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O1 INTELLECTUAL OUTPUT  
Output type: Studies / analysis –  
Best practice guidelines / report

# REVIEW



## BEST PRACTICES

In Educating Sustainability  
and Heritage

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**Enhancing of Heritage Awareness and  
Sustainability of Built Environment in  
Architectural and Urban Design Higher Education**



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## REVIEW: Best Practices In Educating Sustainability and Heritage

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HERSUS Project leader: Vladan Djokić, UBFA

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In current time, as a society, we face multiple challenges and dualities: enable growth yet prevent disruption of the existing urban structure, give a response to the needs of the present without compromising the ability of future generations to meet their own needs, preserve the unique architectural and urban heritage that testifies about our past yet innovate within the architectural and urban design for our present.

With the architectural profession's ongoing stratification between architectural theory and praxis, future architects must take both critical and constructive positions regarding future spatial development. A contemporary built environment will have to balance heritage awareness and sustainable approaches while creating new shapes and conditions for new realities. In this complex scenario, a profile of future architects is under question, along with the institutions' structures and programs that are educating them.

Bearing this in mind, HERSUS partners strive to reassess these dualities in the educational process, hence enhancing and testing innovative and creative teaching practices in the field of sustainability of the built heritage. The project strives to improve educators' and researchers' competence and motivation to include curricula elements that will have tangible results, preparing architectural students and educators to become real actors of the environmental change.

Previously mentioned challenges require vital research and continuous improvement of curricular and extracurricular activities in higher education. To have a successful outcome, they must be transnationally carried out and need to achieve a balance between theory (research and education) and practice (institutional and professional). Both locally and globally alternative practices are developed parallel to institutional architectural education, creating

different methodologies and built structures. Within this arena, HERSUS research project is striving to explore new perspectives and challenges regarding the teaching-learning of heritage awareness and sustainability.

This publication presents the results of the first four months of the project and is structured in three main parts:

- Built Architectural and Urban projects (20 projects, four from each of the five partner organizations)
- Pedagogical and Educational Models (20 courses, four from each of the five partner organizations)
- Influence of National Policies on the Sustainability of Heritage (one report per each partner organization)

The applied approach balanced between different geographies, cultures, and scales provides new insight into the complexity of the definition of heritage in the contemporary context, testifying that heritage transposes from an urban artifact to the urban landscape. It confirms the increasing complexity of thinking about urban and architectural heritage, representing a growing challenge for both researchers and educators to implement such topics in curricula.

The prepared publication's quality was contributed by architectural offices and individuals from five different countries, public bodies, and students whose works were used to illustrate the specific course methodologies.

Vladan Djokić, HERSUS project leader

# EDITORS PERSPECTIVES

THE UNIVERSITY OF BELGRADE -  
FACULTY OF ARCHITECTURE



The work on IO1 was mainly shaped by the contributors' endeavour to interconnect often opposed notions of theory and practice, academic and professional institutions.

When considering sustainability and heritage in the regional context, the University of Belgrade – Faculty of Architecture (UB-FA) continuously tends to enhance and test innovative teaching practices in the field of education. This includes various types of courses from lectures to workshops, from design projects to written thesis and research methodology courses, from compulsory to elective courses, including all study levels: undergraduate, graduate, and doctoral. In the Review, UB-FA (Serbia) will present the courses (1) *Green Construction- Lessons of the past*, (2) *Among Scales: Programming the New Modernity of Belgrade*, (3) *Design Studio 06U*, and (4) *Energy Rehabilitation and certification of existing buildings – case study*. The course types vary from lectures and theoretical projects to workshops, studio design, and seminars. The courses were selected with the intention to present the competence and motivation of educators and researchers to include curricula elements that will have tangible results and a very environmentally sensitive relationship with built heritage and sustainability concepts. In this context, such an approach aims to spread the importance of built heritage within the new generation of students while considering the entire environment, humans, and society in general, preparing students and educators to become real actors of the environmental change. In regard to case studies of built projects, UB-FA presented projects that reflect the development of new intercultural approaches to heritage and the exceptional strength and will of the architects and urban planners to preserve and enhance architectural and urban heritage qualities on different scales. The selected case

studies are (1) *Conservation and Reuse of the Nebojsa Tower in the City of Belgrade and Founding of a Museum and a Cultural Centre*, (2) *Office Building Bulevar 79*, (3) *Museum of Coal Mining and Centre of Industrial Heritage*, and (4) *Detailed Regulation Plan for the Old core of Zemun*. The case studies are located in urban (2) and historical centres (1,4) in Belgrade or mountain areas in Serbia (3). The current use varies between cultural (1, 3), office (2), and mix-use with central activities (4). Sustainability issues, such as effective re-use and enabled social activity, upgrading energy efficiency, and traditional materials, are involved in the projects. Evaluation of energy efficiency and public competition were used as tools for the implementation of the new uses. The projects were rewarded and nominated on several occasions and were disseminated through exhibitions, presentations, publications, and workshops.

