

# GLOBAL VILLAGE 2



Conference proceedings  
**GLOBAL VILLAGE - SHELTER FOR RESILIENT LIVING 2**  
On-line version

## GLOBAL VILLAGE - SHELTER FOR RESILIENT LIVING 2

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Conference proceedings

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# THE IMPORTANCE OF SITE SPECIFIC SUSTAINABLE HOSPITAL DESIGN: GENERAL HOSPITAL IN PLJEVLJA, MONTENEGRO

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## ABSTRACT

The emphasis on ecological design in healthcare settings is growing daily, reflecting the worldwide move towards sustainable planning. These design principles were emphasized in the contest proposal for General Hospital in Pljevlja, Montenegro. Across various design iterations and conceptual frameworks, the final competition entry distinctly emphasizes the integration of natural landscapes with the hospital's architectural design, prioritizing the main hospital users - the patients. The goal was to create a relationship between nature and the architectural structure in healthcare settings, while elevating patients' comfort. We emphasize the enhancing of environmental awareness through passive design techniques and energy-efficient measures, particularly given the information about unique energy usage patterns in hospitals. This approach takes into account the distinct climate and location-specific needs, which are set to be the main factors in the early stages of design process.

*Key words: hospital design, site specific design, sustainable architecture, bioclimatic architecture*

## **I. INTRODUCTION**

In the context of sustainable development, as defined by the Brundtland Report [1] - development that meets the needs of the present without compromising the ability of future generations to meet their own needs - it becomes pertinent to consider architectural functions with an emphasis on sustainability.

Regarding specific architectural functions, such as healthcare buildings, The Indian Green Building Council has highlighted several advantages, as detailed by Srinivas in 2014. [2]:

1. Faster patient recovery times.
2. Prevention of Sick Building Syndrome (SBS) for both patients and staff.
3. Lowered stress levels for hospital personnel, enhancing the quality of patient care.

Examining the sustainability of hospitals encompasses more than merely environmental conservation. This domain primarily acknowledges three intertwined aspects: environmental, economic, and social – which are all impacted by the architectural solutions. [3]

This research aspires to identify design methods specific to hospital structures, given their distinct design features, execution processes and the intricate interplay of humans and their environment during utilization, for the specific given landscape and weather conditions of Pljevlja in Montenegro.

We submitted a design proposal for this General Hospital as part of the architectural competition [4], with a strong focus on passive energy-saving systems that align with the site's limitations. Below are the results of our research-driven design.

## **2. PROPOSED DESIGN METHODOLOGIES/MEASURES**

Rather than prescribing fixed solutions, we adopted a methodology of research through design, critically examining each iteration. Informed by world-renowned frameworks such as LEED and Levels, and mindful of the distinctive topography and climate, we've put forth strategies tailored for the design of this typology.

These strategies derive from in-depth analysis of the specific location and landscape factors (like orientation, sunlight, and site contours), weather conditions (including sun, wind, rain, and angles of sunlight), and the hospital's unique program requirements.

## **3. HOSPITAL DESIGN PROJECT IN PLJEVLJA, MONTENEGRO**

Interacting with nature is identified as a key factor for enhancing healthcare at the given location. Our design prioritizes visual and physical access to the breathtaking surroundings, including newly developed park areas within the plot. The structure's main design ensures the building sprawls around the site's edge, fostering an intimate inner space (Figure 1). This design optimizes views, sunlight, and ventilation by maximizing the distance between building sections. The hospital employs an architectural motif that allows interaction with nature while providing shade and protection – double facade. This "shielding" exterior design extends to the building's base, promoting sheltered outdoor areas.



Most accesses, including main entrances, come from peripheral roads, primarily from the east. Underground parking minimizes surface traffic, enhancing the site's green and serene ambiance.

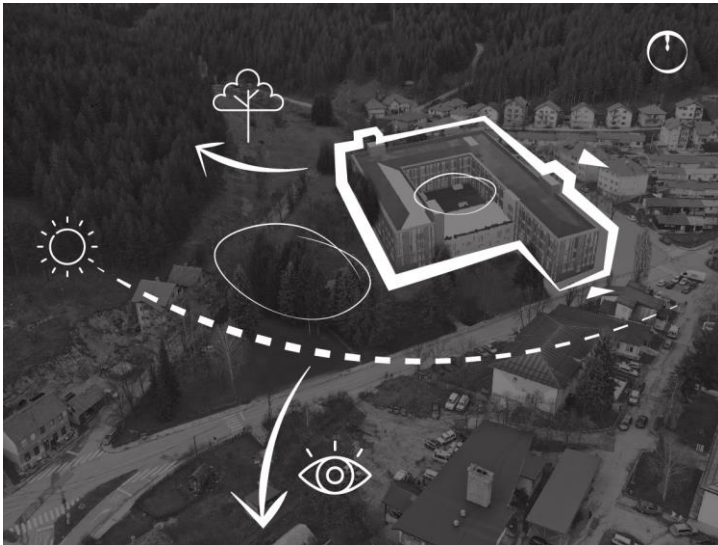


Figure1: *Form & placement of the hospital building on the lot: surroundings and orientation*

