PRIMENA ZGRADA ZA PARKIRANJE U KONTEKSTU ODRŽIVOG RAZVOJA

Abstract: Veliki broj i učestalo korišćenje automobila čini ih jednim od najvećih zagadača pa su tako postali deo problema u nastojanju da se očuva životna sredina. Zgrade za parkiranje, pored osnovne funkcije- odlaganja prevoznih sredstava dok se ne pojavi potreba za njihovom ponovnom upotrebom; u zavisnosti od toga kako su projektovane i primenjene, mogu na različite načine da umanje ovakav negativni uticaj ili čak da predstavljaju deo rešenja problema. Postoje različiti načini na koje zgrade za parkiranje mogu da se primene kod očuvanja živote sredine. Održivost zgrada parkinga prostora dotiče niz međusobno povezanih tema i načina sagledavanja ovog problema kao i različita rešenja primenjena u njihovom projektovanju. Zgrade parkinga su često prve zgrade kod kojih se primenjuju nova projektna i tehnički usavršena rešenja jer su po prirodi prilagodljive različitim transformacijama, unutrašnjim i spoljašnjim, da bi se udovoljilo stalno promjenjivim praktičnim zahtevima.

Key words: vozila, zgrade za parkiranje, transport, životna sredina, održivost

APPLICATION OF PARKING FACILITIES WITHIN SUSTAINABLE DEVELOPMENT

Abstract: Automobiles are presently considered to be one of greatest perils to environment, due to constant increase in number. Parking facilities, along with their primary purpose- putting off vehicles until next using; depending on the manner they were constructed and used, can alleviate influence of traffic on environment or can even be part of a solution. Design of sustainable parking facilities is linked with several mutually connected topics and ways of their perception as well as various applied solutions. There are several manners in which parking facilities can be used in preserving environment. Parking facilities are sort of buildings where new design and technical solutions are frequently introduced for the first time, being easily adaptable to different transformations- internal and external; trying to meet practical demands of constantly changing market.

Key words: vehicles, parking facility, transportation, environment, sustainability

1 đ.i.a-PhD student GAF-a Univerziteta u Nišu, asistent na Visokoj tehničkoj školi strukovnih studija u Nišu, Studijski program građevinsko inženjerstvo, adresa: Aleksandra Medvedeva 20, 18 000 Niš, e-mail: alexvtea@yahoo.com
2 đ.i.a-PhD student GAF-a Univerziteta u Nišu, istrživač-saradnik, Prirodno-matematički fakultet, Univerzitet u Nišu, Višegradska 33, 18 000 Niš, e-mail: sanja_stevanovic@yahoo.com
3 đ.i.a – Master, PhD student GAF-a Univerziteta u Nišu, asistent na Fakultetu tehničkih nauka Univerziteta u Pristini, Studijski program u oblasti arhitekture, adresa: Kneza Milosa 7, 38 220 Kosovska Mitrovica, e-mail: mpavlicic@gmail.com
1. AUTOMOBILE AS SIGNIFICANT PART OF ENVIRONMENTAL PROBLEM

Automobiles are presently considered to be one of greatest perils to environment, due to exhaust gases emitted into the air (carbon monoxide and nitrogen oxides) and constant increase in number. Paradoxically, when it first appeared, at the end of 20th century; automobile was seen as environmental savior by city dwellers, since it stopped stockpiling of animal waste and carcasses at streets, part of the cause of many health and environmental hazards at the beginning of the century. “200 persons were killed in New York in 1900. by horses and horse-drawn vehicles. This contrasts with 344 auto-related fatalities in New York in 2003.” [4]. During the 20th century, as their numbers and use have dramatically increased, they have become part of the current environmental problems. Parking facilities, along with their primary purpose--putting off vehicles until next using; depending on the manner they were constructed and used, can alleviate influence of traffic on environment or can even be part of a solution.

Various manners in which parking facilities can be used in preserving environment are listed below.

2. REDUCING THE AREA OF PARKING LOT

Design of sustainable parking facilities is linked with several mutually connected topics and ways of their perception as well as various applied solutions. Multilevel building, instead of parking lot of the same area, is more sustainable solution because it enables more parking spaces (image 2-d;e;f) or implementation of green space/other usage (image 2-c). However, the type of parking facility—lot or structure—in a development site is usually determined by balancing the cost of land against the cost of constructing parking.

Parking lots, being what they are-large areas covered in concrete, contribute to warming and average temperature rising which can lead to microclimatic change in cities. Paving that has absorbed oils, fuels, road salts and other materials contribute to problems in water runoff and water pollution. Parking facilities can address these issues in several ways, one being the green roof. As well, pervious paving can provide a solution in parking lots.

