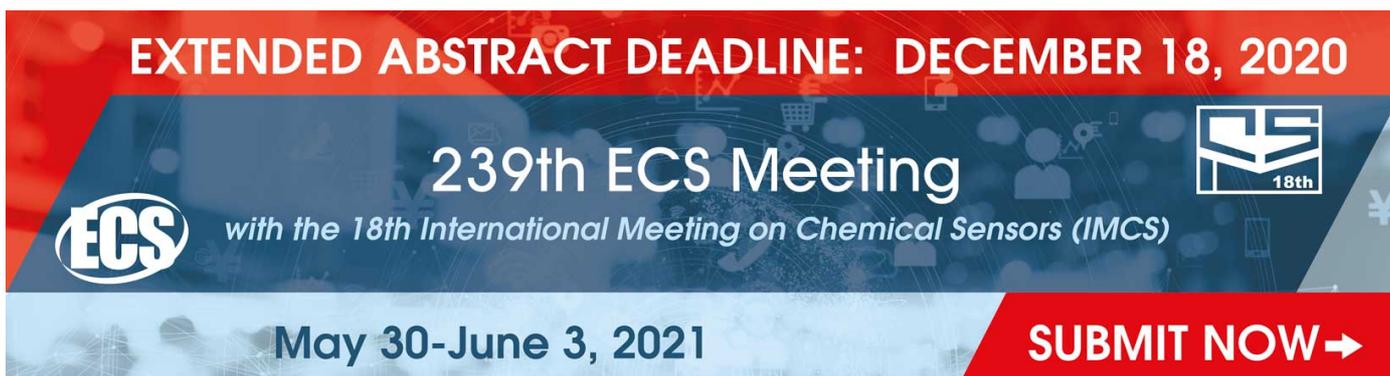


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Creating a Safe Environment in Apartment Courtyard Design

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Abstract. The article reveals the theme of formation of house adjoining territories from the standpoint of security, comfort and organization of places for each resident by age and interests. In connection with the high automobilization of the population, solutions have been proposed for organizing parking spaces for personal transport outside of the house adjoining territories or taking them to underground parking lots. The proposed solutions to create a comfortable environment for the elderly and persons with disabilities in the territory. And, for the education of sports and harmonious personality, the organization of children's playgrounds and training complexes was proposed. Particular attention is paid to creating a cozy harmonious atmosphere of the courtyard with a variety of green spaces and small architectural forms.

1. Introduction

With housing construction rates increasing, new blocks and housing complexes are appearing in cities and towns requiring changes in courtyard landscaping. Courtyards are an important element of neighborhood and residential area landscaping. A typical courtyard usually comprises a land plot under a building; fire vehicle access roads; greening and landscaping elements; substation transformers; utility/service areas, sports grounds and playgrounds; parking lots; dog parks and other facilities which are needed for the building operation and people's comfortable living. Common elements are located depending on demographic composition, building types, environmental and climatic conditions. Common areas size and purpose are determined by building codes or housing development standards [1- 9] as well as by the number of unit owners and/or tenants. Courtyards are gradually changing, with different common elements taking on new functions in the process of operation. Nowadays, residents rarely use outdoor clothes drying areas or carpet racks whereas they need more parking lots.

Modern courtyards are an organized comfortable environment responsible for creating aesthetic appeal and harmony of man and the environment. One of the most important functions of courtyards is creating a safe environment for residents.

The paper aims to create a safe environment for residents' everyday needs, leisure and entertainment. A comfortable multi-purpose environment should comprise playgrounds, sports grounds, utility areas, dog parks, parking lots, sidewalks, ramps and green spaces.



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2. Materials and Methods

The object of research is apartment courtyards; their functional zoning and creating a safe environment in the context of high motorization rates.

3. Results and Discussion

The necessity of creating a safe apartment courtyard results from high motorization rates in cities and towns. With traffic becoming heavier every year, private vehicle owners' needs should be met as they are also apartment building residents. When parking lots are not available, indiscriminate parking may occur on lawns, sidewalks or in recreation areas.

New residential areas are designed to have "courtyards without cars", i. e. an area enclosed on all four sides surrounded by buildings accessible only to specially equipped vehicles. Parking lots are built outside the area with private cars having absolutely no access to it. Children can play safely inside it; adults can participate in leisure activities without fear of a car emerging suddenly from behind the corner. However, in Russian cities and towns, there are older developments in which open courts are aligned along buildings. It is impossible to create a car-free area under such conditions, but much can be done to minimize human-vehicle interaction by separating driveways and parking lots from recreation areas with vegetation and architectural decorative elements (Fig. 1). In this case, a protecting screen of hedges and vertical greening systems are appropriate [10-12].



Figure 1. "A courtyard without cars" concept in apartment courtyard design.

Eco-friendly parking lots, which are becoming still more popular, are a solution to organizing spaces for keeping cars. Constructing these parking areas when landscaping courtyards allows to preserve green lawns and to significantly reinforce the soil in parking lots for private and commercial vehicles, driveways to garages. Its grass pavers are as durable as cobble, crushed stone, asphalt, etc. The working principle lies in the reinforcing ribs which bear the major load while the lawn is not destroyed. Eco-friendly parking lot construction allows to - fully or partially - replace dull areas paved with asphalt or cobblestone as well as lawns destroyed by indiscriminate parking [17]. The soil can be reinforced in parking lots with the help of good planning and design. Parking lots installation is rather simple and it does not require high costs or expensive maintenance. Their additional advantage is that they prevent the soil from retaining moisture during freeze/thaw cycles (Fig.5).

