

# Supporting the education of architecture students of Cracow University of Technology using international research and education programs jointly conducted by schools of architecture

## Abstract

The development of the skills and knowledge of architecture students is largely shaped during their study at a Faculty of Architecture. There is another way of improving student knowledge of architecture and urban planning. Apart from Erasmus programmes, there are also other international academic and education programmes as well as international workshops. The Activation of the Public Spaces of Historical City Centres Based on Local Communities, jointly conducted by the Faculty of Architecture of the Cracow University of Technology and the Technical School of the University CEU Cardenal Herrera in Valencia, is one such programme. The outcomes of this form of teaching include not only the knowledge and skills allowing one to deal with new conditions that young people have to face while being put through a lot of stress, but also the effort they put into multiple-days-long conferences, workshops or the preparation of their Bachelor's in engineering projects. International cooperation and workshops participation have contributed to the enhancement of knowledge about architecture and to the development of participating students' characters.

Keywords: knowledge; architecture; international workshops; thesis diplomas;

## INTRODUCTION

There are many ways in which students' knowledge of architecture and urban planning can be enhanced. Thanks to the Erasmus programme, various types of scholarships and different type of international workshops, students of architecture could study abroad, travel, meet new people, and above all learn about new cultures, architecture and design at many architectural schools located all around the world. Scholarships apply to both the first and second degree of architectural education. Such scholarships typically last one semester, which is a part of the student's education at their home university. The grades from foreign universities are translated and incorporated into the evaluation of a student's entire study tier. There is also different type of workshops for architecture students that take part among others in Valencia in Spain, Venice and Milan in Italy, and Tyssedal in Norway.

One of the mentioned above form is participation in *The Activation of the Public Spaces of Historical City Centres Based on Local Communities* international academic and teaching programme, conducted by the Faculty of Architecture of the Cracow University

of Technology jointly with the Technical School of the University CEU Cardenal Herrera in Valencia. As a part of the programme, students could face new working conditions, which involve not only foreign country, but also coping with stress, new environment, working in groups with diverse languages. They must put a lot of effort and energy into the programme's several-days-long workshops and into their ongoing Bachelor's in Engineering projects. Together with academic teachers who act as tutors, students from the Cracow Faculty of Architecture participate in a week-long workshop organised in Valencia. The focus of the workshop is the urban renewal and activation of decayed urban spaces. In 2019, the workshop project has involved the city of Copenhagen. Polish students worked together with their colleagues from Valencia and Riga during the workshop. The discussions, lectures and workshop classes that were held were aimed at enhancing their interdisciplinary knowledge of architectural composition by expanding it to include elements of psychology, history, urban development, geography, and structural engineering. The workshop developed not only the students' awareness and creativity, but also gave Polish

\* Riccardo Maria Balzarotti, arch. Fellow Researcher, Department of Architecture and Urban Studies, Politecnico di Milano, Italy, <https://orcid.org/0000-0001-5887-7612>, email: [riccardomaria.balzarotti@polimi.it](mailto:riccardomaria.balzarotti@polimi.it)

\*\* Andres Ros Campos, prof. arch. PhD, Department of Projects, Theory and Technique of Design and Architecture, Cardenal Herrera University-CEU, CEU Universities, Valencia, Spain, <https://orcid.org/0000-0003-4356-4642>, email: [ros campos@uchceu.es](mailto:ros campos@uchceu.es)

\*\*\* Luca Maria Francesco Fabris, prof. arch. PhD, Department of Architecture and Urban Studies, Politecnico di Milano, Italy, <https://orcid.org/0000-0001-5724-432X>, email: [lucamariafrancesco.fabris@polimi.it](mailto:lucamariafrancesco.fabris@polimi.it)

\*\*\*\* Pedro Verdejo Gimeno, prof. arch. PhD, Department of Projects, Theory and Technique of Design and Architecture, Cardenal Herrera University-CEU, CEU Universities, Valencia, Spain, <https://orcid.org/0000-0001-6989-0871>, email: [pverdejo@uchceu.es](mailto:pverdejo@uchceu.es)

\*\*\*\*\* Mariusz Twardowski, arch. eng. PhD, DSc, associate professor, Faculty of Architecture, Cracow University of Technology, <https://orcid.org/0000-0001-5177-395X>, email: [mariusz.twardowski@pk.edu.pl](mailto:mariusz.twardowski@pk.edu.pl)

\*\*\*\*\* Agnieszka Żabicka, arch. eng. PhD, Faculty of Architecture, Cracow University of Technology, <https://orcid.org/0000-0001-8835-4564>, email: [agnieszka.zabicka@pk.edu.pl](mailto:agnieszka.zabicka@pk.edu.pl)

tutors an opportunity to put modern educational methods into practice (Jagiełło-Kowalczyk, 2017). Another element of the cooperation between the two universities is teaching the *Thesis Design* module during first-cycle architecture studies. Polish graduate candidates use knowledge gained during the workshop and lectures held in Valencia to design their Bachelor's in Engineering projects using a site located in the Old Town of Valencia. The students are familiarised with the culture, history and geography of the Spanish city and its urban conditions. The entire process ends with a defence of the students' Bachelor of Engineering projects in Cracow and their exhibition at the Technical School of the University CEU Cardenal Herrera in Valencia.

### 1. PURPOSE, SCOPE OF RESEARCH, METHOD

This work assumes the existence of a close relationship between student participation in international workshops and educational programmes and the skills, knowledge, competence, performance measured by grades and educational outcomes of students who participate in such activities (Bojanowski, 2011).

It appears to be clear that every element of knowledge gained by students at each step of their participation in the programme is key. Basic knowledge concerning composition, the technical problems associated with building and Polish and foreign construction law is the first noticeable benefit of participating in the programme. Awareness of differences in climate, culture and context is another field that students gain experience in.

The study is an attempt to answer the question whether such projects have an impact on matters of education and what do participating students gain from them in terms of knowledge, skills, and social competencies, in addition to identifying the differences in the quality of

education between students who have participated in the programme and those who have not. An attempt was made based on four cases.

The research methods used in the study included observation research, the individual case method, analysis, and project critique (Bonenberg, 2013).

A group of students from the Cracow University of Technology who had taken part in international workshops in Venice, Valencia, Tyssedal, and Milan as well as a group of students who had not participated in said workshops, was subjected to an analysis. There were two groups of 89 students (third year of Bachelor's studies) and 78 students (first year of Master's studies). The analysis was performed by examining design studio module and term grades obtained by the students for the semester during which the workshops attended by the students took place.

### 2. CASE 1. Bachelor of Engineering project in Valencia

During the workshop held at the Technical School of the University CEU Cardenal Herrera in Valencia, Polish students were given several plots from which they choose their Bachelor's in Engineering project site. They also attended lectures during which Spanish professors discussed all these areas. Field trips around the city were also organised to help the students understand the subject of these lectures. The topics discussed by the teachers from Valencia also included technical conditions, insulation, shading, the distances between buildings, circulation and the transport system, the amount of greenery and the function of existing buildings. Afterwards, the students participated in on-site studies. This allowed them to assess the location of the plots and their context. The students evaluated the scale of the sites, their different aspects and the height of the

III. 1. Placa de Tavernes de la Valldigna, urban design proposal by Piotr Dziewierz, Filip Sierak



surrounding buildings, as well as access to the plots and matters associated with the buildings they intended to design.

The information they had gained became the basis for analysing and specifying the ideas for their projects. This also provided the students with an opportunity to feel the local atmosphere themselves and identify the sites' genius loci. The conclusion of the workshop and the analyses was to be a decision concerning the selection of one of the seven plots proposed by Cardinal Herrera University tutors, the formulation of a functional programme and setting the scale of the buildings that were to be designed.

After returning from the workshop held in Valencia, the students, working in two-person groups, chose one of the plots and prepared urban design projects. An exemplary project was prepared by Piotr Dziejewicz. Together with another graduate candidate, Filip Sierak, they prepared analyses of their site's urban structure, its circulation system, greenery, and the surrounding buildings. Afterwards, they prepared an urban design proposal. The step that followed was the selection of a site where the building was designed as a part of the conceptual architectural design proposal was placed. The plot selected by the students is in the centre of Valencia's Old Town (Dziejewicz, Sierak, 2019).

After carrying out an urban analysis, the students formulated the project's main design assumptions concerning the urban renewal of the square and the new buildings that were to be designed. These buildings were designed to provide residents with broadly understood recreational and educational functions, including activities meant for small groups and public events. Vehicular traffic was redirected from the area to an underground car parking facility, with the former road replaced by a uniform paved surface with sectioned-off green areas, street furniture and trees.

This short description of the student's project communicates one of the important elements of knowledge that they gained. The students sought the most important points of context that they could find in this specific city. Architectural practice requires future architects to understand the project site, to properly evaluate and analyse its existing components. The project, situated on a site outside of the students' home country, required a greater deal of involvement and engagement from the students, as well as an in-depth study of its site-specific characteristics.

The students were involved in the process of designing their project throughout all of the workdays of every week they spent on it. The curriculum specified obligatory student-tutor meetings to be held once per week. However, the students pushed for more meetings with their tutors so that their project could be reviewed as often as possible. The interesting choice of subject matter and plot concerning the Bachelor's in Engineering project, the cooperation of Spanish University teachers and individual discussions with Polish professors led to the students becoming more engaged in their work than usual.



III. 2. Visualisation, view from the south, proposal by Piotr Dziejewicz

The projects were defended at the Faculty of Architecture of the Cracow University of Technology, receiving very good grades (the highest available scores) and were later presented at the University CEU Cardinal Herrera in Valencia.

It should be noted that the diploma project has had a significant impact on the work of students. The increased involvement in design work, the search for structural solutions that could be used both in Poland and Spain, along with the active attitude displayed by students during reviews and their increased willingness to improve demonstrated during presentations were but some of the positive results of this form of international cooperation. The development of character and fostering student independence further add to the arguments in favour of such collaboration.

In the first case, the group under study comprised 8 students from the Cracow University of Technology who had participated in an international educational programme organised by their mother university and a foreign university. They constituted 9% of the entire year's class (89 persons in total). The learning outcomes obtained because of participation in the international educational programme have been presented in table 1 and table 2.

