

# **The Erection of a Full-Scale Laboratory at the Technical University of Vienna**

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## 1. Introductory Remarks

We are very happy to acquaint you with the planning work of our full-scale laboratory.

So far, none of the Austrian architecture schools provide of any such facilities, even though there have been some individual attempts in the past within the private sector, e.g. as by the furniture constructor Möbelhaus Fehlinger, to introduce such facilities.

More than a year ago we got in touch with one of the major Austrian office furniture manufactures hoping to find a potential sponsor for our full-scale laboratory. Amongst the many things we talked about we also went into detail about the execution of specific research projects. After some preliminary negotiations dealing with specific information and proposals contributed by us we heard nothing more from them. You can imagine how we were taken back on seeing their presentation of a kind of a full-scale laboratory in several publications as their very own invention.

## 2. Review and Present Situation

Ever since 1977 the Institut für Raumgestaltung ('Architectural Styling of Space') has been trying to set up a full-scale laboratory designed for teaching and research purposes. Our aim was even more so invigorated by the International Architecture Symposium "Man and Architectural Space" organized by our institute (1984).

But only in 1988 were we allotted the former library rooms on the ground floor of the main building for our project which also meant that at last an ultimate positive decision had been passed in our favor.

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1 With the cooperation of Gerhard Renk.

The depicted rooms (pictures 1-2) have a clear height of practically 9 meters and thus can be regarded as adequately suited to meet our demands. Though not extremely large with its dimensions of 6 x 9 meters the experimental area at our disposal allows a lot to be done.

Comprehensive planning of required adaption work set in immediately (1988). First we were told that building work would already commence in February, 1989. But in the end the former library shelves were only removed at the beginning of 1990. The repeatedly deferred commencement of building then was put off to March, the scheduled date of completion would have been autumn 1990. Commencement of building was postponed several more times for various reasons. Then, in the middle of June of this year a provisional freeze was put on the project - on account of a drastic lack of funds. It would take us too far to disclose the real reasons for this measure, however.

As the facilities - not adapted for our purposes, however, - are at our disposal, we are trying hard to enable commencement of provisional studying work in the winter term of 1990/91. We do not think that this will put the required alteration work into cold storage. At present we are also struggling to find financial funds for the laboratory equipment and have already partly succeeded in finding outside sponsors for such things as e.g. the lighting fixtures.

In order to improve financial capabilities of specific units and in order to make for more efficiency in operational management, the full-scale laboratory is to be furnished with an adequate organizational chart. The application for registration as an autonomous institute department is presently being examined and probably will be accepted soon. As for the use of this laboratory, accessibility for all other institutes of the faculty is going to be granted; the disciplinary relationship to the Institut für Raumgestaltung, however, surely cannot be questioned.



1. Former library rooms



2. Former library rooms

### 3. Technical Resources

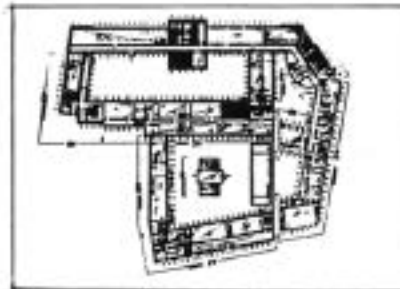
The main building of the Technical University of Vienna (picture 3) was built in the years 1816 to 1818 and several storeys have been added to it since those days. On the left hand side of picture 4 you can see our rooms overlooking the interior courtyard.

Picture 6 shows the ground plan of the ground floor. A new main entrance will be made facing the interior courtyard. Through this entrance you will immediately reach the working and conference area. The experimental area - on the ground floor open to the vault - is surrounded by the working gallery. Both from this gallery and from the working area one can observe what is going on in the experimental area. A spiral stair takes you down to the cellar.

The present entrance at the staircase on the ground floor will be turned into the side entrance. There are also plans to exchange the closed steel door by a glass door, then one could watch the on-going activities in the full-scale laboratory while waiting for the elevator.

On the left bottom of the longitudinal section (picture 5) you can see the experimental floor consisting of adjustable girders and floor units making for alterations of the floor area in any desired manner (e.g.: a raised platform). This floor can be easily subjected to changes by attaching the individual girders at various heights to the brackets, thus allowing for changes of level every 10 cms. Between the girders there are 60 x 60 bonded wood construction units, which are easy to work with. But again, not the complete floor-modulation-device has to be put to use, a combined implementation with lift slabs would also be feasible. The panelling of side walls consists of the same wood plates as the floor, so that screwing, nailing etc. can be done without problems - like on a stage floor at the theater.