Developers are increasingly turning to Low Impact Development (LID) techniques to manage stormwater on-site. In particular, LID techniques can be critical in controlling the quality and quantity of stormwater runoff generated from the impervious surface of parking facilities. LID uses a wide array of methods to retain, detain, filter, recharge, and pass runoff through decentralized, distributed, small-scale controls to reestablish the predevelopment volume of runoff, recharge, storage, and evaporation on a development site. Ultimately, LID seeks to protect and restore important ecological and hydrological functions [2].

3. „GREEN ROOF“

When parking is underground, usually there is an above ground area that is turned into a park or a garden, which is called green roof (image 1). This is an attempt to return the nature reciprocal amount of land that is used for building, which contributes to project’s sustainability.

Albeit, green roof and facades, in buildings whose form is visible on surface, are used increasingly. Example for this type of buildings is „Shinjuku Gardens“ project in Tokyo. It has green roof and facades which creates distinguishing image of garden in seven levels (image 2-a).

Incorporating green roofs on parking structures can retain and naturally filter stormwater runoff, thereby improving water quality. Above ground parking structures could also incorporate roof systems of vegetation, soil, drainage, and waterproof membranes to alleviate environmental problems including storm water runoff and the urban heat island effect. Additional benefits of greenroofs include improved livability of the urban environment by buffering noise, reducing glare, and offering an aesthetic alternative to asphalt roofing. Green roofs are more costly than traditional roof systems; however, the associated costs could be offset by the reduced need for stormwater facilities.
4. AUTOMATED MECHANICAL PARKING FACILITIES

In city cores, with dense population, where area border is limiting factor and ramps can’t be used, automated mechanical parking facilities are applied. This building type is more expensive to make, however, in areas with dense population it is economically viable due to the frequency of car flow through the building. Some advantages of automated parking are: possibility of placing a large number of cars on the same surface, there are no pedestrians inside the building therefore time of leaving and taking
the car is significantly reduced, it requires fewer number of workers to monitor the car- in comparison to conventional parking buildings. There are different constructional and functional types of automated mechanical parking systems (image 3), underground system- inserted into the foundations of existing buildings or above ground constructions- where the appearance of facades and architectural structures blend with the surrounding urban fabric. Mechanisms and systems for car transporting vary among different manufacturers.

Automated parking structures have the potential to change the dynamics of land use, significantly reducing the demand for land devoted to parking. Automated parking can accommodate up to two times the number of cars in the same space as a conventional garage or, in other words, accommodate the same number of cars in half the space, and can be built on a site as small as 20 m by 20 m, in structures up to 20 stories high, above or below ground. These facilities are able to be so space-efficient because they operate using a computerized network of rails and pallets that lift and carry cars from the entrance bay to available slots with no human intervention. In addition to reducing the amount of land devoted to parking, there are many other benefits to automated parking. Automated parking makes parking safer and more convenient, eliminating the risk of car damage, theft, or personal injury, and reducing the water and air pollution attributed to exhaust fumes and impervious surfaces. Moreover, automated parking structures have complete flexibility in the design of the façade; therefore, they can be easily incorporated into existing urban design. In terms of costs, automated parking is now becoming a price-competitive and viable alternative to traditional ramp garages, as land costs in urban areas are at a premium.

5. SUSTAINABLE PARKING FACILITIES WITH LED PANELS

Parking facilities are sort of buildings where new design and technical solutions are frequently introduced for the first time, being easily adaptable to different transformations, internal and external, trying to meet practical demands of constantly changing market. In case that cars and their energy sources change as anticipated, there may be a symbiosis between building, automobile and energy source, in a way that they will mutually provide existence of each other, allowing more sustainable environment. Building creates energy- energy makes vehicles work- need for putting off cars justifies existence of the building- part of energy that the building produces itself is used for lighting and energy needs of building.
LEED (Leadership in Energy and Environmental Design) Green Building Rating System® is a criterion in building facades construction that emerged recently [3]. Several buildings (image 4) have been made by this criterion, new and improved materials, steel and concrete dominantly, contribute to the effectiveness of these solutions while selection of site, with a large number of sunny days per year, is crucial. When parking is located inside a building of a different use applying LED facades for energy accumulation, solely at parking levels, can be sufficient amount of energy for the whole building, thus making a self-sufficient building. Lighting in the building can be classic passive solution or self switching power supply. Energy need of a building can be completely fulfilled by using solar technology.

Solar panels on facades are multifunctional, beside the obvious function of accumulating solar energy and transforming it into electric energy, that could be used for different purposes; they can be designed as sunlight protection or as an aesthetic addition to the facade planes.