The study of competencies and grades demonstrated that the difference between students who had taken part in the workshops and those who had not was significant. The grades received by these students from design studio modules (5.00) were the highest that could possibly be obtained. The average for the entire group under study was 4.24 (table 1). Likewise, in the case of grades obtained during the semester with the workshops for all modules, the average was significantly higher among students who had taken part in the programme (4.60) relative to the entire group under study, for which the average was 4.15 (table 2).

### 3. CASE 2. Revitalisation of an old hotel in Tyssedal, international workshop.

The workshop that focused on the revitalisation of a hotel in Tyssedal was organised by the Faculty of Architecture





Ill. 3. Façade as seen from the fjord and visualisation, proposal by Karolina Wąsik

of the Cracow University of Technology and a private company who owned an old hotel in the area, near one of Norway's fjords. The hotel building, purchased by two businessmen, stands in the small town of Tyssedal. The hotel's heyday was long behind it, yet the new owners wanted to restore it to its former glory and expand it to include an ultra-modern section. This was motivated by the fact that the nearby land was becoming increasingly attractive to tourists, as new tourist trails were being established, along with a new attraction – Trolltunga, which was attracting increasing numbers of tourists.

The students were tasked with renewing the old hotel, which had been used as a hotel for businessmen visiting the owners of a titanium and iron works and a hydroelectric power plant. The students were also asked to design its extension. The hotel's owners also owned the land in its immediate vicinity, which they intended to assign for the hotel's extension. The students had to face a difficult context, as the plot on which the building stood on featured a significant slope. From the south, above the hotel, there were single-family houses, while below the hotel, from the western and northern side, there was an ilmenite and titanium refining plant, which separated the hotel from the picturesque fjord.

The workshop was treated as a competition with prizes and distinctions. It included classes for 25 students from the Faculty of Architecture of the Cracow University of Technology. After the hotel's owners delivered

an introduction, the students worked several hours every day. The classes were taught in English. After each day, all the students and tutors would meet the hotel's owners on a daily summary meeting. During these meetings, the students presented the progress on their projects, defended their design solutions, listened to critiques, and introduced improvements and corrections the next day. Cooperation with an actual client, understanding their needs, requirements and keeping the construction costs of proposals in check were essential elements of the education project (Jagiełło-Kowalczyk, 2007). Class days were mixed with touring the area, visiting the Norwegian Museum of Hydro-power and Industry, the Lilletopp observation spot and the town's buildings, as well as lectures on the history and industrial architecture theory of the town.

Similarly, to the students in Valencia, analyses encompassing the site, function, and greenery, among others, were performed. Inspirations and references were sought. At the end of the workshop, all students prepared an exhibition displaying their first proposals and sketches (Kosiński, Zieliński, 2016).

One of the projects that received high grades was that of student Michał Pyc. The student successfully tackled the project goals by preparing an interesting design with a well-designed functional layout, managing to find his way in the context given (Pyc, 2019). The design by student Karolina Wąsik is another very good

example. She also prepared an excellent design, presenting layouts in a slightly different way (Wąsik, 2019). After their return to Cracow, the students worked on developing their designs. Meetings and summaries of successive work stages were held once a month, with the participation of the hotel's owners. They also took part in thesis project defences, which were the final goal of the workshop. The diploma candidates demonstrated exceptional effectiveness in dealing with stress, defended the solutions proposed in excellent fashion. Their projects were given the highest possible grades. The workshop and the thesis projects also met the expectations of the two businessmen. They saw the potential and directions of design solutions for the old hotel section and the advantages of the site intended for the hotel's extension. They expressed appreciation for the proposed variety of design solutions and delight at the proposals. Due to beautiful visualisations, they rated the proposed forms and massings of the new sections of the hotel very highly. The thesis projects that were the best in the eyes of the businessmen were given prizes and distinctions.

In the second case, the group under study comprised 25 students of the Cracow University of Technology who had taken part in an international workshop organised by their mother university and a private company. They constituted 28% of that entire year's class (a total of 89 persons). The learning outcomes obtained because of participation in the international educational programme have been presented in table 1 and table 2. The study of competencies and grades demonstrated that the difference between students who had taken part in the workshops and those who had not was significant. The grades received by these students from design studio modules (5.00) were the highest that could possibly be obtained. The average for the entire group under study was also 4.24 (table 1). Likewise, in the case of grades obtained during the semester with the workshops for all modules, the average was significantly higher among students who had taken part in the programme (4.89) relative to the entire group under study, for which the average was 4.15 (table 2).

III 4. Façade from the fjord and visualisation, proposal by Michał Pyc







Ill 5. View from an open space through the half transparent façade on the Giudecca Canal, proposal by Maciej Konik

#### 4. CASE 3. Bachelor of Engineering project in Venice

One year after the workshop in Valencia, another workshop round was organised in Venice. There were 15 diploma candidates who participated in it. The students were tasked with revitalising a fragment of Venice's wharf near the School of Architecture building in the Santa Marta district. No specific functions were imposed, and students, while visiting the architecture school, listening to lectures, and talking to academic teachers and students who were studying in Venice, and examining the nearby districts, had to answer the needs of future users.

During the workshop, the diploma candidates listened to a cycle of lectures about Venice. Professors from the Università IUAV di Venezia spoke about the history of the city and the complicated problems of the people who live there. The students learned more about the population flight from the city, of Venice being crowded by tourists, as well as about the "acqua alta" phenomena, which regularly floods the city, and means of protection against this problem. Between lectures, the students toured the city, watching old buildings and new, multi-family housing, primarily on the isle of Giudecca. They sailed between the islands using the "vaporettos", the local water buses, learning about the distinct transport in Venice. They visited parks and other small green areas. Towards the end, they visited the Biennale di Venezia, familiarising themselves with the latest trends and problems in global architecture. Visiting the site on which the students were to design their buildings was another step. The students examined the context, functional determinants, technical conditions of and access to the site.

The students prepared analyses of individual elements, sought inspirations, and began working on the first

conceptual sketches. After returning from the workshop, they prepared site plans. They determined the sites most in need of an intervention and worked on their designs (Jagiełło-Kowalczyk, 2017).

One of the proposals was designed by Maciej Konik. His design of an "Ideal Center" for the student community of the IUAV assumed local and educational measures that were to become the foundation for serious future change that awaited Venice to enable it to change its image of a city without residents but with hotels, tourists, and cruise ships. The design featured a place in which every person could think and create. The design went through stages: from the idea to a physical form. The building was designed with respect for the city's tissue, entering a relationship with the surrounding development via shape and materials. The immediate area of the building was to revitalise and connect the surrounding public spaces and provide access to new, previously unused green areas (Konik, 2019).

The workshop in Venice became a motivation for the students to gather knowledge not only about the site in question, but also about the entire city and its vicinity. During on-site studies and lectures at a foreign university, the students familiarised themselves with the context, culture, and characteristics of the place, which formed the necessary basis for proper analyses and assessments of the environment they encountered. The project demanded considerable involvement and dedication from the students. The ability to explore the site not only in theory, but also in person, became a clear stimulus for self-education and the pursuit of knowledge for students, also in areas outside of architecture. In the third case, the group under study comprised 15 students at the Cracow University of Technology, who

participated in an international educational programme organised by the mother university and a foreign university. They comprised 19% of the year's class (a total of 78 persons). The educational outcomes that resulted from participation in the international educational programme have been presented in table 1 and table 2.

The study concerning the competencies and grades indicated that the differences between students who had participated in the workshop and those who had not was significant. The design studio grades received by these students (5.00) were the highest possible. The average for the entire group under study was 3.99 (table 1). Likewise, in the case of grades for all summer-semester modules, which was the period during which the workshop took place, the average was markedly higher for students who had taken part in the programme (4.61) relative to the entire group under study, which had an average of 4.21 (table 2).

#### 5. CASE 4. The *Connect.A\_Copenhagen\_2019* international workshop.

"Connect.A" is a cyclical workshop organised under the patronage of the University CEU Cardinal Herrera and is an introduction to design classes for Faculty of Architecture students. One site in Europe is chosen each time. In 2019, a plot in Copenhagen was selected as the project site. The international workshop brings students close to the issues and specificity of a given location and is combined with a design competition.

The *Connect.A\_Copenhagen\_2019* workshop took place between the 4th and 8th and February 2019 in Valencia, where almost a hundred students from all over the world worked on the project whose requirements were formulated by the organisers. In between them there were five polish students from Cracow University of Technology. The objective of the competition was to

develop the square of front of the Main Railway Station in Denmark's capital. Copenhagen Central Station (København H) is one of the most important points in the city, often the first place that visitors see, and the largest public transport hub in Denmark.

The objective of the competition formulated by the organisers was to explore the potential of the site and to prepare a proposal of a new public space that would be friendly to both residents and those who visit the city. One extremely valuable element of the event was the opportunity for student projects to be reviewed by and consulted with the academic staff of the CEU Cardinal Herrera University, as well as with guest tutors from the Cracow University of Technology, the Università IUAV di Venezia in Venice and from Riga, in addition to representatives of well-known architectural design companies from Copenhagen: JAJA Architects and Dorte Mandrup Arkitekter (Architecture UCH., 2019).

The design project of one of the workshop's participants, Piotr Dziejewicz, featured the construction of a multi-level public space over an empty space. The shape of the structure was organic, designed to connect all of the most important directions around the square and ensure efficient circulation. The proposal won the prize for the best project among invited students (Dziejewicz, 2019).

The fourth case helped students in the development of their design skills and the skills related to working under stress in a competitive environment of a design competition. Comparing designs on an ongoing basis, along with constant reviews of their work and the progress they had been making by recognised academic teachers from various countries enhanced the students' knowledge of architecture. It also mobilised them to work harder. This can also aid them in navigating the real world of designers, clients, and architectural competitions.

III. 6. The scope of the *Connect.A\_Copenhagen\_2019* workshop design, source: workshop organiser







Ill. 7. Model, freehand sketches and certificate, phot. by Piotr Dziejewicz

In the fourth case, the group under study comprised 5 students of the Cracow University of Technology who participated in an international educational programme organised by a foreign university. They constituted 5% of the entire year's class (a total of 89 persons). The educational outcomes obtained because of participation in the international educational programme were presented in table 1 and table 2.

