

Proposals of the Institute of Integration and Professional Adaptation to improve the comfort of bus stops in Netanya

At the Institute of Integration and Professional Adaptation (hereinafter referred to as the Institute) from June 11 to July 30, 2019 a brainstorming session was held on “Stopping public transport (an element of urban design), improving operational performance”.

As a result of a series of meetings of 11 participants of the Brainstorming session and subsequent analysis and collection of the necessary information, the following proposals were developed to improve the comfort of bus stops in Netanya.

Preamble

Despite the relatively large number of personal vehicles in Israel, due to many different factors, the need to use public transport in

Israel, including in the city of Netanya, is not decreasing, but increasing every year.

With the climatic features of Israel, when the air temperature can reach 40 degrees Celsius, the time spent at stops in Netanya waiting for the bus often stretches to 30 - 40 minutes! Naturally, poorly equipped stops cause negative feelings for those waiting for the bus. This is especially true of older people who, in anticipation of buses in such conditions, suffer, really losing their health. It should also be noted that Netanya is a resort town and the lack of traffic in many parts of the city and non-equipped stops causes bewilderment among the guests of the city.

In connection with the above, there is a need for a comprehensive analysis of how in Netanya public transport stops correspond to the necessary requirements and capabilities of modern technologies. And also the desire to propose such solutions that will improve the situation with public transport stops and make Netanya a role model for other cities in Israel.

Analysis results

A comprehensive review of existing bus stops in Netanya, a rapidly developing city - the center of the country's resort area, which claims to be one of the tourism centers in Israel, during the “brainstorming” revealed a number of significant shortcomings that adversely affect the quality of public services and the image of the city in whole. An analysis of the experience in this matter of other cities in Israel, which have made significant progress in arranging bus stops, and in other countries, showed that it is necessary to make significant changes both in the location of the stops, in their design, and in their information support.

When solving the problem of arranging bus stops in Netanya, the following aspects should be highlighted:

1. Ensuring urban comfort and planning safety aspects;
2. Ensuring physical comfort;
3. Providing informational comfort;
4. Security;
5. Ensuring the individuality of each stop;
6. Energy supply;
7. Organizational and economic issues;
8. Optimization of bus traffic.

Developed recommendations:

1. Ensuring urban comfort and planning safety aspects.

Currently, bus stops in Netanya are significantly inferior in terms of convenience to stops in many cities in Israel. While the Ministry of Transport financing bus stop installations requires the use of standard models, the available set of models allows the municipality to use different models of stopping structures and electronic equipment and choose the most comfortable samples in relation to local conditions. For example, the different design of the stops in Ashdod (Fig. 1 and Fig. 2), recognized as the most environmentally friendly city in the Mediterranean [1], and the tram stops in Jerusalem are much more successful than those installed in Netanya.



Fig. 1. Option 1 design of the bus stop in Ashdod



Fig. 2. Option 2 design of the bus stop in Ashdod

Most stops in Netanya have uncomfortable seats and do not protect those waiting from the scorching sun. And to inconvenience of stops, as shown in Fig. 3 and Fig. 4, the proximity of some of them to garbage cans is added.



Fig. 3. Illustrations to the location of stops near the garbage cans. Netanya, Levi Eshkol street



Fig. 4. Bus stop on Dizingof street.

It is obvious that, strictly adhering to sanitary standards, in the organizational order of the city hall, such an unsanitary situation should be excluded and it is proposed to provide for the arrangement of stops at a distance of at least 15 m from the nearest collection of any kind of garbage.

To improve the safety of stops, it is proposed to arrange stops near intersections of highways, after traffic lights in the direction of travel, as well as to install pavilions of stops with an entrance opening from the side of the sidewalk, with a blank wall towards the roadway.

The 180 degree rotation of the pavilions is dictated by several considerations. This is, above all, a sharp increase in security, additional protection for people when a car hits a bus stop. The possibility

of increasing the size of the roof to provide greater protection from solar radiation and additional space to accommodate the solar panel. Saving space on narrow sidewalks.

On the combined of the three fragments of the same stop fig. 5 shows not optimal placement of stops.



Fig. 5. Narrowed sidewalks almost half a meter and the complete absence of shadow in the middle of the day.

The proposed location of the pavilions of stops is now used in England (Fig.6) [2].



Fig.6. Location pavilions stops in England [2].

2. Providing physical comfort.

For the physical comfort of the stops it is proposed:

- provide for air conditioning inside the pavilion. To do this, it is necessary to perform an air conditioning system built into the roof structure, or an air curtain system;

- to equip with an automatic system for maintaining the indoor temperature, recommended by medical standards depending on the outdoor temperature, and also carrying out adaptive air conditioning control depending on the presence of passengers at a stop.

- seats and other structural elements made of materials of high thermal inertia;

- It is necessary to provide for evening lighting.

To illustrate the proposal for the use of air cooling systems at stops, we can cite the project on improving the comfort of bus stops started in Eilat, implemented by the Ministry of Transport in cooperation with the Eilat Mayor's Office and the Egged Bus Company [3,4]. Figure 7 shows a sketch of such a stop.



