29 km / 32 mins by public transport, 2 km / 5 mins by private transport, 1 km / 11 mins on foot. Travel time on public and private transport is indicated without taking into account the potential traffic jams. In the mental city map, these are completely different districts, although they are located literally next to each other.

The necessity of arranging pedestrian routes to connect the city parts located at different terrain levels is obvious. In the first case, it is necessary to arrange a route that would make it possible to connect Svetlanskaya street with the future cinema and concert hall on Aksakovskaya street, which implies the funicular reconstruction. In the second case, as there is no funicular, the arrangement of a pedestrian route makes it possible to connect two levels of No. 49 and No. 50 residential neighborhoods with Dalzavod, but unlike the first example, there is no vertical transport there.
Figure 2. Routes of traveling between Funicular (elevation +110 m) and Tsirk (elevation +21 m) bus stops located at different levels.

Figure 3. Routes of traveling between Tolstogo (elevation +136 m) and Dalzavod (elevation +29 m) bus stops located at different levels.

4. Discussion

Nowadays, various programs for reconstructing and designing new pedestrian environments are being implemented in the world. And it would be shortsighted to ignore this experience. All the variety of successful examples of implemented projects targeted at arranging the pedestrian environment can be conditionally divided into vertical and horizontal.

**Vertical connectors.** Pedestrian routes are adapted by specialized lifting platforms, vertical and inclined elevators, funiculars, cable cars, escalators, and travelators, which can be installed on almost any slope.

*Hungerburgbahn funicular, Innsbruck, Austria, 2007.*

The Hungerburgbahn funicular is a modern and unique hybrid of an elevator and a railway, which connects the city center with the Hungerburg district. Previously, there was the old Hungerburgbahn on the site of the modern funicular, which was in operation from 1906 to 2005 (fig. 4) [9].

"Mid-Level Central Escalator" system of street escalators, Hong Kong, China, 1993.

Hong Kong has the terrain crossed by high hills, moreover, the city has a complex highly developed traffic infrastructure. More than 80% of Hong Kong residents travel by public transport. The public transport infrastructure includes the underground, suburban and interurban e-trains, bus service, ferry service between the island and the city mainland, as well as with the adjacent islands, tram, and funicular connecting the city center with Victoria Peak. Hong Kong also has a network of moving sidewalks such as travelators and escalators that are used as a transport. A similarly combined escalator connects the lower and upper terraces of Hong Kong Island. The Hong Kong escalator system is the world's longest covered network of moving sidewalks, with a length of more than 800 m and a height of 135 m along steep sloping streets connecting various districts of Hong Kong Island (fig. 5) [8].

*Cable car, La Paz, Bolivia, 2014.*

La Paz is located in the Andes at an altitude of 3,600 m. The city’s public alternative transport is the world's longest cable car, which connects the two-million metropolis with the El Alto bedroom community, located at 4,000 m. The total length of this transport route is more than 10 km (fig. 6) [4].

One of the ways to arrange a hill is the implementation of Terrenkur design. Considering the Vladivostok’s conditions, it can serve as a means of investigating the unique city’s panoramas. Although Terrenkur is a method of health resort treatment, its integration with the city structure can become more and more popular due to a well-balanced physical activity along the indicated routes.
Horizontal connectors. The Trans-Siberian railway line, cutting through Vladivostok, is a serious problem preventing the connectivity of certain city areas. The creation of comfortable pedestrian routes will not only provide a convenient environment but also encourage the development of separated territories.

Luchtsingel (Air Canal) pedestrian bridge, Rotterdam, Netherlands, 2015.

In the modern world, it is necessary to create such bridge structures that would meet all the needs of urban and pedestrian thought. It is a great example of how to use space without destroying the urban transport infrastructure. The pedestrian bridge constructed next to the Sint-Jans-Molenbeek train station in Brussels was designed to improve pedestrian access between the three parts of the city. It passes over the railway line and the motorway (fig. 7) [6].

Figure 4. Hungerburgbahn funicular, Innsbruck, Austria [9].

Figure 5. A travellator in Hong Kong, China [8].

Figure 6. Cable car in the urban structure, La Paz, Bolivia [4].

Figure 7. Luchtsingel (Air Canal) pedestrian bridge, Rotterdam, Netherlands [6].

5. Conclusions
Nowadays, Vladivostok’s pedestrian urban spaces do not form an integrated system and are not technically equipped. The typology of objects that ensure the functioning of such spaces is very limited in comparison with the expanded typology of pedestrian spaces in foreign countries. In order to prevent the situation described by Vukan Vuchik as “... people who do not have cars or are not able to drive, lose their mobility and become second-class citizens” [2, p 25], it is necessary to design a comfortable pedestrian environment that considers the year-round factor. The city’s distinctive feature is that in most cases the network of pedestrian routes can be formed exclusively outside the connection with the street network for a significant part of residential areas located outside the historic center. Using two main types of connection (horizontal and vertical), it is necessary to draw up a general
scheme for arranging urban pedestrian spaces, considering the possibilities to introduce those types of urban off-street public transport that have proven themselves well in other countries.

Thus, pedestrian spaces should become the semantic core of a comfortable urban environment, defining the uniqueness of the city, providing citizens with access to the city’s public resources, and giving them the privilege of mobility. This will undoubtedly become a significant contribution to the long and difficult work targeted at making the living environment of Vladivostok city worthy of its residents.

6. References

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