The study concerning the competences and grades showed that the difference between students who had participated in the workshop and those who had not was significant. The design module grades received by those students (5.00) were the highest possible. The average for the entire group under study was 4.24 (table 1). Likewise, in the case of grades for all modules taught throughout the semester during which the workshop took place, the grade average was significantly higher among students who had participated in the programme (4.67) when compared to the entire group under study, whose average was 4.15 (table 2).

#### 6. CASE 5. *Activation of Contemporary Public Spaces – Milan 2021*

The international design workshop *Activation of Contemporary Public Spaces* took place in Milan, Italy in November 2021 as a part of the Erasmus+ grant jointly conducted by the Cracow University of Technology, University CEU Cardinal Herrera in Valencia and Politecnico di Milano. The host of this workshop was the Politecnico di Milano. The task of the students was to design the revitalization of Piazza Tirana. The 48 students participating in this workshop (16 students from each of the participating universities) were divided into international teams of 3-4 people. During seminars and design work, students learned about the history, as well as the functional and the social issues of the place. They solved compositional problems. They had to face different design and cultural approaches represented by colleagues from various parts of Europe. They were learning how to cooperate in an international group of designers.

During international workshop in Milan, the group of students from Poland consisted of 16 people who were selected to participate in the workshop by evaluation of

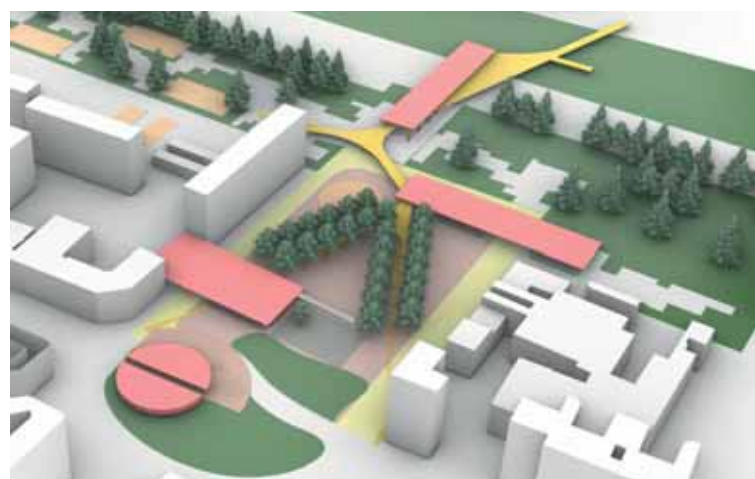
their previous course projects from the second and first year of studies. They were chosen out of 48 students that took part in the design course at the Faculty of Architecture in the Chair of Housing Environment in the 3rd year, 5th semester of Bachelor studies. The average grading of the course project of those 16 people who were participating in the workshop in Milan was 4.59 (out of a possible 5.0), while the other people, who do not participate was 3.97 (table 1). It should be noted that the competences of students participating in foreign student programs have increased in comparison to the other students. The students not only made more interesting and higher in the quality projects in the opinion of the evaluators, but also during the defenses they showed outstanding freedom in formulating conclusions, reflecting on their own projects, and showed exceptional skills in conducting discussions about their projects.

#### 7. EDUCATIONAL OUTCOMES

We can observe student educational outcomes in two areas: knowledge and skills, which lead to the final component of educational outcomes—social competence. In terms of both fields, the students who took part in the four cases of international cooperation in teaching have demonstrated much better outcomes than students who have not participated in the workshops and joint Bachelor's in Engineering projects. They have much better developed communication skills not only with other students from their University but also peers, professors and people in general from their and other countries. They get to know foreign languages, cultures, cities, and social environment which can be very helpful not only in the student life but also later at work (Długoszowski, 2013).

Concerning the field of knowledge, they demonstrated familiarity with and an understanding of the subject matter of the history of architecture and urban planning as well as their cultural determinants, the principles of urban design; elements of urban design composition; relationships between elements that shape space, the skill of drafting land development plans in accordance

Ill 8. 3D model view of Piazza Tirana, proposal by team of Aurora Bosia (POLIMI), Magda Piech (CUT) and Samuel Pavlik (CEU UCH)







III 9. 3D view of Piazza Tirana, proposal by team of Cecilia Seller (POLIMI), Jenny Halvorsen Eide (CEU UCH), Anna Mikula (CUT) and Grzegorz Wrona (CUT)

with technical, social, wildlife-related, cultural and legal requirements, subject matter concerning the basics of academic research, subject matter concerning building construction and materials science –technical matters associated with the design and construction of buildings, matters concerning structural systems, matters concerning building services installations, the principles of designing energy-efficient buildings, matters concerning the visual arts and artistic techniques associated with drawing, painting, sculpture and other artistic disciplines, as well as the precepts of modelling. Concerning the field of skills, they demonstrated the ability to identify and take into consideration the cultural determinants of the structure of the form and style of works of architecture and urban layouts, to identify and take into consideration the relationships between past and newly-designed architecture, to identify the relationships between a building and its surroundings, prepare an urban survey, perform basic academic work–collect literature, perform a case study, formulate conclusions and formulate design assumptions, employ abstract reasoning to technical problems, apply various technical and material means to present an architectural proposal, use software necessary in contemporary design. They also raised the quality of using a foreign language in a professional context, communicated using specialist terminology, took part in a discussion and cooperated with others as a part of teamwork.

The areas above lead to an increased level of social competences that prepare students to undertake the drafting of land development plans, architectural designs of building complexes and their presentation, the assessment of works of architecture from the point

of view of their site, cultural determinants, usefulness, structure and aesthetic against the background of conditions specific to urban planning and the cultural determinants of the structure of forms and styles of works of architecture and urban layouts, the preparation of technical documentation and the use of the general principles of energy-efficient building design, the acknowledgement of the significance of knowledge in solving cognitive and practical problems and drawing on the opinions of expert should they encounter difficulties in solving problems by themselves, performing critical assessments of the knowledge they possess and come into contact with.

Students who took part in this form of international cooperation demonstrated above-average scores in these outcomes. Their efforts were appreciated in the form of awards given during workshops and through being given the highest possible scores for their Bachelor's in Engineering projects.

The above is confirmed by the design studio grades received by students and the average grades received during the post-workshop semester. When analysing the grades it should be noted that the grade range was 2.0–5.0, with the lowest passing grade being 3.0, while the maximum passing grade that a student could obtain was 5.0. This means that a student passed a module only when their grades were within the 3.0–5.0 range. The analysis of the impact of participation in international workshops and partnering programmes with foreign universities has been shown in the tables below (table 1 and table 2). The analysis was performed on the grades of two groups of subjects comprising 89 and 78 persons, respectively. The workshop in Valencia

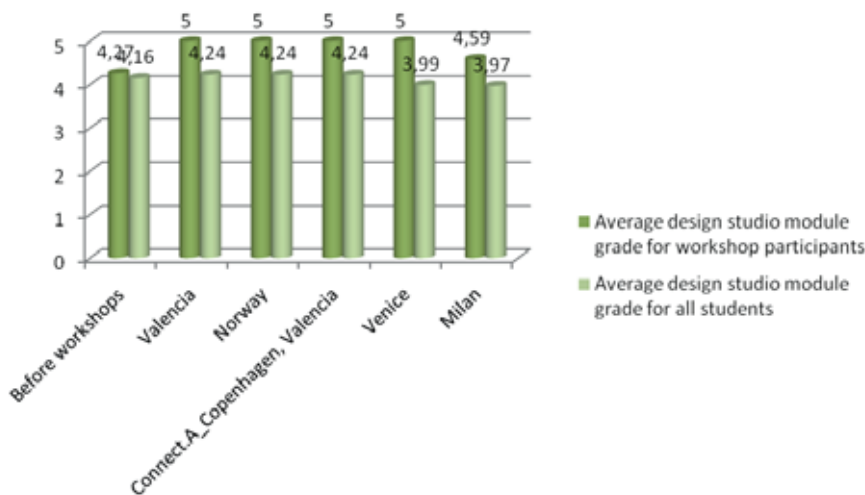


Table 1. Average design studio module grade: source: Faculty of Architecture, Cracow University of Technology, prepared by: Agnieszka Żabicka

was attended by 8 students, the one in Norway by 25 students, the one in Venice by 15 students, while the Connect.A\_Copenhagen workshop attracted 5 students. The study concerning the impact of participation in international workshops on the quality of design skills and design studio module grades obtained by students demonstrated that students who participated in the programmes displayed markedly better performance when compared to persons who had not participated in these events. At the same time students who participated in the programmes made improvement in their own grades in comparison to their grades before participation in international workshops.

The study assessing the impact of international workshops on the quality of general developmental skills and grades for all modules taught by the university demonstrated that the participants of the programmes under study could demonstrate considerably greater achievements in relation to those who had not participated in such programmes.

For the last few years, there has been a higher opportunity for Polish students to visit international universities. Beforehand, students had to go to foreign educational institutions on their own. Such, basically new, cooperation between various universities, direct contacts between academic teachers from different countries in the world allow for more and more extensive cooperation regarding the exchange programs and visit of foreign students at diverse locations (Skaza, Szpakowska-Loranc, Twardowski, 2017). The difference in grades, sophistication of the design

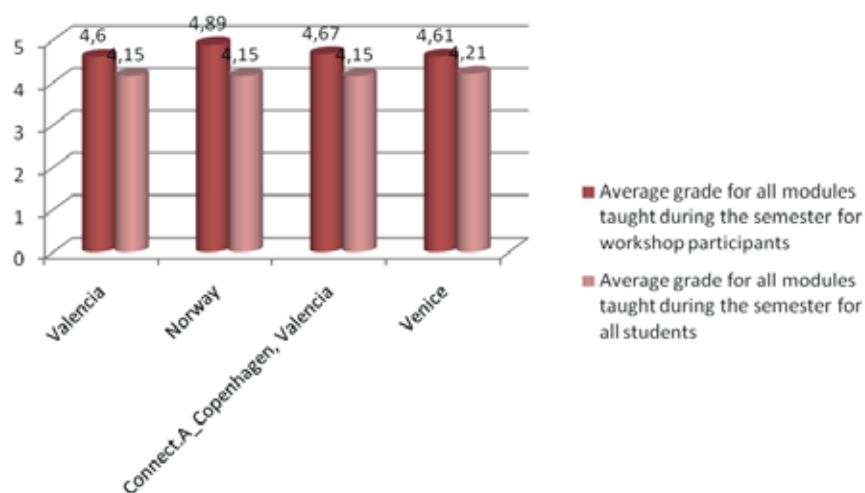
process and projects, personal and intellectual development are the first features that are immediately noticeable among students participating in the above-described programs.

