

## **Recommendations for the use of Eco-Parking in an Urban Environment**

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**Abstract:** The article examines the problems of creating and using traditional parking spaces and their replacement with modern environmentally friendly eco-parking, their impact on urban space, the city's ecology and the well-being and health of the population, as well as issues of economic development and the technological feasibility of using eco-parking.

**Keywords:** lawn gratings, parking spaces, eco-parking, geotextiles, geogrid, concrete gratings, polymer gratings.

**Introduction.** To date, the Regulations on the organization of places for permanent and temporary storage of vehicles, aimed at the development of road facilities and the procedure for their use, have been adopted (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 213 dated July 31, 2013), in the strategy of action for the further development of the Republic of Uzbekistan in 2017-2021, including "...implementation of target programs for the development and modernization of automobile transport, engineering, communications and social infrastructure,...", 2019 Decree of the President of the Republic of Uzbekistan dated February 1 No. 5647 "On measures to radical improvement of the public administration system in the field of transport", development of the field of transport and transport communications, introduction of modern technologies and intelligent management systems in the field and other regulations related to the field of transport, increase in the number of road traffic accidents (RTA) based on the tasks defined in regulatory documents, improper planning of parking spaces, parking and parking along the road, lack of parking in city centers, traffic jams on central streets, reduced road capacity and environmentally toxic gases, high levels of noise pollution, as well as solutions to today's global environmental problems to a certain extent through eco-parking is one of the pressing problems of our country today.

In modern urban planning there is a clear trend aimed at improving the quality of life of the city and its ecology. One of the components of this concept is the landscaping of the territory in order to improve air quality and the aesthetic characteristics of the urban environment. Foreign scientific research proves that this approach also affects the psychological state of the population. In addition to creating green areas and lawns, an additional measure is the organization of eco-parking. This makes it possible to reduce the area of concrete or asphalt sites while maintaining the possibility of accommodating vehicles.

## Materials and Methods

In conditions of high-density urban development, a decrease in environmental indicators is observed, which is associated primarily with a decrease in urban green spaces. To solve the problem of greening densely populated cities, it is necessary to look for new ways to return natural complexes to the urban structure [1].

Today, eco-parking is common all over the world. Their main task is aimed at preserving the ecological environment and, to a certain extent, reducing traffic.

Eco-parking is created by strengthening the soil with natural materials such as crushed stone and sand. Then a grass fence and a layer of soil covered with seeds are laid. Ecological parking is also suitable for cars and even trucks. For large high-pressure loads, more complex “pads” are used to increase strength (geogrid – a geotextile covering filled with sand and crushed gravel). Such durable, environmentally friendly parking lots allow heavy vehicles, including trucks, and even helicopters to land without problems [4].

Materials often used in the construction of eco-parking areas are:

- lawn grid – to create the base for eco-parking;
- geogrid – creating the foundation for an eco-parking;
- geotextiles – used to separate, drain and strengthen individual layers of a structure.

Additional materials include biomats and geogrids. To create an eco-parking, you need to understand its structure, because it uses a grid of polymer modules arranged in the form of cells. Before laying, it is necessary to prepare the base. To do this, the soil is dug up to a certain depth, then covered with crushed stone and sand, compacted well, and sometimes covered with geotextiles as a reinforcing and separating layer [5].



**Figure 1.** Top view of lawn grate

When constructing eco-parking lots, grid modules are first laid, which are fastened together with special locks into a continuous sheet. The lattice fabric distributes the entire load of transport and pedestrians over its surface, preventing the formation of ruts and holes. In addition, moisture seeps through the cells into the lower layers of the soil, without forming puddles in the parking lot.

Eco-parking is a construction technology that allows people to achieve comfortable living conditions in harmony with nature.



**Figure 2.** Eco-parking

Eco-parking is a part of the territory reinforced with a grass fence and a layer of fertile soil. It provides sufficient rigidity and wear resistance for passenger cars and light commercial vehicles. At the same time, the possibility of free germination of natural grass on the site remains. Eco-parking areas are divided into two types depending on what material the lawn grate is made of [3]:

**Concrete.** The reinforcing lattice of such platforms consists of blocks made of sand-cement mixture. The advantages of concrete eco-parking lots are their high strength and wear resistance, allowing them to withstand intense mechanical loads, including from truck tires. Their disadvantages include the high visibility of the cells (which can also be an advantage), as well as the need for additional soil reinforcement due to the large mass of the blocks.

Concrete grates are the first material used to create lawn parking lots. They have a large volume, thick-walled honeycomb structure and very exceptional strength.



**Figure 3.** View of a car over a concrete lawn grate

**Plastic.** This type of eco-parking technology uses cellular block grids made of colored polyethylene (for example, ERFOLG Green Parking). The advantage of this coating is its low weight, inconspicuousness in overgrown grass, as well as the fastening of the modules into a single structure using latched locks. Although plastic gratings are less durable and wear-resistant than concrete gratings, they can withstand heavy foot traffic as well as the loads of cars and light trucks.

Modular polymer gratings – modular lawn gratings made from recycled plastic are used both for strengthening lawns and for paving with decorative tiles. By its design, the product is a flat lattice divided into square or diamond-shaped modules.