Fig.7. Sketch of a comfortable bus stop in Eilat [4].

The size of the bus stops are 2.5 by 5.2 m and they will have with automatic sliding glass doors. It is supposed to use two options for cooling the stop booths. An air conditioner mounted in the roof of the bus stop or a conventional suspended air conditioner. Their thermostats will be set to a temperature of 23-26 degrees.

It should be noted here that at an external temperature of 40 degrees, a large temperature difference created creates thermal stress and can adversely affect the cardiovascular system of people waiting transport. And, as noted in our proposal, to mitigate this effect, it is proposed to equip the bus stops with an automatic system for maintaining the temperature inside the stop, by which is recommended by medical standards depending on the outdoor temperature and humidity [5].

3. Providing informational comfort.

For informational comfort of waiting buses at stops it is proposed:

- Provide an indication of the time of arrival of the transport. Scoreboard with time of arrival must work in day and night modes and have power supply, independent from other elements of information support;

- Provide user-friendly information boards in the constructions of the walls of stops for placing an interactive fragment of a map of the city with the location of the nearest public facilities, schemes of urban transport routes. The board should be equipped with the ability to switch to several foreign languages;

- Provide an interactive communication system with service providers such as ambulance, police and taxi calls;

- Information support can be performed on the basis of existing online applications.

Currently, in Netanya a bulletin boards bus work in the same language and often the information on them does not coincide with reality. Can focus on the experience of other cities in Israel and a promising project in Eilat, where the stops will be equipped with an interactive screen with information about the nearest buses, tourist routes in the city, and a bus travel smart card charging station [4]. They are also equipped with video cameras that broadcast in real time to the municipal control center.

Interesting special the low-power, high-resolution screens (Fig. 8), created using e-ink digital displays, are installed at bus stops in England by Transport for London (TfL) [6].



Fig.8. Screens of Corporation Transport for London at bus stops [6].

These devices broadcast information about the schedule and direction of transport, as well as the time of arrival of buses giving us the ability to get a variety of real-time travel information to customers at bus stops. The screen size are 90x20 cm. The devices are equipped with multi-colored buttons, with which you can turn on the backlight, update the data or switch the page. Charging devices is carried out from sunlight, and to read information from the display in the daytime does not require the inclusion of the backlight - this saves energy consumption.

Enough ergonomically designed bus stops in Switzerland. Figure 9 shows the electronic information board of the city transport company installed at all bus stops in Geneva and auxiliary maps.

Our proposal assumes that a fragment of the city plan should be inserted into the construction of the stop pavilion, where changes in the location of the expected vehicles, as well as nearby sights and street names, are displayed interactively. For all information received in the interactive mode, the choice of the display language must be provided.



Fig. 9. Information board of the citywide transport company at bus stops in Geneva.

An unsuccessful example of organizing information support for a bus stop can serve the information board for stop of buses No.4 and 14 in Netanya on Herzl street, shown in Fig. 10.



Fig. 10. Information board of stop the buses No. 4 and 14 in Netanya, on Herzl street.

The information board on the movement of buses mainly shows the temporary traffic of buses on the nearest streets that do not stop at this stop, and most of the time there are no data on the movement of buses No. 4 and 14. This is misleading to people waiting for buses and can have negative consequences, including for the organizers of this stop. Apparently, this main information board should be urgently reprogrammed for the real traffic of buses stopping on it, or must be disabled.

The current information on the board, that is now provided, can only be auxiliary and can be called up to the screen at the request of the user.

4. Security.

Safety of stops should be divided into safety against terrorist attacks and vandalism. To protect against terrorist attacks, it is proposed to carry out a stop design:

- option 1, with protective-restrictive columns along the stop bus up to 80 cm high at a distance of 1.5 m from each other;
- option 2: with a blank wall along the carriageway, the part opened towards the sidewalk. Along the blank wall, place the protective element in the form of a steel pipe with a diameter of 200 mm at a height of 600 mm;
- blank stop walls should be made of a transparent and sufficiently elastic material. Perhaps the use of monolithic polycarbonate;
- stops must be equipped with a video surveillance system and other means of control that are connected to a unified system of automated control, diagnostics and decision making, as well as a system for sending alarm messages and communication with the police or the transport department of the municipality.

To combat the manifestations of vandalism, you can use the same means of control and a single automated dispatch service with the addition and exclusion of some control systems.

5. Providing the individuality of each bus stop.

The introduction of fragments of individuality in bus stops can positively affect the appearance of the city. To do this, it is proposed:

- each bus stop should have its own individual shade. In the style of modern trends in the transition from relations in society, subject-objects to the relationship of subject-subjects, need move from mass to subject-oriented production of stops, making them individualized, which will increase their attractiveness and diversify the urban landscape, as well as increase the interest of sponsors to invest in " their "bus stops.
- at the stop, will can indicate the sponsor of the stop, or general sponsors that help in the implementation of the project

The ministry of transport agreed on a number of typical solutions for bus stops and, as can be seen from Fig. 1 and Fig. 2, Ashdod uses two types of stops at a minimum. And for the coastal city of Netanya, depending on the location of the stop position, it is necessary to choose the most appropriate type of construction. But a typical design should not exclude the possibility of giving bus stop an individual shade with minimal constructive modifications and financial costs. And these issues can be agreed with the Ministry of Transport. Moreover, this can positively affect the attractiveness of the city for tourists and reduce budget costs for the installation and operation of stops by attracting sponsors.