6. VEHICLE CHANGES

In large cities, parking facilities can be important turning points for commuters when transiting from different means of transportation or entering a building. Parking facilities are integral part of big cities transport nodes, where driver lives his car and continues travel by bus, train, plain etc.

Traffic in big city core can be overwhelming and time consuming, introduction of bicycle parking, as an alternative which is environment friendly, is particularly attractive lately; therefore many European cities have storages, showers, and lockers on-site for bicycle renting. Providing for bicycle parking in prominent, convenient, and secure locations, might encourage people to bike between places as opposed to driving their personal automobiles.

The very first parking facilities were for electric vehicles and charging stations were included within the facility structure [1]. With the current changes in vehicle design, the parking facility often accommodates electric vehicle use for personal automobiles as well as for campus and other vehicles required for particular owners and users of facilities. However, as the fuel source changes, design of car will also evolve and the way it moves will change with it. What this means to future architectural design is that new experiments in alternate fuels for vehicles will impact parking facility design. New fuel sources for the automobile can eliminate air pollution hazards caused by emissions from the vehicle and automobile manufactures are working on the solutions. As the automobile changes the parking facility and related code issues would also begin to change in order to address the new movement realities. Other movement devices, of various shapes and sizes, are also appearing which will challenge the interior design and flow of the parking facility as well.

6.1 Car Sharing

The way that a car is powered in the future could solve environmental issues but traffic and parking concerns will remain if we as a culture continue to depend on the single occupancy vehicle.

One idea, that is taking hold, is the idea of point to point use of the car. Car can be rent for a distance from home to work where it would be left in a facility to be rented by someone who can use it during the day. The return trip home would function in the same way. Depending upon the access of these parking rental structures many point to point uses could occur. Each car sharing vehicle replaces four to eight privately owned cars, thus reducing parking demand. Moreover, car sharing reduces vehicle miles traveled, thereby, helping to alleviate traffic congestion and improve air quality. In car sharing arrangements, vehicle fleets are located in various areas throughout the city and adjacent neighborhoods, usually at transit nodes or in commercial districts.

6.2 Shared parking

Shared parking can be defined as parking utilized jointly among different buildings and facilities in an area, to take advantage of different peak parking characteristics that vary by time of day, day of week, and/or season of year. For example, many businesses or government offices experience their peak business during normal daytime business hours on weekdays, while restaurants and bars peak in the evening hours and on weekends. This presents an opportunity for shared parking arrangements. Shared parking arrangements significantly reduces the amount of land devoted to parking and, in so doing, creates more opportunities for creative site planning and landscaping.
7. MIXED USE FACILITIES

Synthesis of an apartment building and parking facility makes parking more efficient by maximally approaching user to his final destination. Mixed use buildings are obviously beneficial for using the same floor space, increased security and improved accessibility. However, there are more benefits; these buildings are usually aesthetically very attractive, due to necessary change in rhythm on the facade planes between different purpose floors.

When designing mixed use building with parking, one must follow fire protection regulations. Therefore, integrating parking with an apartment building or a hospital is a challenging assignment for designer.

Transit Village is a popular urban form currently in expansion throughout United States. There are various design solutions dealing with synthesis of parking with residential buildings and other types of buildings, with special emphasis on transit and car storage.

8. NEW FORMS OF MOVEMENT

As the automobile is changing so are new movement technologies appearing that will allow us to move through space in new ways. Personal Rapid Transit (PRT), although it has been around for over 40 years and is still functioning at West Virginia University in Morgantown is now starting to reappear in designs across the world. Heathrow airport opened to the public advanced version of PRT at the end of 2009. These small car-like driverless vehicles travel point-to-point providing safer, more accessible, faster movement directly to destination. In PRT designs, vehicles are sized for individual or small group travel, typically carrying no more than 3 to 6 passengers per vehicle. Guide ways are arranged in a network topology, with all stations located on sidings, and with frequent merge/diverge points. This approach allows for nonstop, point-to-point travel, bypassing all intermediate stations. The point-to-point service has been compared to a taxi or a horizontal elevator.

A new elevator system (similar to those used in libraries) can travel horizontally as well as vertically allowing for greater use of the elevator shaft and potential to create safer access and egress especially in tall buildings. These emerging technologies could change the way we design our cities, towns and buildings to create safer, more environmentally friendly spaces and places due to their scale and ability to interface with alternative more sustainable power sources.

9. CONCLUSION

Whether they are connecting different transportation types, reducing traffic and mitigate congestion or showing explicitly (with their green roof and facades) the way their creators chose to implement, in order to preserve environment and pass it to future generations, along with the idea that former pollutant can become part of purifying process, these buildings will exist as long as there are vehicles, while their form and numerous functions will continue to follow technology development, energy sources and latest urban trends.

REFERENCE