In the review of the current state concerned with heritage in national and sectoral policies, UBFA particularly highlighted the lack of (1) representation (regarding lack of guidelines, evaluation, and research methods, recognition of various urban heritage types (industrial, vernacular, modernistic, intangible)), and (2) mechanisms for financing the revitalization and funding in general (a national budget that decreases in time)), identified within *Strategy of Sustainable Urban Development of the Republic of Serbia Until 2030*. The abovementioned problems were identified as the leading causes for continuous and evident devastation of cultural heritage. Additional issues are perceived in unbalanced and fragmented spatial interventions, often illegal, affecting the loss of unique spatial patterns and relations.

UNIVERSITÀ IUAV DI VENEZIA



The current analysis of the educational programmes and courses in IUAV highlights how Sustainability and Cultural Heritage are enhanced by architectural and urban master degrees and postgraduate programmes. IUAV programmes and courses offer



different and complementary approaches regarding the themes of Sustainability. IUAV offers broad programmes, such as Master Degree Programme in Architecture (thought in Italian), Master Degree Programme in Architecture (thought in English), City and Environment: Planning and Policies and IUAV - Specialisation School in Architectural and Landscape Heritage, postgraduate program, IUAV-SSIBAP

The detailed examination of the specific courses highlights how Heritage awareness has been traditionally present in the IUAV approach to the training and design process (research, documentation, values assessment, design strategies, and proposal). IUAV educational offer presents two different kinds of courses, focused on Sustainability and Cultural Heritage: the monodisciplinary courses and the integrated workshops. The monodisciplinary courses aim to give the students the tools to approach architectural problems with the autonomy of judgment improved by the knowledge of the historical and theoretical frame. The integrated workshops offer learning opportunities and work experience under the direct supervision of high-profile professionals and teachers. The master's degree thesis provides a turning point to the students' educational path, where all the main issues related to Heritage and Sustainability could be managed and detailed. Accordingly, IUAV presented courses (1) *Integrated Design Lab – Focus 3: Regeneration and Conservation of Historic Buildings and Environments*, (2) *Studio 2: Sustainable City Project, City, and Environment: Planning and Policies in Italian*, (3) *Restoration Theories and Techniques*, and (4) *Elements of applied petrography: Deterioration of stone and lithoid materials*. This list expresses the different IUAV approaches on Sustainability, dealing not only with environmental or technological issues but also with social, economic, and cultural aspects. For example, specific design proposals on cultural Heritage express Sustainability in terms of re-use and improvement of a part of a city or a building. The team's four local case studies are adherent to the IUAV approach towards Heritage and Sustainability. The choice aims to underline the idea of Sustainability

concerning environmental or technological issues and social, economic, and cultural aspects. All the case studies are in historical contexts and/or areas with high cultural value (Venice, Verona urban area, Venzone, Treviso Sile River natural park). The re-use of ancient buildings to create new social and cultural values is coherent to the European Commission's argument about the recent years' soil thematic strategy. Accordingly, IUAV decided to present (1) *Punta della Dogana, Venezia (VE)*, (2) *Ex-bakery of Santa Marta area, Verona (VR)*, (3) *Rebuilding program of Venzone, Venzone (UD)*, and (4) *H-Farm project, Roncade (TV)*. Having in mind the long tradition of architecture and urban design in Italy and its relation to the regulatory framework, IUAV presented the timeline of the leading national urban, landscape, and environmental legal provisions regarding cultural / built heritage and sustainable development. The report focuses on the period from 1860 to 2020, highlighting the primary laws, establishing key institutions, adopting the main Charters and Decrees that strongly influenced the interlink between heritage and Sustainability.