## 8. CONCLUSIONS

When analysing educational outcomes, we can conclude that working on Bachelor's in Engineering projects as a part of international cooperation efforts and participation in workshops has two major positive contributions. The first is linked with improving knowledge of architecture, while the second is the development of character. On the one hand, an improvement

in competence in the field of architectural design, coordination between the various branches of engineering, an improvement in the quality of site analysis and a greater attention to deeper issues related to a site's existing context are observed. On the other, both cases have indicated an increased overall development of and proficiency in solving general human problems and coping with life under conditions different to those the students normally reside, in addition to more efficient decision-making. (Zuziak, 2013) Greater student involvement was observed among students who participated in both programmes relative to students who did not. International cooperation does not need to be long-term to achieve a significant increase in the performance indicators measured. Even a several-days-long workshop can improve the qualifications of students, their motivation, performance, and skills. Week-long classes and lectures in a new area, in a foreign country

Table 2. Average grade for all modules during the semester: source: Faculty of Architecture, Cracow University of Technology, prepared by: Agnieszka Żabicka





and often in a different language become a strong impulse to students to enhance their knowledge and competences. Observable differences in their approach to work, their openness in solving design problems, their willingness to work hard and the quality of their projects were noted, as were their presentation and project defence skills. All cases can be seen as a confirmation of the significance of international cooperation to the educational outcomes of students (Twardowski, 2018).

#### REFERENCES

- [1] Bojanowski, K., 2011, Edukacja architektoniczna. *Magazyn Architektoniczny ARCH* 7, 92-93.
- [2] Bonenberg, A. (2013). Selected students' works. *Architecture of the services and housing in teaching programs 1*, Publishing House of Poznan University of Technology, 27-40.
- [3] Długoszowski, A., 2013, Optymalizacja procesów projektowych jako odpowiedź na wyzwania współczesnego świata / The Optimization of the Design Process as the Response for the Challenge of the Modern World. *Dom i osiedle jutra. Część I, Housing Environment 11*, Wydawnictwo Katedry Kształtowania Środowiska Mieszkaniowego WAPK, 80-84.
- [4] Jagiełło-Kowalczyk, M., 2017, Smart Project w edukacji studentów architektury/Smart Project in the Education of Students of Architecture. *Smart Project, Building And City. Housing Environment 21*, Wydawnictwo Katedry Kształtowania Środowiska Mieszkaniowego WAPK, 159-165.
- [5] Jagiełło-Kowalczyk, M., 2007, Zaangażowanie młodzieży w ideę kształtowania zrównoważonego środowiska mieszkaniowego / Young people's involvement in the idea of shaping a sustainable housing environment. *Green Growth, Housing Environment 5*, Wydawnictwo Katedry Kształtowania Środowiska Mieszkaniowego WAPK, 138-141.
- [6] Jagiełło-Kowalczyk, M., 2017, The role of international student workshops in the process of educating architects – conceptual design and the development of preliminary energy objectives, *Global Journal of Engineering Education* 19(3), 262-266.
- [7] Kosiński, W. & Zieliński, M., 2016, Urbanistyka krajobrazu i krajobraz urbanistyczny. Teoria, praktyka, edukacja. *Space & Form = Przestrzeń i Forma* 25, 7-52.
- [8] Skaza, M., Szpakowska-Loranc, E. & Twardowski, M., 2017, *Śladami architektury*. Monografia Wydawnictwo Politechniki Krakowskiej.

Students who took part in the workshops presented in the article and who have prepared the Bachelor's in Engineering project discussed here are currently enrolled in Master's studies and are awarded the best possible scores for their performance. Their abilities have also been acknowledged by practicing architects, as they have found employment at esteemed Polish design companies, while also receiving proposals of employment by Spanish architectural studios.

- [9] Zuziak, I., 2013, Misja architekta / Architect's Mission. *Dom i osiedle jutra. Część II, Housing Environment 12*, Wydawnictwo Katedry Kształtowania Środowiska Mieszkaniowego WAPK, 238-243.

#### ONLINE SOURCES

- [10] Architecture UCH., 2019, February 20, *Architecture UCH: International Workshop Connect.A: Countdown to Copenhagen*. University CEU Cardinal Herrera. Retrieved 9.05.2019, from <https://blog.uchceu.es/arquitectura/en/international-workshop-connecta-countdown-copenhagen/>
- [11] Twardowski, M., 2018, *The First Degree Diploma Design Syllabus. Karta przedmiotu Projektowanie Dyplomowe*. Retrieved 16.07.2019, from <http://syllabus.pk.edu.pl/plan/show/html.pk?id=3256>

#### UNPUBLISHED MATERIALS

- [12] Dziewierz, P., 2019, The Connect.A\_Copenhagen\_2019 workshop description project. [Unpublished workshop's project]. Cracow University of Technology.
- [13] Dziewierz, P. & Sierak, F., 2019, Placa de Taverbes de la Valldigna. [Unpublished bachelor's thesis]. Cracow University of Technology.
- [14] Konik, M., 2019, IDEA CENTER. [Unpublished bachelor's thesis]. Cracow University of Technology.
- [15] Pyc, M., 2019, Revitalization and expansion of the historic hotel in Tyssedal. [Unpublished bachelor's thesis]. Cracow University of Technology.
- [16] Wąsik, K., 2019, Revitalization and expansion of a hotel in Tyssedal, Norway. [Unpublished bachelor's thesis]. Cracow University of Technology.