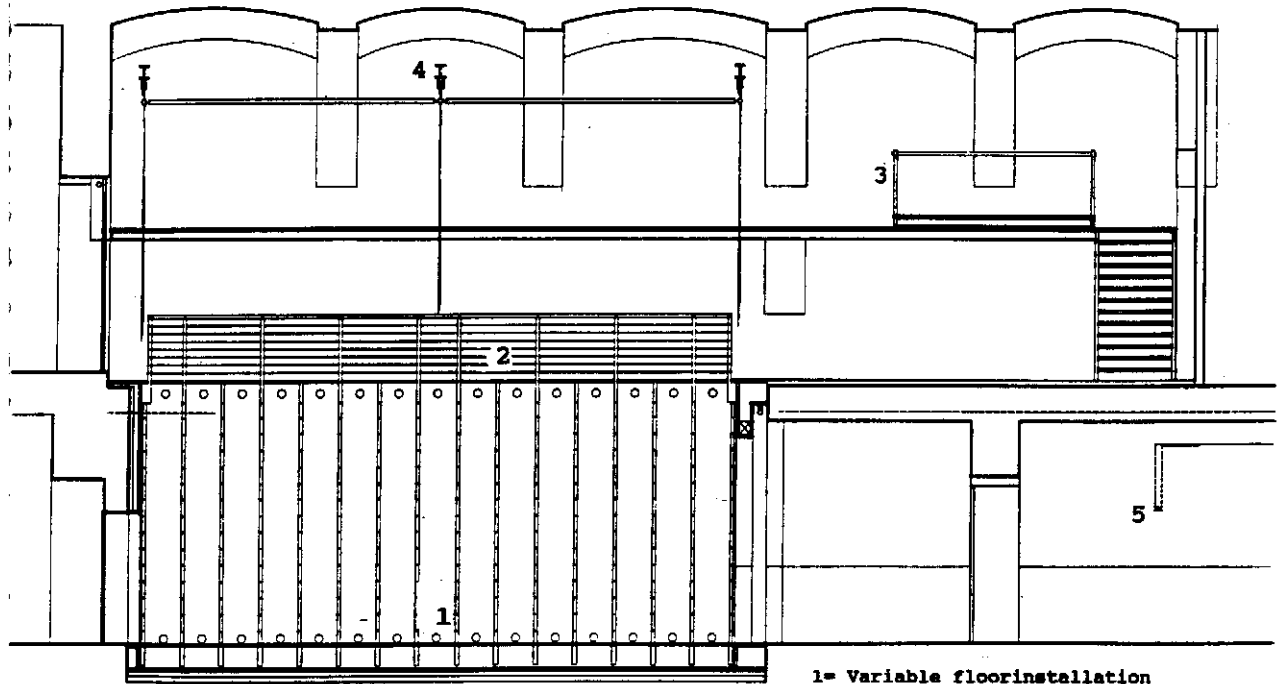
At the half height of the room the (removable) banister of the working gallery becomes visible. Further upwards the installation of an adjustable