## THE UNIVERSITY OF CYPRUS



The University of Cyprus (UCY) starts from the premise that teaching sustainability issues in the context of heritage architecture courses require a multidisciplinary approach, highlighting the challenge to find a balance between addressing architectural heritage for future societies while covering contemporary socio-economic needs and sustainable requirements.

This is the general concept of the postgraduate programs *Conservation and Restoration of Historic Buildings and Sites* and *Energy Technologies and Sustainable Design* at the University of Cyprus.

These two programs provide necessary knowledge and expertise in conserving built heritage and building energy performance, respectively. They both address, to a lesser or greater extent, issues of social, economic, environmental, and cultural

sustainability associated with the built environment, and they also promote the enhancement of digital competences and skills for supporting a competent work profile, as an emerging demand of our society. The challenge for the two programs' future development is to further address the connection between cultural heritage and sustainable development. This will develop critical thinking on how current and future practitioners may preserve, use and develop architectural, cultural heritage in a sustainable way and how cultural heritage may be used as a driving force for sustainable development.

As an integral segment of above mention programs, UCY (Cyprus) presented the courses (1) *Architecture and the Critical History of Ecology*, (2) *History and Critical Theory of Conservation*, (3) *Special Topics on Recording and Documenting Buildings and Sites*, and (4) *Capstone Design Project*. The selected courses types include lectures, theoretical projects, workshops, studio design, compulsory and elective. The courses' purposes and objectives are related to both sustainability and cultural heritage, while learning outcomes are related to the theory and practice, providing students with the necessary knowledge and expertise in building energy performance and the conservation of built heritage, respectively. The selected courses address aspects of sustainability and promote cultural heritage as a base for environmental development.

UCY (Cyprus) presented the case studies (1) *Urban Landscape Rehabilitation in Lefkara*, (2) *HYBUILD Aglantzia Case Study*, (3) *Restoration of Alexandros Dimitriou Tower*, and (4) *Restoration of a vernacular dwelling in Kapedes*. All the buildings selected are listed, predominantly with residential use. Selected case studies were used as a basis to address specific sustainability issues, such as the rehabilitation of traditional rural settlements, the use of traditional materials and techniques, the incorporation of renewable energy systems in the structures, and the upgrading of the energy efficiency of the buildings. UCY has shown tremendous effort both to select relevant cases and explain in detail tools and technologies used in the project documentation, design,

and construction, such as data loggers for monitoring temperature and moisture, weather stations for monitoring external and internal environmental conditions.

In the report on the Influence of national policies on the sustainability of heritage from the architectural and urban design perspective, UCY highlighted the efforts in Cyprus in the previous 40 years regarding architectural heritage preservation and documentation through the implementation of the Laws, Acts, Inventories, and Programs.

The UCY specifically emphasizes the efforts in protecting and improving vernacular architecture. The current philosophy and practice in the field of architectural conservation aim to establish a balance between necessary functional modification and improvements of energy efficiency (retrofitting) while safeguarding the special architectural and historical aspects of heritage buildings or sites.

## THE ARISTOTLE UNIVERSITY OF THESSALONIKI



This introvert examination focused on sustainability and cultural heritage themes, allowing mapping of curricula and course structures of the educational methodologies and material employed.

AUTH's contribution analyzed three programs of study offered at the school that are relevant to the themes of sustainability and cultural heritage, such as (1) *the 5yr Integrated M.Arch Program*, (2) *the Program of Postgraduate Studies Environmental Architectural and Urban Design*, and (3) *Interdepartmental Postgraduate Studies Program, Protection, Conservation and Restoration of Cultural Monuments*. The first one is the result of School professors' long-term effort, perceivable in the discussion of General Staff Assemblies, numerous meetings of the Study Committees, open presentations and discussions with teachers and students, and a two-day conference entitled "Architecture Studies: Continuity and Change". The other two

programs offer specialist knowledge at the postgraduate level. From 1998, the Interdepartmental Postgraduate Studies Program deals with the conservation and restoration of historical buildings, traditional materials, and techniques, digital methodologies for surveying historic buildings, and environmental aspects of heritage structures. On the other hand, the Postgraduate program of Studies EAAD was only recently introduced (2015-16), reflecting the emersion of environmental studies in a national context and is one of only two programs that deal with environmental urban and architectural design in Greece.