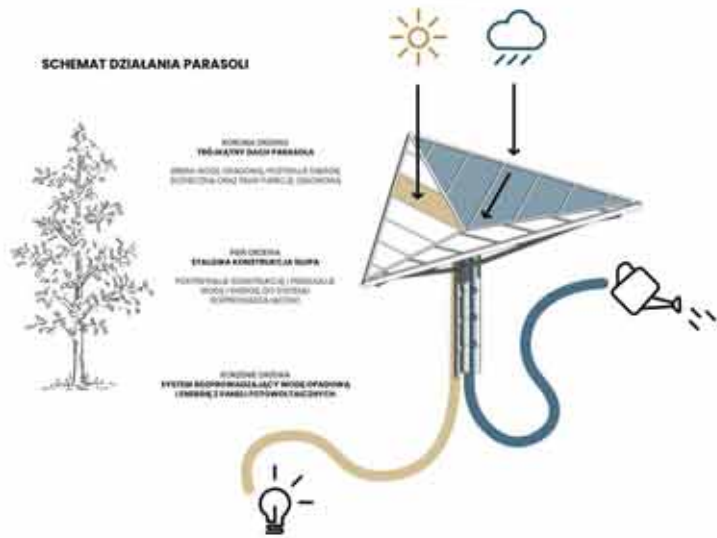
**SCHEMAT MAGAZYNOWANIA I WYKORZYSTYWANIA WODY DESZCZOWEJ**



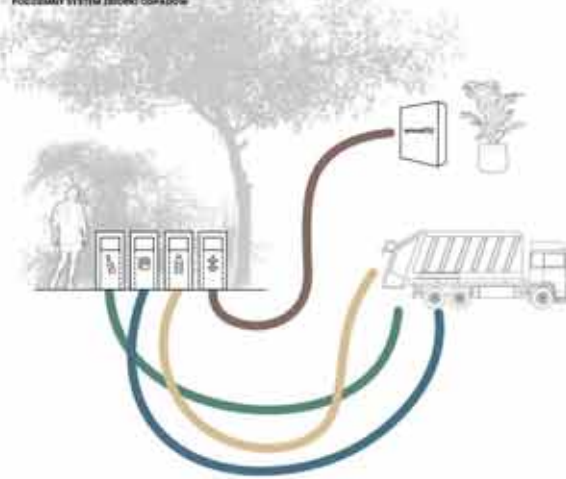
**SCHEMAT MAGAZYNOWANIA I SEGREGACJI ODPADÓW**



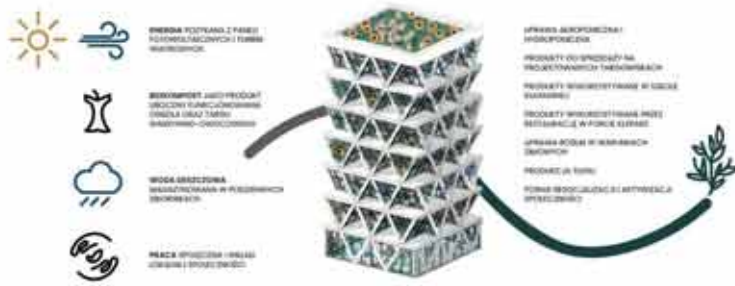
**SCHEMAT DZIAŁANIA PARASOLI**



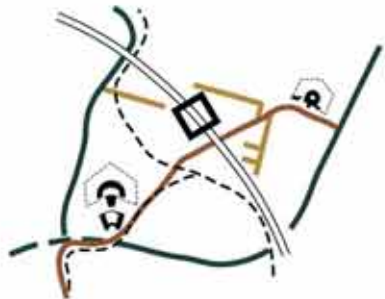
**SCHEMAT DZIAŁANIA SYSTEMU KOLEKCJI ODPADÓW**



**SCHEMAT DZIAŁANIA FARM WERTYKALNYCH**



**SCHEMAT KOMUNIKACJI**



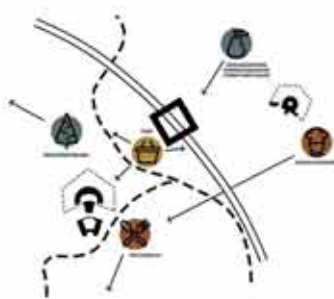
**SCHEMAT ALTERNATYWNYCH SPOSOBÓW TRANSPORTU**



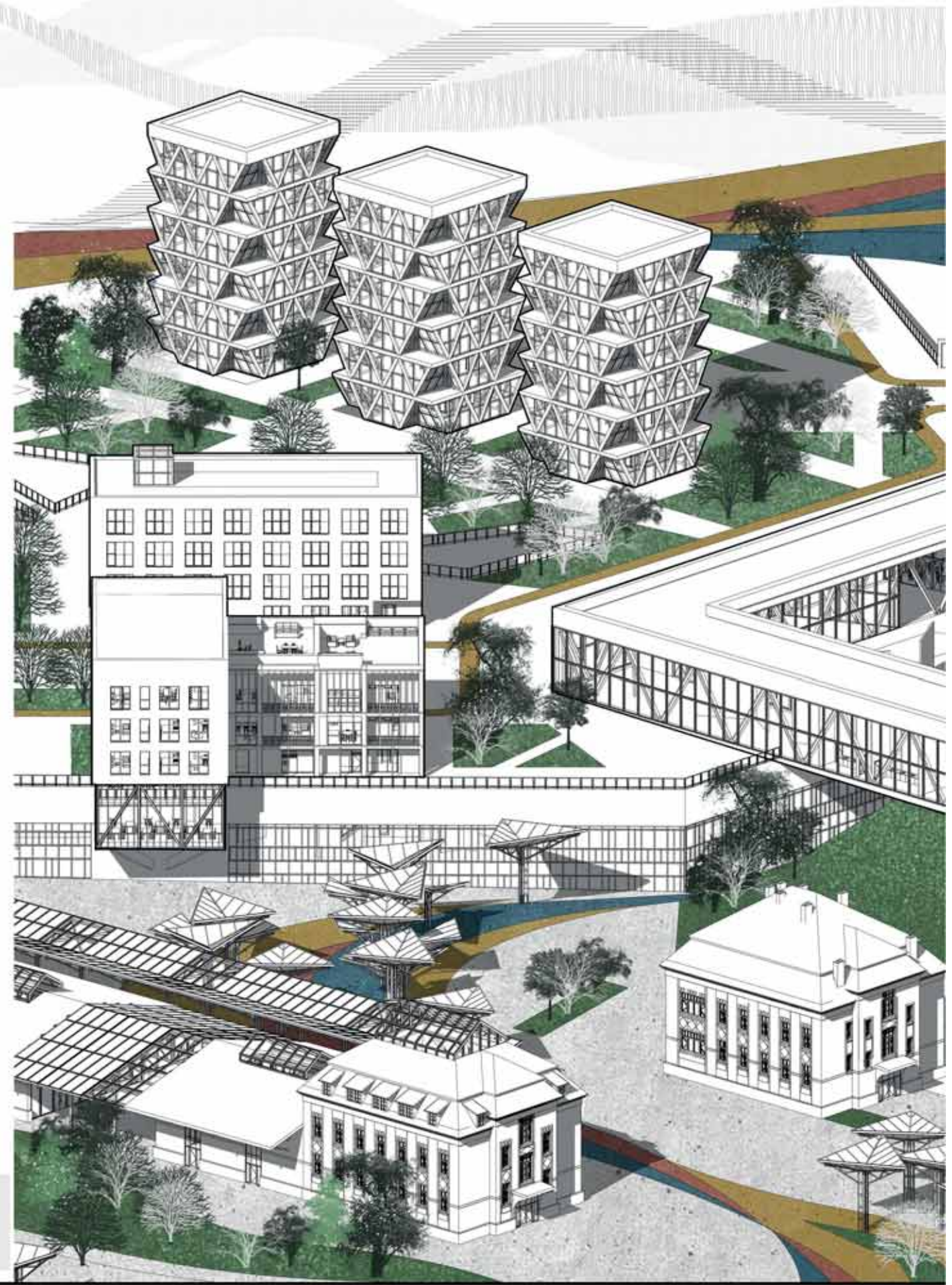
**SCHEMAT PRZESTRZENI**



**SCHEMAT FUNKCJONALNY**



- TRASA KOLEJOWA
- TRASA TRAMWAJOWA
- TRZY FORTY
- DRÓGA GŁÓWNA
- TUNELE
- DRÓGA LOKALNA
- WOZOWIEC
- TRASA KOLEJOWA
- TRASA TRAMWAJOWA
- TRZY FORTY
- ŚCIEŻKA PIESZO-ROWEROWA
- TRASA AUTOBUSOWA
- TRASA KOLEJOWA
- TRASA TRAMWAJOWA
- TRZY FORTY
- BUDYNKI MIESZKALNE Z USŁUGAMI W PARTERZE
- BUDYNKI USŁUGOWE
- PRZESTRZEŃ PUBLICZNA
- TRASA KOLEJOWA
- TRASA TRAMWAJOWA
- TRZY FORTY
- STREFA KULINARNA
- STREFA ŻYCIOWA
- STREFA TARGOWA



OSIEDLE Z TARGOWISKIEM I OGRÓDKAMI PARTYCYPACYJNYMI

WYDZIAŁ ARCHITEKTURY POLITECHNIKI KRAKOWSKIEJ, KATEDRA KSZTAŁTOWANIA ŚRODOWISKA MIESZKANOWEGO, ZESPÓŁ PROJEKTOWANIA URBANISTYCZNO-ARCHITEKTONICZNEGO I-C-7 PROJEKTOWANE WIELORODZINNYCH ZESPÓŁÓW MIESZKANOWYCH STOPIEŃ 8 ROK I SEMESTR I 2021/2022



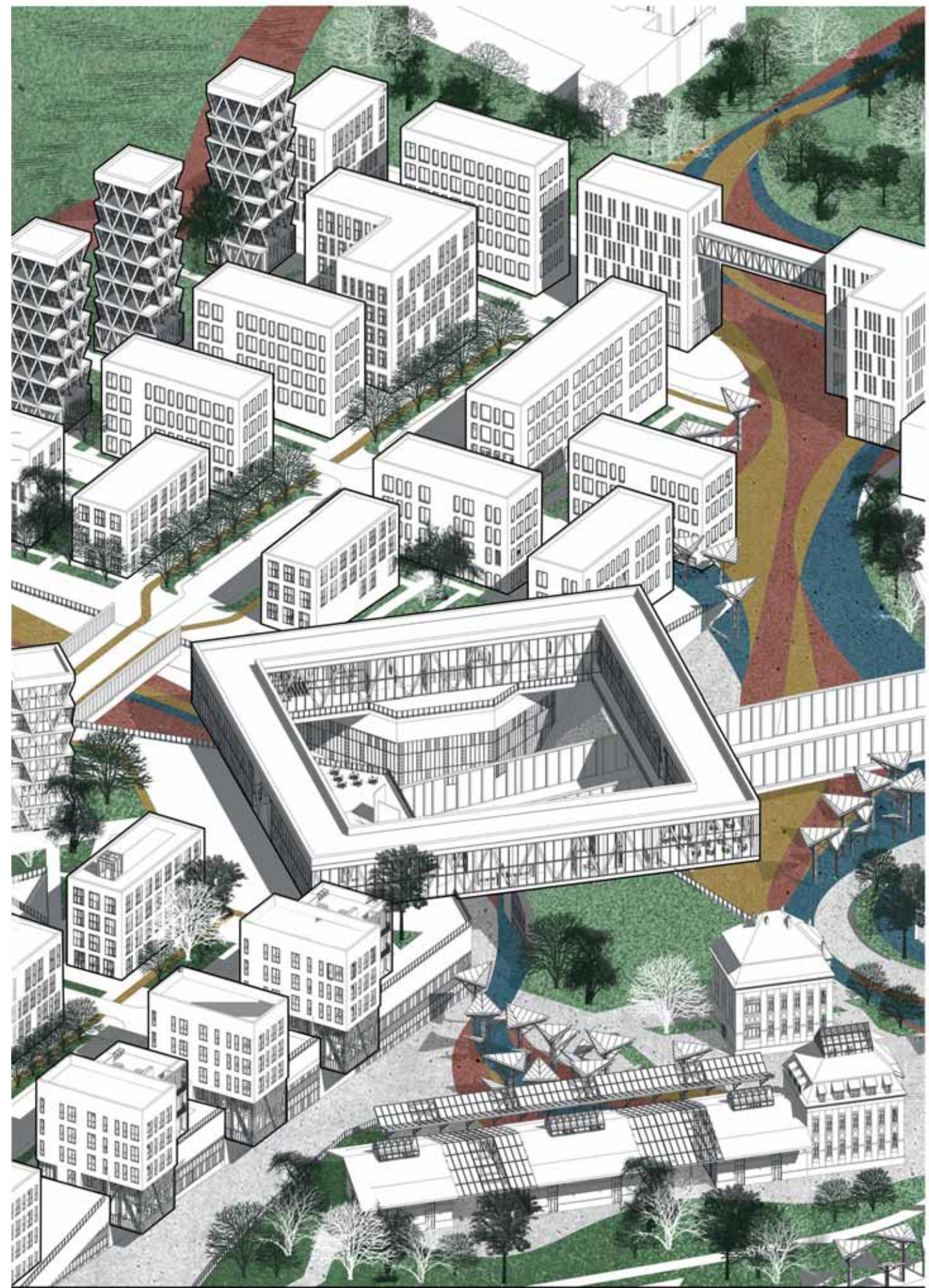
PROWADZĄCY PRZEDMIOT: DR HAB. INŻ. ARCH. MARIUSZ TWARDOŃSKI, PROF. PIŁ  
 PROWADZĄCY GRUPĘ: DR INŻ. ARCH. PIOTR BROSIKOWICZ  
 ZESPÓŁ: DOMINIKA CIEPLAK, KAMIL FEDERYDA





