4 IN A ROW: ARCHITECTURAL DESIGN AS ADAPTATION AND MITIGATION MEASURE FOR THE PROBLEMS OF TODAY?

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INTRODUCTION

This contribution describes an academic effort conducted in Winterterm 2018/2019 at the Faculty of Architecture and Planning of the TU Wien. Thereby, a collaborative teaching effort established in the year (see [1]) before was continued and furtherly improved. Such as in the year before (coupled design studio of the Master Programme Architecture and project course of the Master of Building Science Programme "Building Envelope 4.0) Master students from Building Science and Architecture programmes were asked to form groups and to collaboratively develop clever design ideas and to proof their performance. The topic of the winter term 2018/2019 did – unlike the year before – not focus on just one solitaire building, but rather addressed a convolute of buildings situated along a heavy-traffic street (Operngasse) in Vienna. The buildings addressed in the course are highlighted in Figure 1.

Figure 1: Buildings along the Operngasse that have been addressed in the design studio / project course. Note: In the right lower, half the "Freihaus" complex of TU Wien can be seen.

Thereby, each group of students was assigned one building. Their task was to improve not only the singular building regarding appearance (façade) and internal organisation (plan layout, usage, occupant comfort, etc) but also to think about interrelations between the different buildings in term of urban structure of the neighbourhood. Given the idea to integrate greenery in buildings, an additional task was to consider façade and roof greenery as good as possible in the retrofits. Challenges related to the design studio included the existing plan layout of the buildings (all but one

building were built around 1937 and featured *Gründerzeit* plan layouts, but severely lower ceiling heights than the original *Gründerzeit buildings*) that could be considered as far from today's requirements, and the rather slim structural elements (slabs, columns). Moreover, the thermal and acoustical performance of these old buildings required comprehensive improvement. Regarding the one and only newer building, an office building with a rather regular plan layout dating back to the late 1970ies and early 1980ies, the major challenge was to find ways to integrate as good as possible residential units. All of the building suffer from vacancies along the ground floor street façade, thus solutions addressing that issue were also part of the task. The progress in the design studio was structured into (i) concept phase, (ii) design phase, (iii) evaluation phase, and (iv) detailing and work-planning phase. Students, in contrast to many other design studios, had to work out technical solutions for their design and to think about the construction effort connected with their suggested interventions.

RETROFIT CONCEPTS

The retrofit concepts spanned a wide range of different interventions. Some of the concepts just performed minimal invasive changes, such as punctual addition of boxes that host plants and a watering system. Others added an additional layer in front of the façade that serves as a second skin. The interstitial space between can be used for balconies, growing space for plants, or ventilation purposes. Two other design concepts suggested the addition of kinematic shading elements before the façade layer. Finally, some concepts totally opened the façade of the building or even performed subtractive interventions onto the building (office building). Close to all designs optimized their design in the direction of factory prefabrication to shorten construction times. Figure 2 illustrates some of the developed designs.

Figure 2: Examples of improved Operngassen facades.

CONCLUSION

The outcome of the design studio / project course unravelled a large demand by students toward interdisciplinary courses. In detail, the combination of design skills, technical assessments and a long-term "big picture" view is something that is severely missing in today's planning practice, and thus in many academic efforts. However, the generation of well-performing, aesthetically attractive, and technically feasible architecture requires multidisciplinary approaches and the utilization of technical skills (e.g. simulation utilization) and knowledge-based approaches. As such, we plan to continue with this collaboration and to think about 1:1 realizations (of course in small scales) encompassing building greenery.

REFERENCES

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