A thorough examination of the aforementioned programs was also carried out through detailed analysis of specific courses contained within the respective curricula (1) *Design Studio 7 - Architectural Design In Historical Context*, (2) *Architectural Design Studio II*, (3) *Urban Design Studio I & II* and (4) *Interdisciplinary Studio Course*. In the context of this review, the above selection reflects the ethos of architectural educational practices that prevail at the school, whereby specialized knowledge is introduced through theoretical courses and seminars, is supported through technical teaching and practice, and is ultimately consolidated through interdisciplinary design studios. These do not only focus on a singular approach to the design project's evolution but integrate theoretical approaches, supported by lectures (tutors) and presentations/submissions of small thesis/studies (students), practical exercises, software tutorials, etc.

The review of educational practices is followed by four case studies of realized projects that reflect the issues, practices, and open questions that prevail in the discussion of sustainability and cultural heritage at the local level. All case studies focus on the historic urban context and reflect multifaceted approaches in designing for sustainability, conservation, reuse, resilience. The studies are representative of different scales of intervention: (1) *Bioclimatic upgrade of the greater area of Hrimatistiriou Square* at the historical Centre of Thessaloniki, (2) *Creative reuse of the*

*barracks at the Pavlos Melas Metropolitan Park* (former military camp), Municipality of Pavlos Melas, Thessaloniki, (3) *Restoration and environmental upgrade of Vernacular Residence at Ano Poli* (Upper/Old city) of Thessaloniki, and (4) *Restoration and creative reuse of a building block consisting of 13+ historic structures, in Plaka, Athens, to house the State Museum of Modern Greek Culture*.

The above case studies are followed by a report on the National legal and regulatory framework under which the projects were developed, which makes further references to the practical context, the initiatives, and national and international programs that instigate and support such initiatives, programs, designs, and applications.

#### THE UNIVERSITY OF SEVILLE



In this Review, the University of Seville (USE) focused its pedagogical and educational models at the School of Architecture, University of Seville, while the framework of best practices in Sustainability and Built heritage is regarded in the scope of Andalusia. The decentralized character of Spanish geopolitics and the transference of power to the different autonomous governments in terms of heritage management and architectural and urban policies, in general, make one autonomous region the proper framework for this study. Starting from the historical relevance of heritage in Andalusia, established interlink between the architects involved in the professional practice to teach at the university, intensive research on the field, and strong collaboration with public institutions, USE has presented the endeavor to translate this context into education. It has been done through an integral presence of heritage training in the School of Architecture curricula, especially within programs *Fundamentos de Arquitectura*, *The Máster Universitario en Arquitectura y Patrimonio Histórico (MARPH)* /Master's degree in Architecture and Historical Heritage, and *The Máster Universitario en*

Ciudad y Arquitectura Sostenibles (MCAS) / Master degree in Sustainable Architecture and Cities.

For the purpose of the selection of case studies of best practices, the following has been taken into account: (1) focus both on contents and on innovative methods, (2) focus both monographic and those cases where heritage and sustainability appear as a transversal, although essential vector, (3) both compulsory and optional courses, (4) show courses of the last three semesters of the main program on architecture, the semester 8 focused on heritage being 9 and 10 the specialization semesters of the degree.

Accordingly, four case studies were selected (1) *Landscape, City and Architecture in Andalusia*, (2) *Architectural History, Theory and Composition 3*, (3) *Architectural History, Theory and Composition 4: City*, and (4) *Architecture and Heritage*. In this sense, USE highlights that courses in the postgraduate programs are traditionally structured in a set of lectures and/or workshops offered by different professors. This is why innovative methods and coherent curricula is best shown within these last three semesters of the degree on architecture.

In the field of practice, specially built projects, USE applied specific criteria for case studies selection: territorial balance; notions of scales and ownership; diverse aspects and contributions from the professional practice in the context of built heritage and sustainability; awards and acknowledgments while focusing on the less recognized heritage both for institutions and society; temporality, focusing on case studies of the 21st century, as representative of the mature phase of Andalusian practice.

Accordingly, USE presented the case studies of (1) *Rehabilitation of Casa Diáñez (Diáñez House) as administrative building*, Alcalá de los Gazules historic center, Cádiz; (2) *Recovery of King's Path*, Gaitanes Gorge, Service Road of the hydroelectric dam of The Gaitanejo, Paraje Natural Desfiladero Natural de los Gaitanes (Álora, Antequera, Ardales), Málaga; (3) *Recovery of the Cerro*

*de San Miguel and the Darro river area*. Rehabilitation of the Nasrid wall of San Miguel Alto and its surroundings, Upper Albayzin, Granada, and (4) *Rehabilitation of Santa Ana Ceramic Factory as the Public Museum of Ceramics*, Triana historic neighborhood, Sevilla.