The particular design approaches employed for this project were dictated by the needs of the hospital's functionality, including:

- Positioning patient rooms on the southern façade to ensure maximum sunlight exposure and optimal views. By arranging them in grid pattern (8x8m), it enables natural ventilation, optimizes sunlight utilization, and reduces energy consumption for both heating and cooling. Additionally, stacking them vertically creates a dedicated patient zone with regulated access, temperature, lighting, and noise levels (Figure 2).
- A corresponding group emerged on the opposite side of the corridor, designated for doctors' offices. These rooms benefit from more diffused sunlight and a northern orientation. This setup is optimized by having smaller façade openings (windows) and larger sections clad in façade walls (Figure 2).



Figure2: Visualization of the North-west (left) & south-west (right) façade

- Incorporating an exterior corridor in the form of a glazed balcony on the southern facades not only shields the rooms from external elements but also ensures a controlled environment. Additionally, it provides shade in the hot summer months and acts as a thermal buffer during the winter (Figure 3).

In this arrangement, each patient's room is equipped with a balcony, which helps mitigate some of the anticipated energy use from heating and cooling the area.

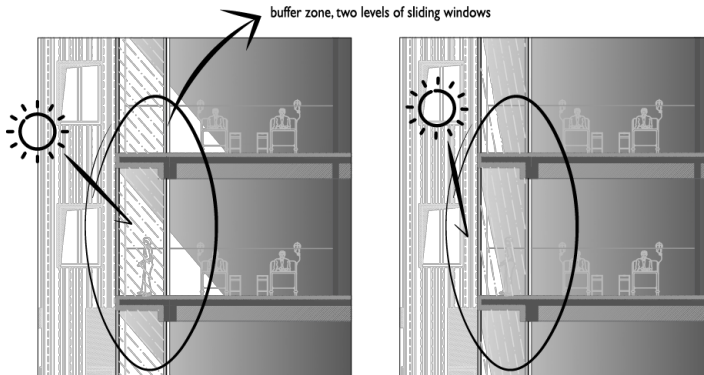


Figure3: Sections through the patients' room and glazed (buffer) balcony in summer (left) & winter time (right)

- The entire building features straightforward and direct access, with four strategically positioned vertical communication points. These hubs have elevators that run from the garage to the roof. Additionally, all corridors are spacious, ensuring effortless maneuverability (Figure 4).

- The design incorporates an eco-conscious microclimate areas, distributed over three zones: the atrium, the roof of the building's fourth (lowest) section, and an open external garden. This garden features a grassy buffer adjacent to the forest to shield the hospital from potential wildfires.

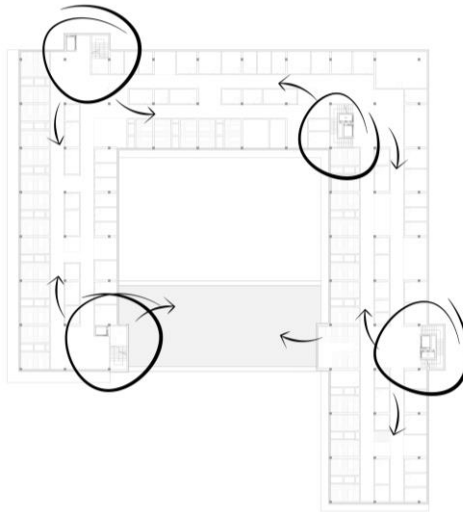


Figure4: *Floor plan of the hospital with marked entrances*

#### 4. CONCLUSIONS

Constructing a sustainable hospital involves the same energy considerations as other typologies. However, the primary users of this facility typically have higher energy demands than a standard resident or employee. This is because their comfort requirements are paramount and should not be overlooked. Ensuring their comfort is the central objective when designing a new hospital.

In the design process of this hospital, our aim was to reduce the energy consumption of patients, all while enhancing their comfort levels. This ensures that the final outcome meets both ecological and medical standards.

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