OSIEDLE Z TARGOWISKIEM I OGRÓDKAMI PARTYCYPACYJNYMI

WYDZIAŁ ARCHITEKTURY POLITECHNIKI KRAKOWSKIEJ, KATEDRA KSZTAŁTOWANIA ŚRODOWISKA MIESZKANOWEGO, ZESPÓŁ PROJEKTOWANIA URBANISTYCZNO-ARCHITEKTONICZNEGO  
I-C-7 PROJEKTOWANE WIELKODZIWNYCH ZESPÓŁÓW MIESZKANOWYCH  
STOPIEŃ 9 BOK I SEMESTR | 2021/2022



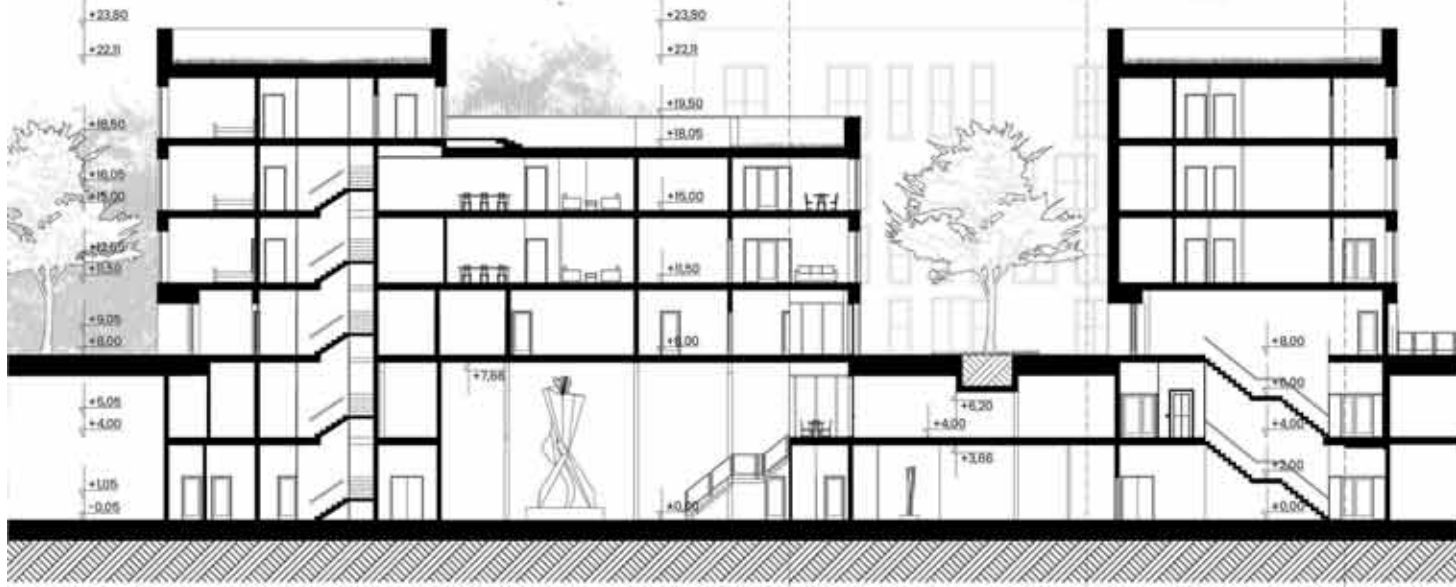
OSIEDLE Z TARGOWISKIEM I OGRÓDKAMI PARTYCYPACYJNYMI

WYDZIAŁ ARCHITEKTURY POLITECHNIKI KRAKOWSKIEJ, KATEDRA KSZTAŁTOWANIA ŚRODOWISKA MIESZKANOWEGO, ZESPÓŁ PROJEKTOWANIA URBANISTYCZNO-ARCHITEKTONICZNEGO  
I-C-7 PROJEKTOWANE WIELKODZIWNYCH ZESPÓŁÓW MIESZKANOWYCH  
STOPIEŃ 9 BOK I SEMESTR | 2021/2022