USE completed the diagnosis with a report on urban policies that regulate heritage protection, conservation, and management, offering an insight into Andalusian policies in the Spanish context. USE specifically highlights the regulative framework on all three levels: national, regional, and municipal, while providing an in-depth review of the international context, charters, and recommendations.

# Built Architectural & Urban Projects



Serbia (Belgrade)



Italy (Venice)



Cyprus (Nicosia)



Greece (Thessaloniki)



Spain (Seville)



SERBIA

X

Nataša Ćuković Ignjatović  
Nevena Lukić

project

03

# Office building BULEVAR 79

## Office building BULEVAR 79

### IDENTIFICATION

#### Information about the location

✗ Urban centre

#### Address

✗ Bulevar kralja Aleksandra 79,  
11 000 Belgrade, Serbia

#### Country/Region

✗ Serbia/Belgrade Metropolitan Region

#### Coordinates

(GIS: ETRS89/Google Maps: WGS84)

✗ Long= 20.48135360 °  
Lat= 44.80316170 °

#### City size

✗ National capital population over  
1.600.000

#### Website

✗ <https://www.remorker.rs/bulevar79>

#### Accessibility

✗ Public building

#### Public visits

✗ No

#### Category

✗ Architectural project  
Restoration / Reconstruction

#### Deliberative and participatory planning

✗ No

#### Current use

✗ Office building

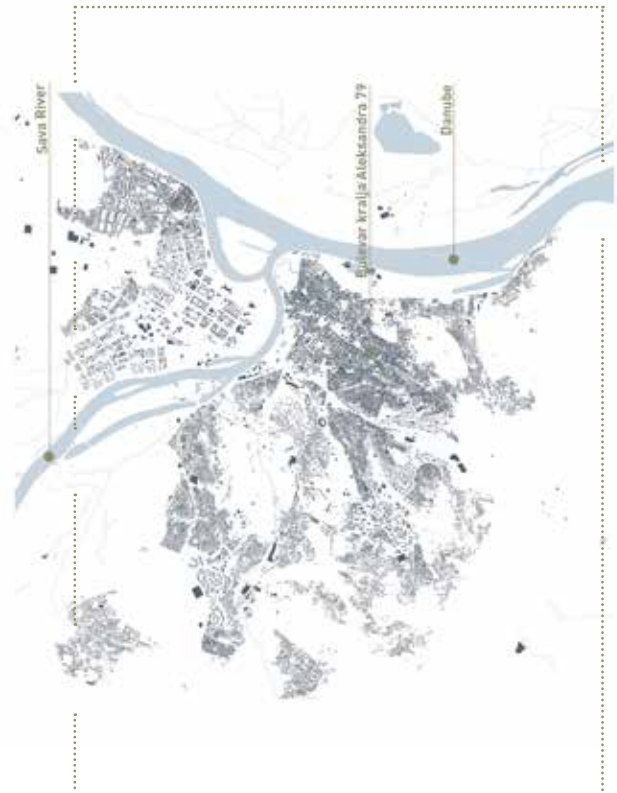


Figure 1: Location map  
*Authors of the case study report*



Figure 2: The office building  
*source Aleksandra Đorđević*

Year (period) of the project renovation/  
restoration

✗ 2018

Area of the building (m<sup>2</sup>)

✗ 3600 m<sup>2</sup>

Current owner

✗ private: Marera Properties d.o.o.

Architects

✗ Remorker architects

Other designers/engineers

✗ ARMONT SP d.o.o. (Facade  
construction)

Other agents

✗ N/A

Developer

✗ Marera Properties d.o.o

Building contractor

✗ Multiple building contractors

Cost of the project/execution time

✗ N/A

Previous studies (Ex. Archaeological,  
historical, structural, materials, etc.)

✗ No previous studies have been done

## KEY FEATURES



Remarkable attributes/  
Singularities/Specific Values

- N/A

Scope of application/necessity of  
the project:

Trudbenik office building is a building positioned in a wider city center in one of the busiest streets in the city of Belgrade. The building has been outdated with a depleted facade and interior of the building. New investors recognised the potential to renovate this building and create a new landmark in that part of the town.