6. Energy supply.

For autonomous power supply of stops it is proposed:

- place solar panels on the stopping roof and provide for automatic change of the angle of inclination of the panels in the direction of the sun;
- provide for the installation of solar panels the possibility of using additional horizontal elements and part of the walls. In this case, the total output of solar panels can produce at least 1 kW of electricity;
- in the case of placing a universal charger and night lighting, provide for a backup power supply of bus stop from the city power grid.

7. Organizational and economic issues.

The costs of arranging and maintaining the working capacity of bus stops should be minimal for the city hall due to effective measures, for example, such as:

- attracting investments through a paid permit for the placement of vending machines with attractive goods for stopping users, posting ads and advertisements, including interactive ones;
- providing the opportunity to create personalized stops for sponsors who pay for their installation and, if possible, maintenance;
- equipment of stops with devices for paying for travel and refueling Rav-Kav travel cards.

As a result, the installation and operation of the proposed public transport stops can in the long run give the city a positive cumulative economic effect.

More habitually rely on the state budget. But we suggest that at least part of the stops can be made at the expense of the funds of interested persons and organizations (for example: Magen David Hell cars, nominal benches on Nice Boulevard). In this case, can counting not only on charity, but also on commercial interest. What is supposed to look for ways to attract investment.

As an additional source of financing for the equipment of more comfortable stops, it is possible to consider the introduction of payment for night parking of tourist buses, minibuses and trucks on loose sites, such as those on Hatana'im street near the school (Fig.11), on Emeq Hefer street (Fig.12), or on Dov Oz street. Such places are throughout the city and, on the basis of the cost of a comfortable bus stop in Eilat [4] equal to NIS 141,000 shekels and the cost of setting up stop NIS 25-40,000, from rough estimates, will be possible to establish during the year 60 similar bus stops due to payment of night parking at free sites.



Fig.11. Night parking of buses and trucks on loose site on Hatana'im street.



Fig. 12. Night parking of trucks at the site near the bus stop next the garbage collection on Emeq Hefer Street.

Installation and operation of the proposed public transport stops must begin with the most heavily used bus routes.

8. Bus traffic optimization.

For the successful implementation of the program for creating comfortable stops, it is necessary to work out and implement multifactor optimization of the logistics of bus movement through the territory of Netanya. It should be emphasized that the bus stop is a component of the bus service and its quality characteristics are directly related to the organization of normal bus traffic and without establishing optimal urban traffic, the work of which causes a lot of criticism from the residents, the project itself may become ineffective.

One of the brainstorming participants, Dr. Michail Kozlov, systems engineer, was the Chief Designer of projects, worked on the optimization of technical systems and taught for 10 years Theory of Decision Making at the University of Technology, Ukraine. And in practical classes with students he analyzed the optimal solution of the transport task.

Another participant - architect Michael Karpovsky in Moscow was engaged in integrated residential construction, including urban planning tasks within the “big Moscow” framework, and he is also close to the problems of traffic optimization.

The rest of the participants in the brainstorming also have their own views on improving traffic in Netanya. And based on our knowledge and experience, we could help in formulating the task of optimizing the movement of buses in Netanya, the formation of the Technical Specification, as well as participating in the design and consideration of solutions to the multi-parameter problem of optimizing bus traffic to ensure maximum comfort for users of public transport and minimize the cost of its functioning.

All 8 components of the project are correlated and without their coordination the task will not be solved optimally. And when solving each of the points separately, this must be taken into account.

As a result of all actions for arranging bus stops, an intelligent or smart bus stop (SBS) will be formed, similar to a smart home. SBS will subject-oriented in the spirit of advancing post-non-classical rationality. And such SBS can become an integral part of a reasonable resort city of Netanya, along with comfortable beaches, terrenkurs and other coastal facilities. The totality of such events will allow Netanya to dominate the competitive tourist environment.

We are ready to cooperate with everyone who is interested in improving the comfort of public transport stops in Netanya and the attractiveness of their appearance. And also, we are ready to participate in all types of analytical, design, consulting and construction works on this topic.

BIBLIOGRAPHY

1. Ashdod is recognized as the most environmentally friendly city in the Mediterranean.
<https://www.ashdodinfo.co.il> › ashdod › 20.11.2019.
2. livejournal. gre4ark.livejournal.com
3. Transportation Ministry to roll out interactive air-conditioned bus stops. Israel Hayom. 2018-12-27.
4. Israel: Coming Soon – Air Conditioned Bus Stops In Eilat. The Yeshiva World. June 17, 2019.
5. Engineering ToolBox, (2006). Indoor Comfort Temperature versus Outdoor Temperature.
6. Transport for London tries out e-ink signage. December 23rd, 2015
<https://newatlas.com/transport-for-london-e-ink-displays/410...>

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