3. Main building of the University with the location of the Full-Scale Laboratory

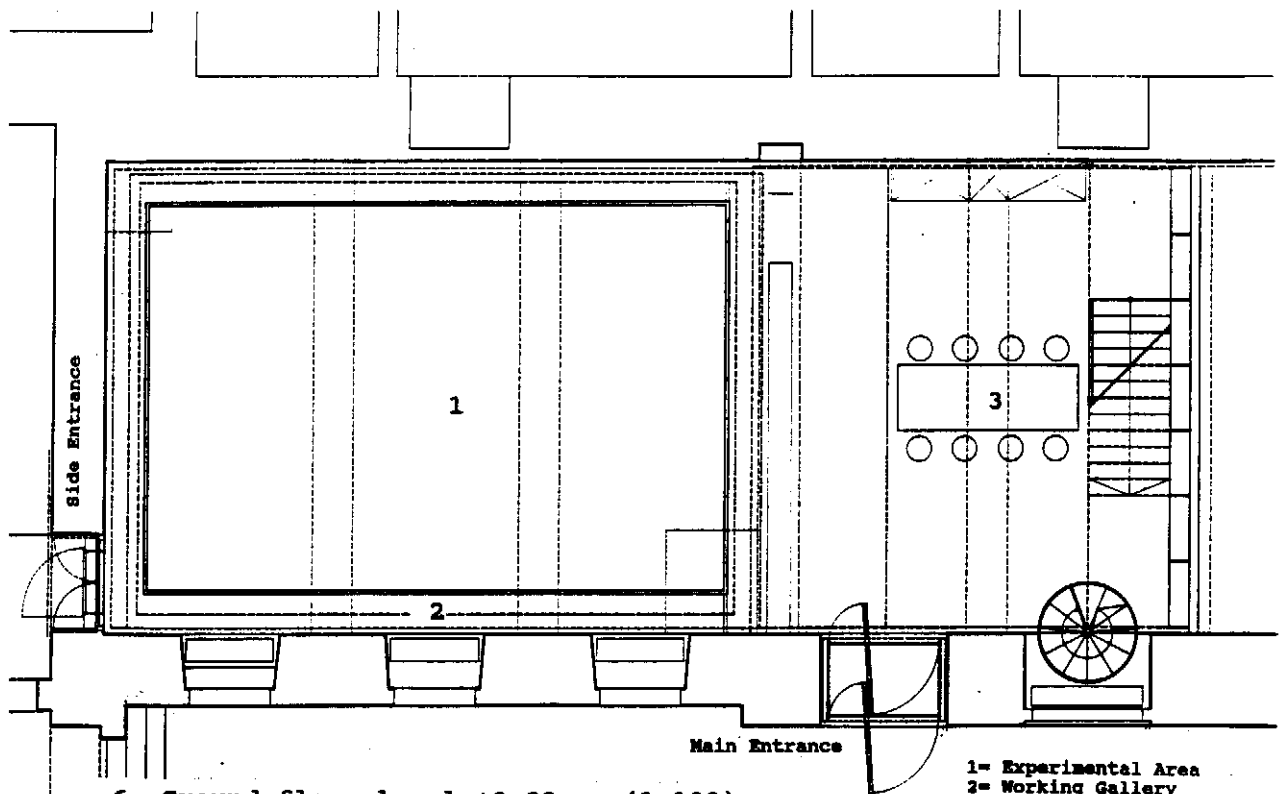


4. Interior courtyard of the main building



5. Longitudinal section (scale 1:100)

- 1= Variable floor installation
- 2= Working Gallery
- 3= Movable Stage
- 4= Lighting installation
- 5= Area for endoscopic simulation



6. Ground floor level +0,23 m. (1:100)

- 1= Experimental Area
- 2= Working Gallery
- 3= Working area

assembly ceiling could be provided (picture 8).

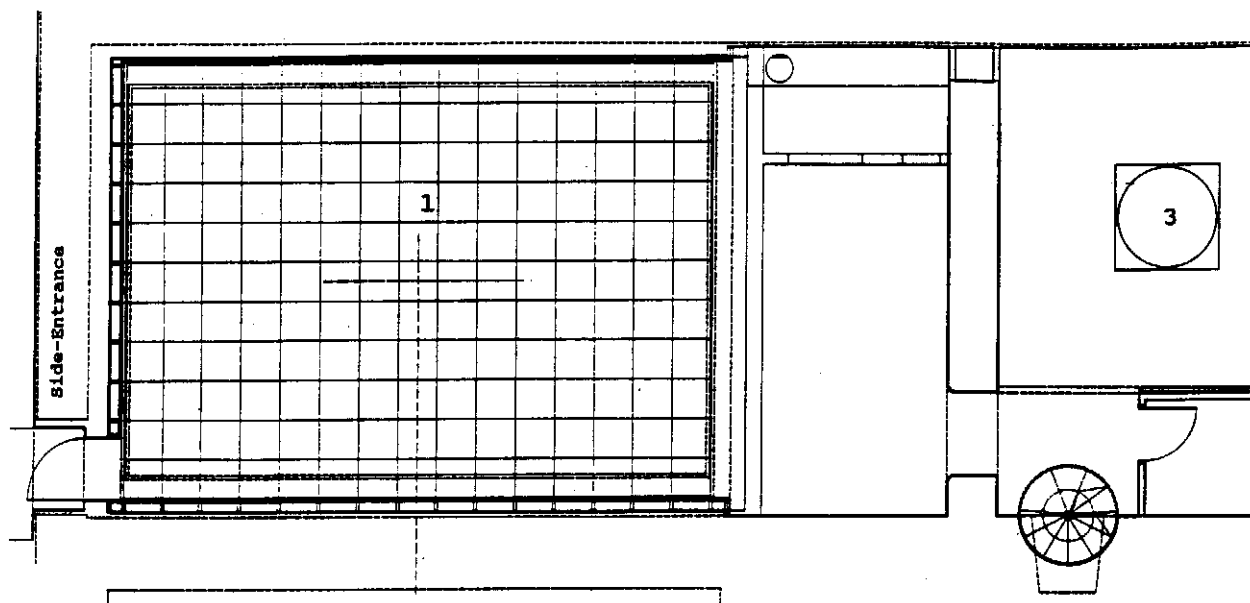
On three steel girders lined up behind each other three joints of a rod system can be adjusted according to height by means of tackle lines. This could be used for example to simulate a shed roof by attaching light-weight slabs or other materials to the rods. If this adjustable ceiling will be considered in the first building period is still under discussion at present.