## HISTORY OF THE BUILDING/SITE



### Original use

✕ Commercial

## HISTORIC USES

The office building of “Trudbenik” (one of the major building companies in former Yugoslavia)

## CONSTRUCTION PERIOD

1964

## SUMMARY OF MAJOR FUNCTIONAL AND STRUCTURAL CHANGES / YEAR OF INTERVENTION

No previous restoration has been done

## ARCHITECTS / AGENTS

I. Bezetyky, A. Stojanović

## PHYSICAL CONDITION BEFORE RESTORATION / RENOVATION

The building has been outdated with a depleted facade and interior of the building.

## STATUS OF PROTECTION

The building is not under protection.

## GENERAL DESCRIPTION OF THE BUILDING BEFORE ITS RENOVATION / RESTORATION

The building is formed of two connected parts: The main building (Gf + 7 floors) facing the street and the annex (Gf + 1) in the back. The higher part has a flat roof, while the lower part has a sloping roof. The walls are made of solid brick and the building has

a glass facade. Interior of the building - the ground floor has an open plan concept, while on the upper floors there is a central corridor with offices on both sides. Vertical communications are separated and located in the corner of the building.

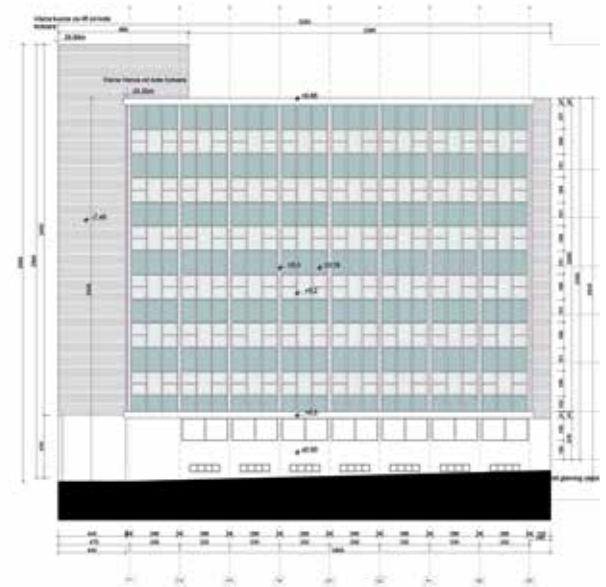


Figure 3. The original building facade - before restoration

source Remorker architects

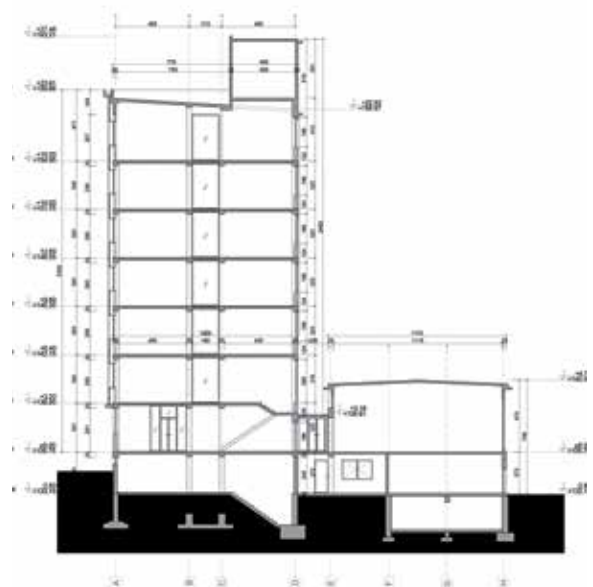


Figure 4. The original layout of the building before restoration - section

source Remorker architects

## PROJECT DESCRIPTION



### DESIGN PROJECT IDEA FOR THE RENOVATION / RESTORATION

The existing facility has good integration into the environment, and it is a well-designed facility. The main restoration idea was to improve the building by respecting the environment. The authors decided to keep the original construction, and renovate the building's facade and interior. The main entrance on the ground floor has been completely changed, opened and emphasized. The entire existing facade was removed, as well as the parapets and windows from the ground floor. The ground floor facade has been replaced with a curtain wall facade that gives the illusion that the object is floating. The upper floors' facade is a double skin facade - triple-glazed windows in one layer and a shading aluminum structure in the other layer. On some of the glazed parts, the second layer of the facade is perforated. The new facade has provided both solar shading and additional sun protection as well as interesting shadows in the interior of the building.