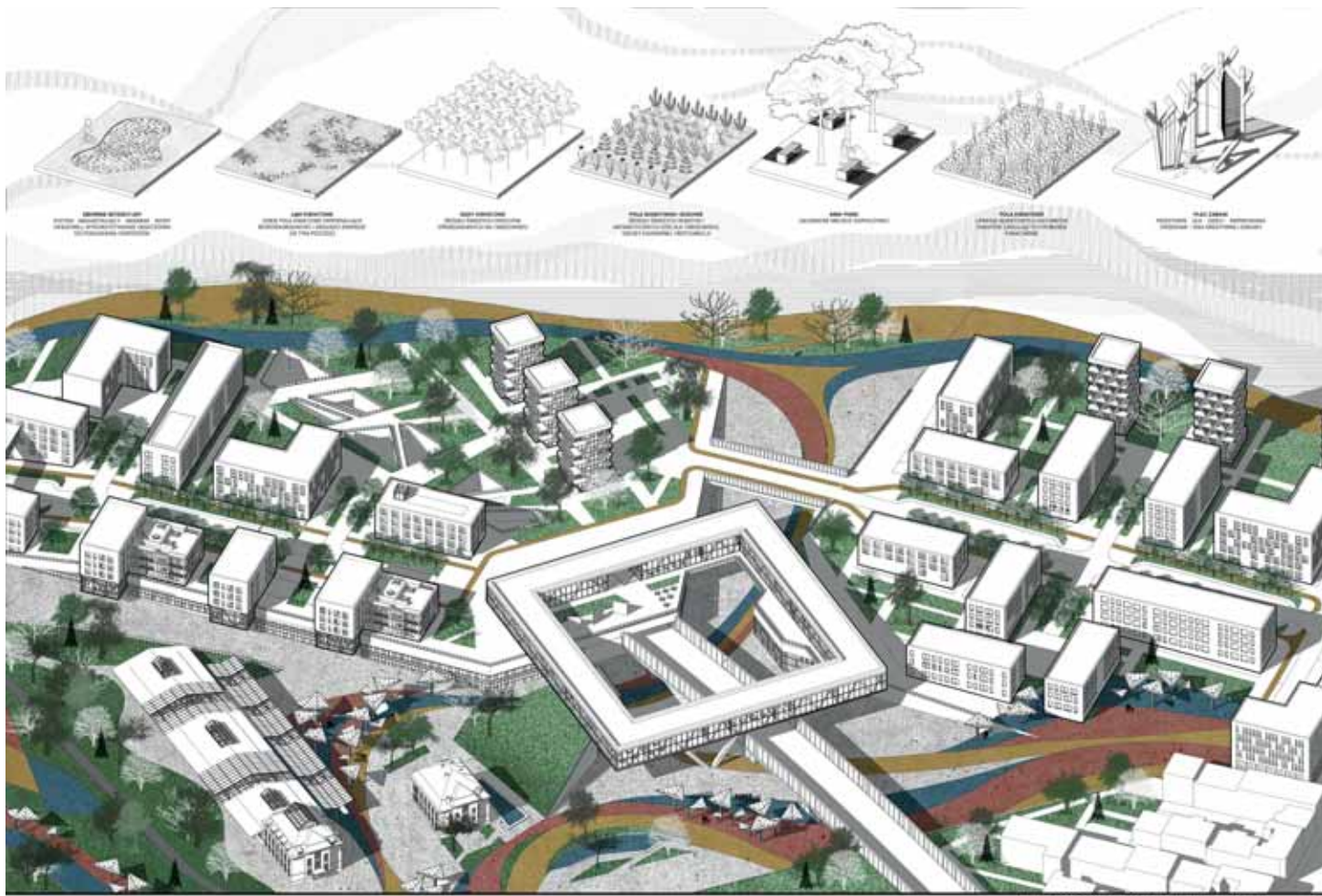
PRZEKRÓJ PODŁUŻNY B-B  
SKALA 1:200



PRZEKRÓJ POPRZECZNY A-A  
SKALA 1:200







OSIEDLE Z TARGOWISKIEM I OGRÓDKAMI PARTYCYPACYJNYMI  
 MIĘDZY FORTAMI



OSIEDLE Z TARGOWISKIEM I OGRÓDKAMI PARTYCYPACYJNYMI  
 MIĘDZY FORTAMI









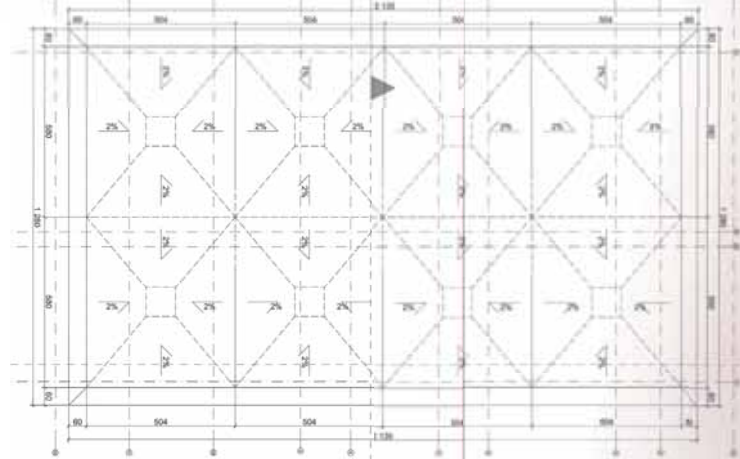


# The Gate of Turia, Valencia

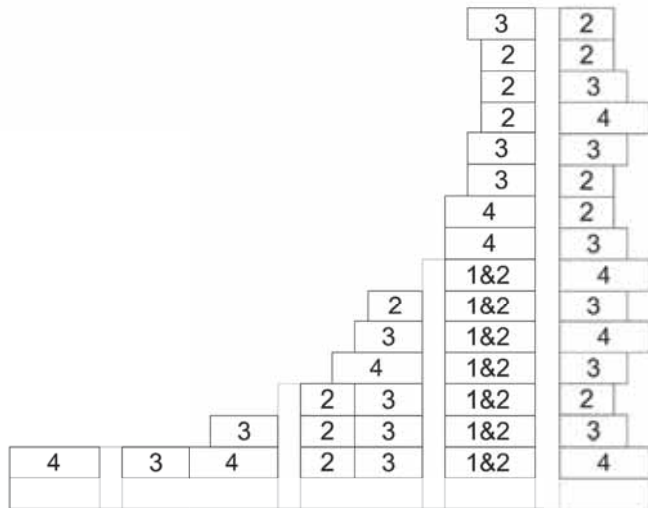


Rzut piętra +1 skala 1:100

Zestawienie pomieszczeń			Zestawienie pomieszczeń			Zestawienie pomieszczeń					
Kondygnacja	Nr	Nazwa pomieszczenia	Powierzchnia	Kondygnacja	Nr	Nazwa pomieszczenia	Powierzchnia	Kondygnacja	Nr	Nazwa pomieszczenia	Powierzchnia
<b>Poziom -1</b>			<b>Poziom 0</b>			<b>Poziom 0</b>			<b>Poziom 0</b>		
0.1.1	Schowek	13,5	1.1.1	Korytarz	7,2	2.4.3	Aneks kuchenny	12,6	2.4.3	Aneks kuchenny	12,6
0.1.2	Schowek	11,8	1.1.2	Korytarz	7,2	2.4.4	Pokój dzienny	24,9	2.4.4	Pokój dzienny	24,9
0.1.3	Schowek	13,5	1.1.3	Korytarz	7,2	2.4.5	Sypialnia rodziców	17,0	2.4.5	Sypialnia rodziców	17,0
0.1.4	Schowek	13,0	1.1.4	Korytarz	7,2	2.4.6	Łazienka	4,2	2.4.6	Łazienka	4,2
0.1.5	Schowek	18,7	1.2.1	Śmietnik	10,7	2.4.7	Dziecięcy 1	13,3	2.4.7	Dziecięcy 1	13,3
0.1.6	Schowek	15,2	1.2.2	Śmietnik	10,7	2.4.8	Dziecięcy 2	13,0	2.4.8	Dziecięcy 2	13,0
0.1.7	Schowek	16,7	1.2.3	Śmietnik	10,7	2.5.1	Przedpokój	3,3	2.5.1	Przedpokój	3,3
0.1.8	Schowek	12,5	1.2.4	Śmietnik	11,5	2.6.2	Aneks kuchenny	7,4	2.6.2	Aneks kuchenny	7,4
0.1.9	Schowek	12,5	1.3.1	Klatka schodowa	15,6	2.5.3	Pokój dzienny	22,8	2.5.3	Pokój dzienny	22,8
0.1.10	Schowek	12,1	1.3.2	Klatka schodowa	15,6	2.5.4	Sypialnia	16,7	2.5.4	Sypialnia	16,7
0.1.11	Schowek	12,1	1.3.3	Klatka schodowa	15,6	2.5.5	Łazienka	9,0	2.5.5	Łazienka	9,0
0.1.12	Schowek	9,7	1.3.4	Klatka schodowa	19,0	2.6.1	Przedpokój	3,6	2.6.1	Przedpokój	3,6
0.1.13	Schowek	9,5	1.4.1	Rowerownia	90,7	2.6.2	Łazienka	7,6	2.6.2	Łazienka	7,6
0.1.14	Schowek	9,7	1.5.1	Recepcja	23,0	2.6.3	Aneks kuchenny	10,7	2.6.3	Aneks kuchenny	10,7
0.1.15	Schowek	21,8	1.5.2	Silownia	90,8	2.6.4	Pokój dzienny	20,8	2.6.4	Pokój dzienny	20,8
0.1.16	Schowek	11,8	1.5.3	Schowek	4,2	2.6.5	Sypialnia rodziców	14,9	2.6.5	Sypialnia rodziców	14,9
0.1.17	Schowek	13,5	1.5.4	WC dla niepełnospraw...	4,5	2.6.6	Łazienka	4,2	2.6.6	Łazienka	4,2
0.1.18	Schowek	13,0	1.5.5	Pomieszczenie socjalne	6,5	2.6.7	Dziecięcy 1	12,9	2.6.7	Dziecięcy 1	12,9
0.1.19	Schowek	11,8	1.5.6	WC	2,1	2.7.1	Przedpokój	3,7	2.7.1	Przedpokój	3,7
0.1.20	Schowek	13,5	1.5.7	Korytarz	4,9	2.7.2	Łazienka	10,0	2.7.2	Łazienka	10,0
0.1.21	Schowek	13,0	1.5.8	Szafnia męska	5,6	2.7.3	Pokój dzienny	20,5	2.7.3	Pokój dzienny	20,5
0.1.22	Schowek	11,8	1.5.9	WC męski	10,6	2.7.4	Aneks kuchenny	7,2	2.7.4	Aneks kuchenny	7,2
0.1.23	Schowek	14,5	1.5.10	Szafnia damska	5,6	2.7.5	Sypialnia	16,7	2.7.5	Sypialnia	16,7
0.1.24	Schowek	6,3	1.5.11	WC damski	10,4	2.8.1	Przedpokój	2,8	2.8.1	Przedpokój	2,8
0.1.25	Schowek	5,5	1.6.1	Recepcja	26,1	2.8.2	Łazienka	8,0	2.8.2	Łazienka	8,0
0.1.26	Schowek	6,3	1.6.2	Korytarz	10,2	2.8.3	Pokój	18,5	2.8.3	Pokój	18,5
0.1.27	Schowek	9,2	1.6.3	Biuro	14,1	2.8.4	Aneks kuchenny	8,1	2.8.4	Aneks kuchenny	8,1
0.1.28	Schowek	6,8	1.6.4	Sala do fizjoterapii	36,1	2.9.1	Przedpokój	6,9	2.9.1	Przedpokój	6,9
0.1.29	Schowek	9,8	1.6.5	WC dla niepełnospraw...	4,5	2.9.2	Łazienka	9,6	2.9.2	Łazienka	9,6
0.1.30	Schowek	7,1	1.6.6	Pomieszczenie socjalne	13,3	2.9.3	Aneks kuchenny	12,6	2.9.3	Aneks kuchenny	12,6
0.1.31	Schowek	7,4	1.6.7	WC	2,8	2.9.4	Pokój dzienny	26,1	2.9.4	Pokój dzienny	26,1
0.1.32	Schowek	6,4	1.6.8	Schowek	2,8	2.9.5	Sypialnia rodziców	17,0	2.9.5	Sypialnia rodziców	17,0
0.1.33	Schowek	6,4	1.6.9	Schowek	7,7	2.9.6	Łazienka	4,2	2.9.6	Łazienka	4,2
0.1.34	Schowek	6,7	1.6.10	Pomieszczenie technic...	4,1	2.9.7	Dziecięcy 1	13,3	2.9.7	Dziecięcy 1	13,3
0.1.35	Schowek	6,4	1.7.1	Recepcja	23,2	2.9.8	Dziecięcy 2	13,0	2.9.8	Dziecięcy 2	13,0
0.1.36	Schowek	6,2	1.7.2	Salon kosmetyczny	41,8			841,4 m²			3 788,5 m²
0.1.37	Schowek	6,4	1.7.3	WC dla niepełnospraw...	4,5						
0.1.38	Schowek	9,2	1.7.4	Pomieszczenie socjalne	17,8						
0.1.39	Schowek	6,5	1.7.5	WC	2,6						
0.1.40	Schowek	5,5	1.7.6	Schowek	2,8						
0.1.41	Schowek	6,3	1.7.7	Pomieszczenie technic...	2,2						
0.1.42	Schowek	7,0	1.8.1	Recepcja	28,1						
0.1.43	Schowek	7,0	1.8.2	Salon fryzjerski	42,1						
0.1.44	Schowek	6,3	1.8.3	Pomieszczenie socjalne	18,7						
0.1.45	Schowek	5,5	1.8.4	WC	2,9						
0.1.46	Schowek	6,3	1.8.5	Schowek	6,7						
0.1.47	Schowek	6,1	1.8.6	Pomieszczenie technic...	4,1						
0.1.48	Schowek	5,5			7208 m²						
0.1.49	Schowek	6,3	<b>Poziom +1</b>								
0.1.50	Schowek	6,1	2.1.1	Klatka schodowa	5,8						
0.1.51	Schowek	5,5	2.1.2	Klatka schodowa	6,0						
0.1.52	Schowek	6,8	2.1.3	Klatka schodowa	6,0						
0.2.1	Korytarz	13,5	2.1.4	Klatka schodowa	7,3						
0.2.2	Korytarz	18,9	2.2.1	Przedpokój	6,9						
0.2.3	Korytarz	9,7	2.2.2	Łazienka	9,5						
0.2.4	Korytarz	9,7	2.2.3	Aneks kuchenny	12,6						
0.3.1	Klatka schodowa	15,4	2.2.4	Pokój dzienny	26,2						
0.3.2	Klatka schodowa	15,4	2.2.5	Łazienka	4,2						
0.3.3	Klatka schodowa	22,1	2.2.6	Sypialnia rodziców	17,6						
0.3.4	Klatka schodowa	31,8	2.2.7	Dziecięcy 1	13,2						
0.4.1	Pomieszczenie technic...	6,7	2.2.8	Dziecięcy 2	13,0						
0.4.2	Pomieszczenie technic...	3,7	2.3.1	Przedpokój	5,1						
0.4.3	Pomieszczenie technic...	15,7	2.3.2	Łazienka	7,6						
0.4.4	Pomieszczenie technic...	3,7	2.3.3	Aneks kuchenny	14,6						
0.4.5	Pomieszczenie technic...	6,7	2.3.4	Pokój dzienny	20,8						
0.4.6	Pomieszczenie technic...	3,7	2.3.5	Sypialnia rodziców	14,9						
0.4.7	Pomieszczenie technic...	13,1	2.3.6	Łazienka	4,2						
0.4.8	Pomieszczenie technic...	4,6	2.3.7	Dziecięcy 1	12,9						
0.5.1	Parking	1 735,3	2.4.1	Przedpokój	6,9						
		2 426,5 m²	2.4.2	Łazienka	9,6						



Widok dachu z góry skala 1:100



Schemat rozmieszczenia klatek schodowych i pomieszczeń ze względu na liczbę pokoi