A modern courtyard must meet the needs of various population groups. Appropriate functional zoning plays a crucial part in it. The more zones in a courtyard, the more residents would consider it to be a recreation area rather than an intermediary between the building and the parking lot.

It is necessary to allocate zones for playgrounds for different age groups; sports grounds for all groups; spaces for group and one-on-one communication. Several playgrounds for different age groups can be arranged so that toddlers would not be in the way of older children in the active play area (Fig.1). The terrain permitting, its peculiarities can be used while arranging playgrounds (Fig.2) Slopes are good for slides and climbing walls. The latter can be used by adults as well as a

complement to the sports ground. A healthy lifestyle has become very popular lately. Experience has shown that exercising in the open air has a better therapeutic effect on the human body than working out in the stuffy atmosphere of the gym. Creating modern multi-purpose sports complexes in courtyards means ultimately meeting children and their parents' needs for doing sports and participating in active family leisure in the open air; encouraging the residents to lead a healthy lifestyle; also the residents gain access to a sports ground equipped with all the latest facilities (Fig. 3).



Figure 2. Terrain landscaping: creating a climbing wall on a playground.



Figure 3. A multi-purpose sports complex.

Terrain including artificial one is also used for creating recreation areas. It can be a secluded space for one-on-one communication symbolically separated from the rest of the area. Common areas can be used for residents' meetings and other public activities. Tables for board games can be installed next to benches as well.

Architectural decorative elements and spatial compositions made of organic or non-polluting materials are developed in order to make courtyards more aesthetically appealing. These elements are not only original design objects but they also play a part in arranging games.

Creating a comfortable environment for senior citizens and people with disabilities is crucially important in courtyard landscaping. Pathways and recreation areas are designed so that they are accessible and safe for mobility-impaired residents. Courtyard zones accessibility is provided by the appropriate width of the pathways, ramps availability and handrails on flights of stairs. For mobility-impaired residents' comfort, the recreation areas must be equipped with disabled parking bays as well as with benches with backs and arm rests. For blind and visually-impaired residents, tactile and colored markings are made (Fig.4). The top and bottom steps of the stairs must be visually or tactilely marked [15-16].



Figure 4. An equipped entrance for the disabled.



Figure 5. An eco-friendly parking lot.

The environmental factor is aligned with the safety and zoning factors. Greening is an important element of functional zoning. Vegetation improves microclimate and has a beneficial effect on people's psychophysical condition. Vegetation regulates temperature and humidity and facilitates horizontal and vertical aeration. A courtyard is an important element of the living environment and as such must perform health and recreational functions, in which vegetation renders vital services [18]. Functional zoning of a courtyard is performed with the help of molded and unmolded hedges, shrub borders and big solitary trees. In order to protect plants around the playgrounds, benches can be installed and borders or low retaining walls can be built [13]. Along the driveways and pedestrian crossings, linear green spaces are provided. To this end, shrub hedges and bushes are used. While greening and landscaping playgrounds, emphasis is placed on protection from dust and winds as well as provision of optimum illumination and aeration of the playground. Trees should be planted not closer than 2 m (6 feet) to the edges of the playground; thus uneven illumination and dappled light on the pavers are eliminated. In the process of greening recreation areas for adults, partial shading of the surface is allowed [10]. Recreation areas should be shaded in the summer when solar insolation is high; also, using hedges and vertical greening systems should be used to create an enclosed space. Vertical greening systems can be applied on chicken mesh wire fences which usually surround sports and playgrounds. Vertical greening systems are good at reducing noise pollution, which is very important for such areas. Greening is indispensable for protection from traffic noise. Rows of trees planted in a checkered fashion help reduce noise and even without foliage reduce noise levels by 2-6 dB. Vegetation absorbs up to 24% of sound energy, reflecting and dispersing the rest of it in every direction.

As eco-friendly fences, various vertical greening systems can be used along with hedges. Vegetation looks good on wooden fences and can be used to disguise unsightly structures. For example, in compliance with sanitation standards, a garbage can storage area must be surrounded by a border and a shrubbery.

Vegetation not only improves the courtyard climate, reduces noise and air pollution, but also has a favorable aesthetic effect on the residents. The color green is relaxing and comforting; it can diffuse anxiety and restore emotional stability, which is very important for modern urbanized society, with people being under pressure on a daily basis.

4. Conclusion

Thus, while designing an apartment courtyard emphasis is placed on the residents' comfort, both physical and psychological ones. A courtyard must be accessible to every resident including all groups of mobility-impaired citizens, such as disabled people, senior citizens, parents with perambulators and/or strollers and people with temporary locomotor disabilities. Apartment building residents must be protected from negative environmental effects due to high motorization rates; the courtyard microclimate should be supported at its best.

The above trends and concepts are far short of the full list of problems tackled by designers while landscaping apartment courtyards.

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