### DESCRIPTION OF THE CHANGES AND ADDITIONS

The building kept the same form and function. The main intervention was the reorganization of the main entrance and lobby orientation towards the main street instead of the side and the car access to the inner courtyard. The ground floor has been opened - new floor-to-ceiling openings have been introduced on the facade to give more light throughout the ground floor and the lobby. Also partition walls have been replaced with glass partitions to give an open plan feel and provide natural lighting to the corridors. Top floors remained in the same layout - central corridor with offices on both sides. Interior walls have been replaced with glass partitions giving the illusion of the open space.

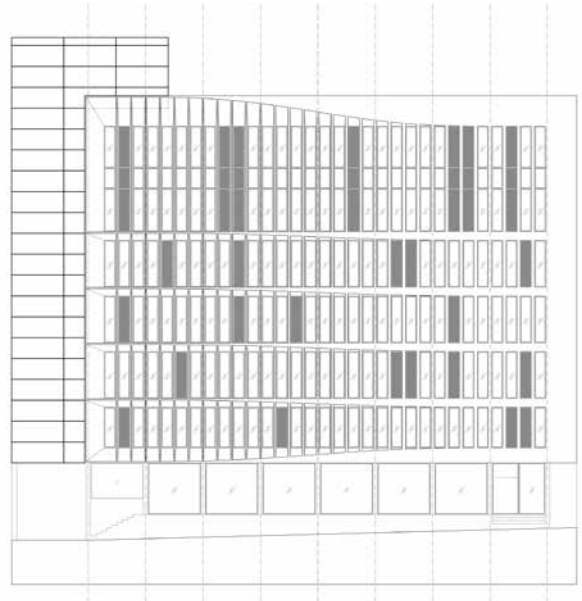


Figure 5. The building facade - after the restoration  
source Remorker architects

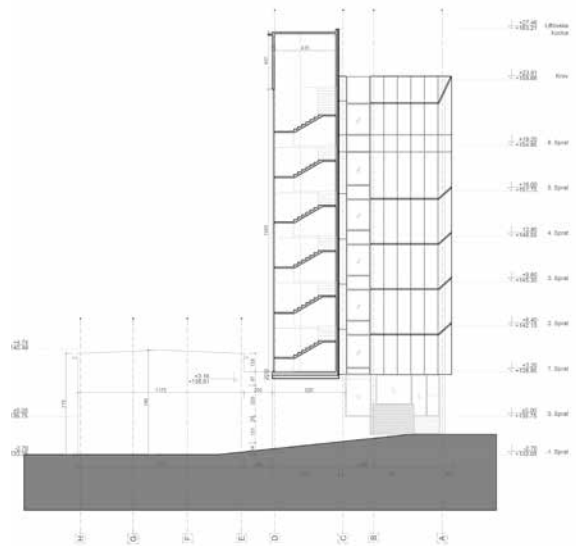


Figure 6. The new layout of the building after restoration - section  
source Remorker architects

## BUILDING MATERIALS

The original facade was a curtain wall facade that has been replaced with 800m<sup>2</sup> of double skin facade system - triple-glazed curtain wall system with 3mm aluminium panels some of them perforated, and 150m<sup>2</sup> of ventilated facade with fiber-cement cladding. Floors of the main entrance lobby and corridor were of natural stone but in poor condition and with major damages, so the existing floor has been removed and granite ceramics were installed. In the office space, the parquet was also in poor condition, so it was replaced with high fire resistance carpets that also act as a good sound absorber. The original walls were plastered with MDF coatings on some parts and all have been removed and replaced with glass partitions.

## PROJECT IN RELATION TO THE SUSTAINABILITY

Social aspect:

Added value to the local cityscape, new design features.

Economic aspect:

N/A

Environmental aspect:

Renovation aiming to preserve the most of the existing structure instead of the demolition of a damaged and depleted building; improved energy efficiency (EPC rating B, while code demand is C); improved soundproofing and indoor acoustics; providing indoor environmental comfort parameters above standard practice and national standards.