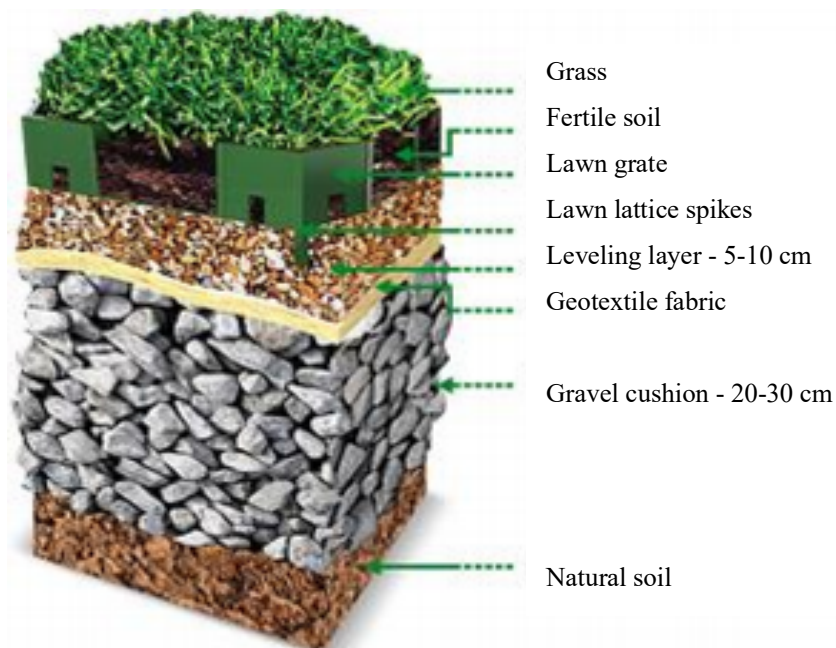


**Figure 4.** Frame polymer lawn gratings

The use of one or another type of grating to create eco-parking on the lawn is determined by the expected load, soil properties and aesthetic requirements for the territory [2].

**Results and Discussion.** The durability of “green parking” depends both on the characteristics of the lattice coverings and on the quality of their installation. To ensure long-term and efficient operation of eco-parking areas, they should be built as follows:

- a layer of soil 20-50 cm thick is removed from the specified area, after which the remaining soil is leveled and compacted;
- a load-bearing layer of crushed stone 10-30 cm thick is poured into the pit (depending on the size of the planned load);
- geotextile fabric is laid on top of the compacted stone, allowing water to pass through but retaining solid particles;
- then a sand layer 5-20 cm thick is backfilled and compacted, on which the lawn grid is laid;
- cover cells are filled with fertile soil and sown with seeds, from which grass will sprout in 2-4 weeks.



**Figure 5.** Layers of lawn lattice

The walls of the cells protect the roots of plants from damage by car wheels and the feet of passengers. Grass grows well in them. The grilles themselves do not emit any harmful substances, they are absolutely environmentally friendly. In addition, they are frost-resistant and resistant to alkaline conditions in soils, do not rot and are not destroyed by chemicals. Their service life is 20 years or more [1].

Multilayer laying should ensure sufficient density of the base to prevent deformation of the eco-parking lot during soil movements. In addition, the crushed stone layer acts as natural drainage and prevents the accumulation of excess moisture on the surface.

When choosing lawn gratings, you need to evaluate the main advantages and disadvantages of each product. In the area of houses with a country yard, eco-parking lots do not experience heavy loads, so the main criteria for choosing a material are its appearance, environmental safety and ease of installation.

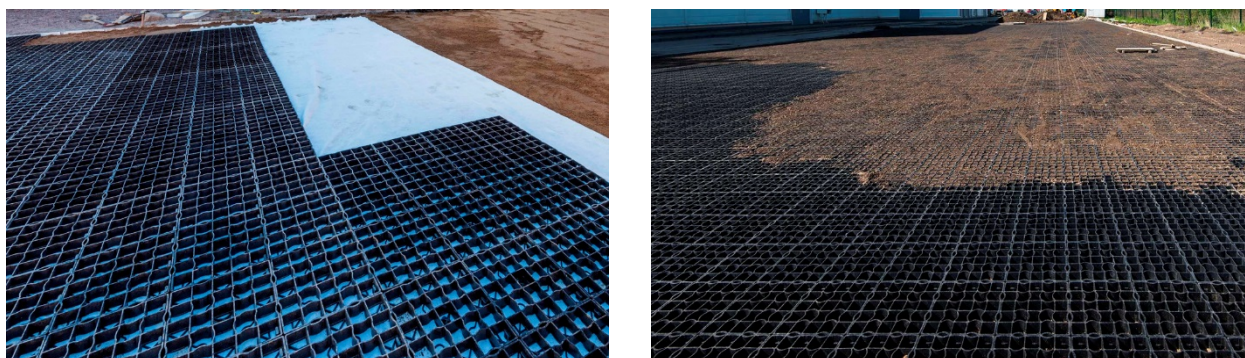


Figure 6.

## Conclusion

Currently, eco-parking has no competitors as a temporary parking place. There is no environmentally friendly way to arrange parking spaces for vehicles yet.

With the introduction and use of eco-parking, which are being implemented in our country, green parking lots are gradually replacing asphalt ones and will contribute to an increase in the mass of all the cheapest and aesthetically safe residential and public buildings for motorists and passers-by. The eco-parking lots at its top can withstand heavy loads, keeping the parking areas green. Thus, the construction of eco-parking solves, on the one hand, two global problems: environmental and car parking.

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