In the cross section (picture 9) the inner courtyard is located on the right. The movable working platform has not only been designed for mere observation. It is supposed to be used for experimental work, too, for instance, to suspend or position light-weight building members as well as for the operation of lighting fixtures. Where the working platform is normally 'parked' it could provide additional useful working space as well.

Raumgestaltung as such should principally be demonstrated in the structures of the full-scale laboratory and also should allow for an experimental character. This will be expressed both in the construction method and in the material choice. Therefore, the floor members of the stage (made of steel) are to be made of laminated glass.

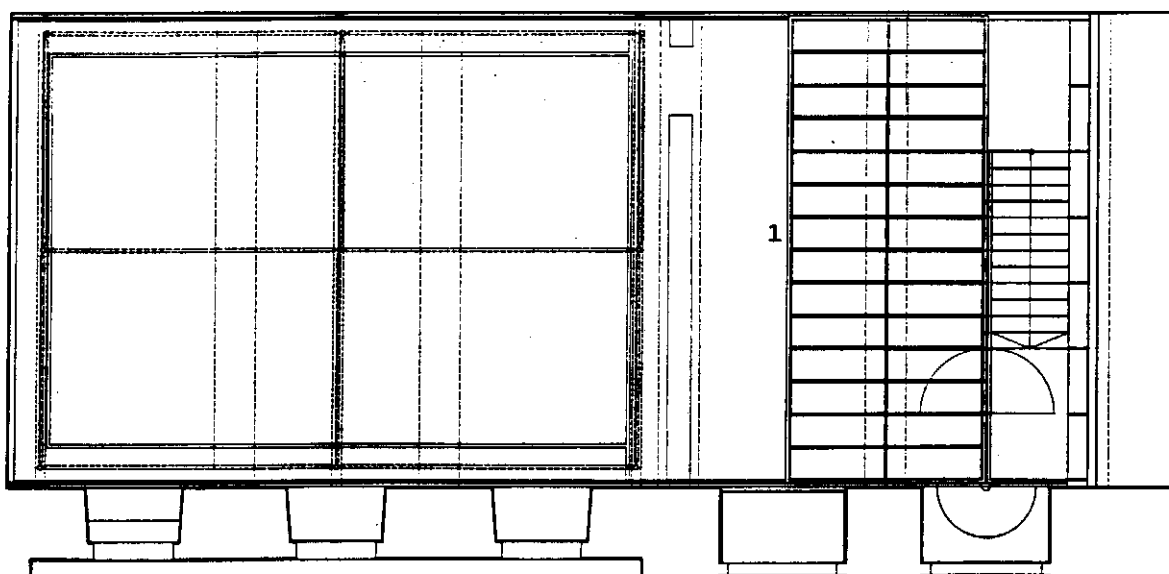
The rather dim daylight results from the building structure. As far as lighting is concerned artificial lighting will have to be relied upon heavily and experimenting with varied sources of artificial lighting will be required. If daylight plays a decisive role in certain experiments, then an open-air arrangement in the adjacent courtyard can be provided. Moreover, nowadays simulation of daylight by means of artificial lighting has become possible, too.