# The Gate of Turia, Valencia







**Zagospodarowanie placu  
Piazza Tirana**  
Skala 1:500



- 1 | Plac zabaw
- 2 | Parking podziemny
- 3 | Amfiteatr
- 4 | Sadzawka
- 5 | Pawilona
- 6 | Przystanek autobusowy
- 7 | Przystanek tramwajowy
- 8 | Plac przed stacją
- 9 | Projektowany budynek

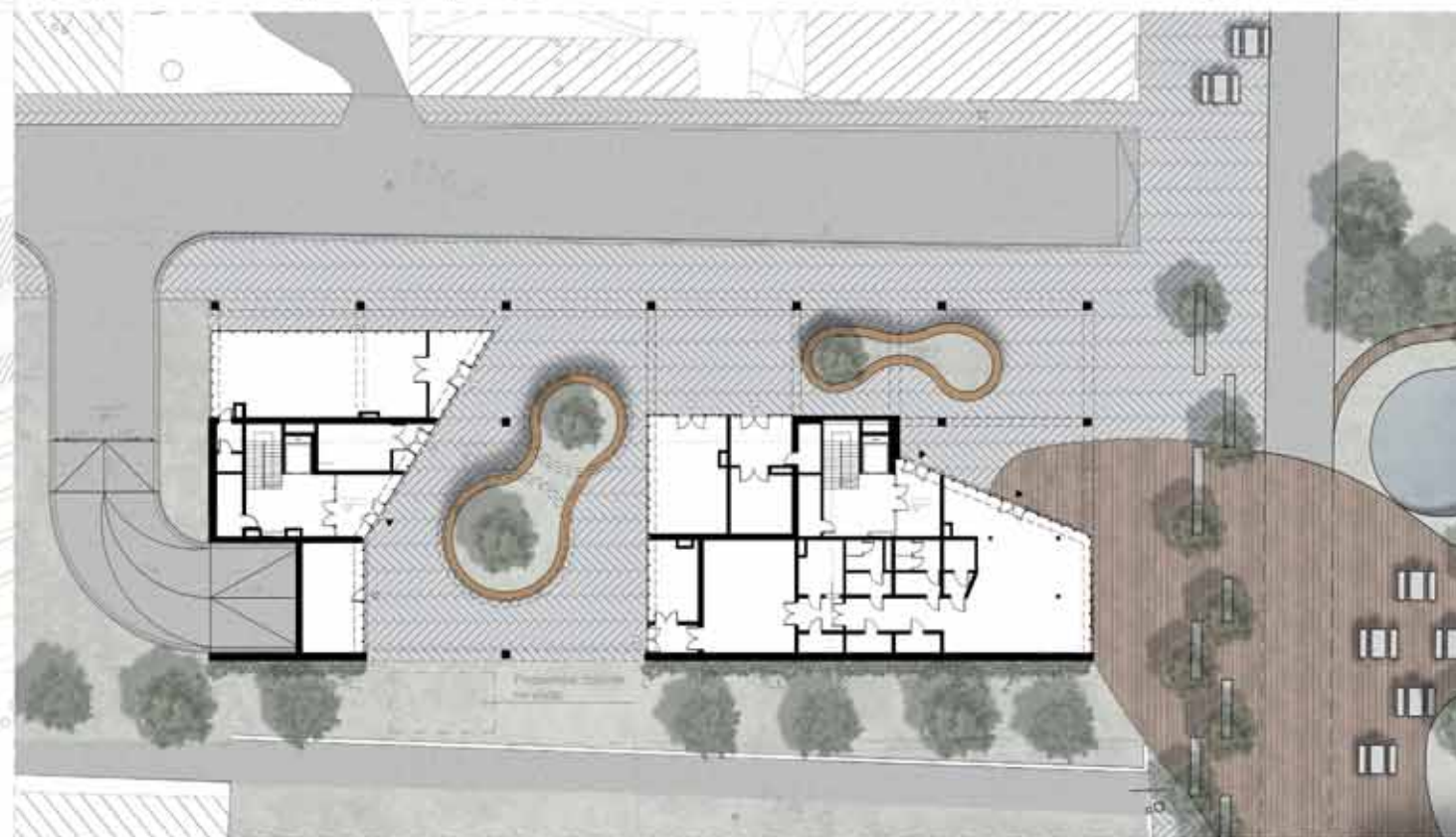
Olga Gochowska, rok II, semestr V, 2023/2022  
Katedra malarstwa Srodowiska Muzycznego, prowadzący: architekt dr hab. inż. arch. Mariusz Twardowski, prof. P.N., przewodniczący: architekt dr inż. arch. Piotr Borowicz



**Bilans terenu**

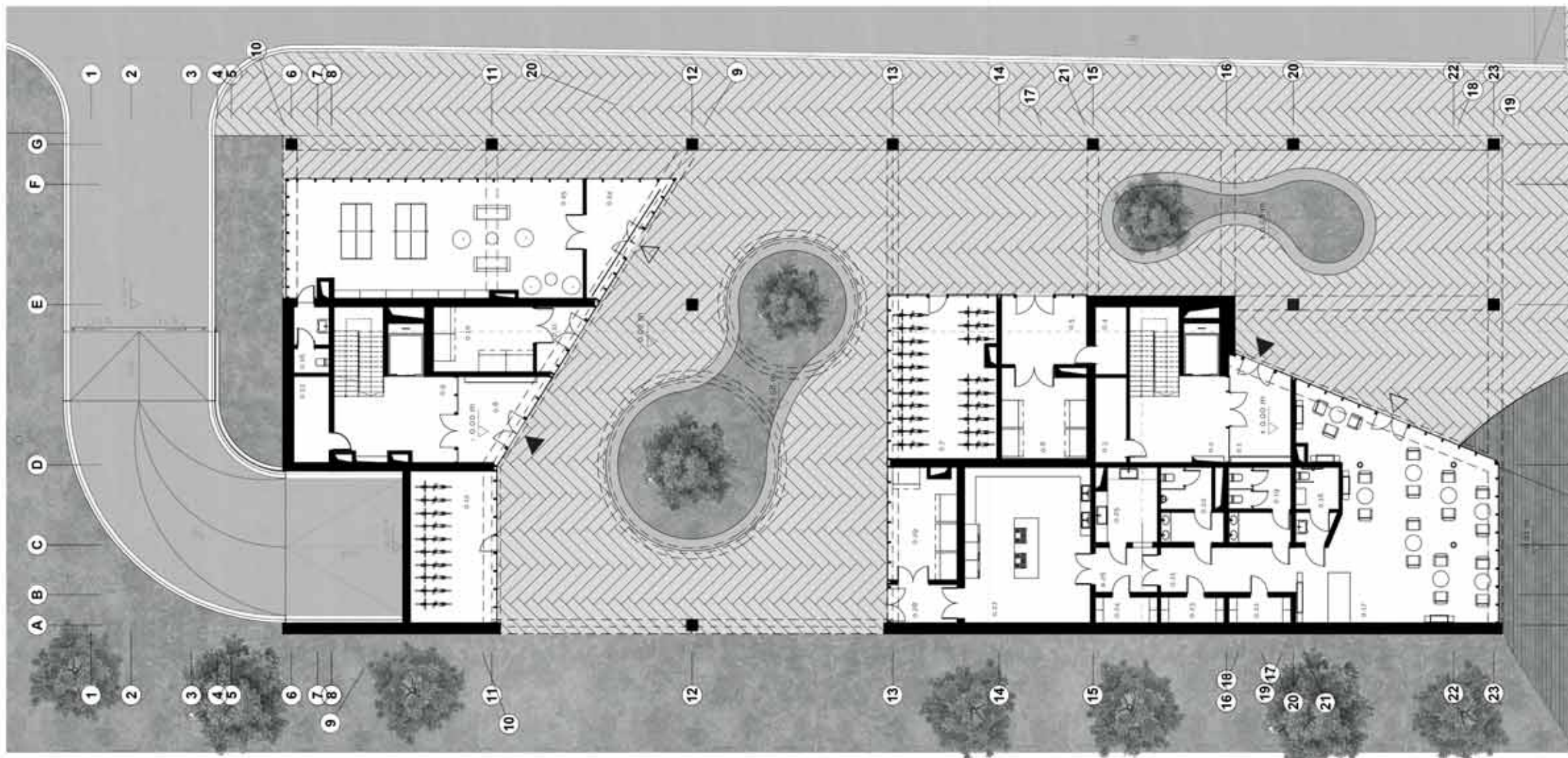
Powierzchnia zabudowy	890 m <sup>2</sup>	20 %
Powierzchnia biologicznie czynna	5819 m <sup>2</sup>	25,8 %
Powierzchnia utwardzona	10481 m <sup>2</sup>	78,2 %
Powierzchnia całkowita	30220 m <sup>2</sup>	100 %

**Zagospodarowanie terenu**  
Skala 1:200



Olga Gochowska, rok II, semestr V, 2023/2022  
Katedra malarstwa Srodowiska Muzycznego, prowadzący: architekt dr hab. inż. arch. Mariusz Twardowski, prof. P.N., przewodniczący: architekt dr inż. arch. Piotr Borowicz





Zestawienie powierzchni		
Nr strefy	Nazwa strefy	Powierzchnia (m <sup>2</sup> )
01	Wzrostki I	14,8
02	Kolba schodowa I	11,4
03	Pom. techniczne	6,5
04	Pom. techniczne	5,3
05	Pom. na odpady	15,4
06	Przebiegnie	14,5
07	Rowczenie	12,2
08	Wzrostki II	13,7
09	Kolba schodowa II	12,2
010	Pom. na odpady	16,2
011	Przebiegnie	5,7
012	Rowczenie	12,8
013	Pom. techniczne	7,8
014	Przebiegnie	14,6
015	Pom. widowne	14,8
016	AC	5,7
017	Przebiegnie	19,8
018	AC - dla mieszkańców	7,5
019	AC - dla mieszkańców	11,7
020	AC - Magazyn	10,6
021	Kuchnia	14,2
022	Magazyn I	4,0
023	Magazyn II	4,0
024	Chłodnia	4,0
025	Strefa biurowych miejsc	11,0
026	Strefa podparcia	11,0
027	Kuchnia	18,8
028	Pom. na odpady	15,0
029	Przebiegnie	16,7
		100,0 m <sup>2</sup>

Rzut parteru