## SPECIAL METHODS OR TECHNIQUES USED IN THE PROJECT WHICH REFLECT THE SUSTAINABLE DESIGN

- Use of high efficient triple-glazed curtain wall system and use of insulation layers in the reconstruction of the facade and roofs in order to improve the energy efficiency of the building, according to building regulations in RS



Figure 7. The building facade - after the restoration  
source Aleksandra Đorđević



Figure 8. The building facade - after the restoration  
source Aleksandra Đorđević



Figure 9. The office building after restoration  
source Aleksandra Dorđević

- Including passive environmental strategies such as ventilated facade and roof systems, solar shading, etc.
- Materials used in both interior (triple-glazed facade) and interior (carpets) provide additional sound absorption
- Usage of the glass partitions provides more light in the interior

### DIGITAL DATA EMPLOYED FOR THE DOCUMENTATION (3D SCANNING, PHOTOGRAMMETRY, ETC.)

No digital data has been collected. The evaluation of energy efficiency measurements applied has been done by the certified engineer according to national regulations, and it demonstrated that the renovated building is EPC class B regarding its energy demands.

## TOOLS/TECHNOLOGIES USED FOR THE IMPLEMENTATION OF THE NEW USE

Table 1. Energy efficiency rating

| Energy efficiency rating | Commercial        | New                                    | Existing ones                          |
|--------------------------|-------------------|--|--|
|                          | $Q_{H,nd}$<br>[%] | $Q_{H,nd}$<br>[kWh/(m <sup>2</sup> a)] | $Q_{H,nd}$<br>[kWh/(m <sup>2</sup> a)] |
| A*                       | ≤ 15              | ≤ 8                                    | ≤ 10                                   |
| A                        | ≤ 25              | ≤ 14                                   | ≤ 16                                   |
| B                        | ≤ 50              | ≤ 29                                   | ≤ 33                                   |
| C                        | ≤ 100             | dozv                                   | dozv                                   |
| D                        | ≤ 150             | ≤ 83                                   | ≤ 98                                   |
| E                        | ≤ 200             | ≤ 110                                  | ≤ 130                                  |
| F                        | ≤ 250             | ≤ 138                                  | ≤ 163                                  |
| G                        | > 250             | > 138                                  | > 163                                  |

|                  |       |                      |
|------------------|-------|----------------------|
| $Q_{H,nd}$       | 90843 | kWh/a                |
| qH <sub>nd</sub> | 28.82 | kWh/m <sup>2</sup> a |
| $Q_{H,nd}$       | 44.34 | %                    |
| Plaznost         | B     |                      |

## DISSEMINATION / PROMOTION ACTIVITIES (WORKSHOPS, CONGRESS, PUBLICATIONS, PRIZES)

Awards:

- Award of the City of Belgrade in 2018
- The project was exhibited at the 41<sup>st</sup> Salon of architecture in Belgrade in 2019
- The project has been presented in multiple articles and lectures

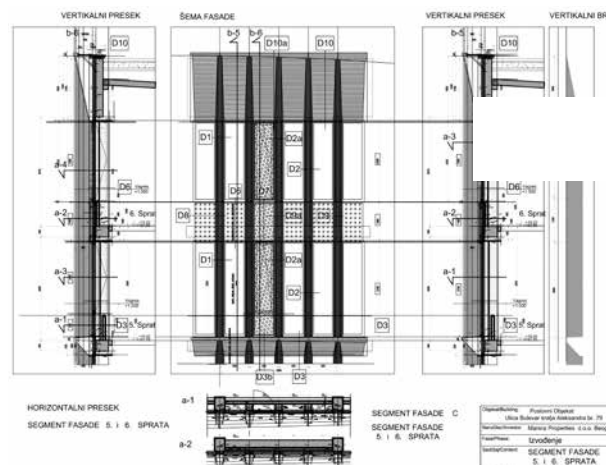


Figure 10. The office building after restoration  
source Remorker architects

## REFERENCES

× N/A

## ACADEMIC WORKS / STUDENTS RELATED PROJECTS / PUBLICATIONS

× N/A

## OTHER SIMILAR PROJECTS AS A REFERENCE

- office building - RESAVSKA 31 -  
Remorker architects

For more information about the project visit  
<https://www.remorker.rs/resavska31>

-office building - MAKEDONSKA 44 -  
Remorker architects

For more information about the project visit  
<https://www.remorker.rs/makedonska44>

## REFERENCE TO WORLDWIDE EXAMPLES

× N/A