In the course of the large-scale expansion of the Technical University of Vienna at the so-called 'Aspanggründen' there also were plans for an own building for the full-scale laboratory which would have meant that the problem of daylight would have had to been coped with.



7. Cellar level -4,37 m. (1:100)

- 1= Experimental Area
- 2= Side gallery
- 3= Area for endoscopic simulation



8. Upper floor level  
+2,75 m. (1:100)

- 1= Movable Stage

At the staircase on the cellar level there is an entrance connecting directly to the experimental area. The grid on the picture shows the already described 60 x 60 wood units. On the right of the picture 7 you can see the area for endoscopic simulation.

#### 4. Operation and Possibilities for Use

Simulation of architectural space in life-size is not treated isolated by us, but in connection with various simulation techniques, e.g. endoscopic simulation.

Integration into this discipline will mainly be achieved by means of the specific study course "Simulation Aided Design - S.A.D.", also dealing with computer graphics and animation, stereoscopy and holography as simulation techniques.

The full-scale laboratory could - depending on the organizational possibilities - lend itself well to design practice, as threedimensional simulation techniques would considerably add to the expressiveness and would also greatly stimulate experimenting and trying.

In our opinion a full-scale laboratory should be considered as a kind of theater stage. Therefore materials that can be easily operated with will be used, such as wood and cardboard. This could actually be regarded as "low-cost-simulation", as extravagant training and high material costs could surely be avoided. Thus very realistic surfaces could be temporarily or permanently attached without any problems. Apart from the visual effect e.g. also the acoustic behaviour plays an important role. The complete range of three-dimensional effects will not always be able to be achieved under the given circumstances.

At some full-scale laboratories the demonstration and examining of spacial dimensions is regarded to be of utmost importance. Though these things are important, we hold the view that they should not be considered isolated from the next step dealing with the representation of light, color and material effects.

Which spacial experiments can be performed at the full-scale laboratory at the Technical University of Vienna?

Right in the beginning we pointed out that the experimental area is limited with its 6 x 9 meters. This means that simulations of complete ground plans of e.g. apartments can hardly be executed, but significant parts, such as the living room or the entrance area can be treated individually.

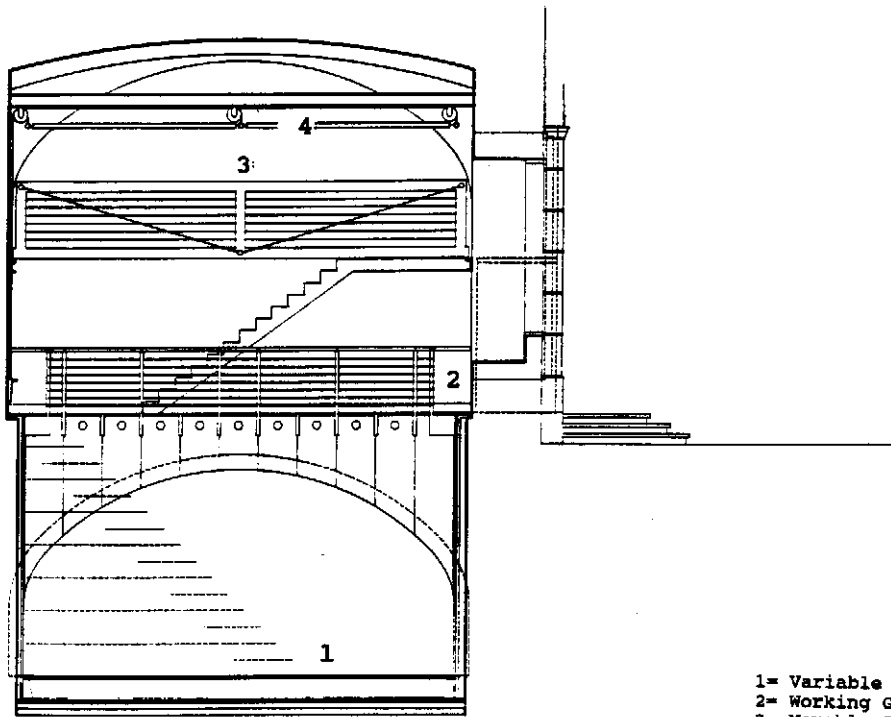
We made the experience that some functional and stylistic failures often occur when practicing architectural design. Spacial demonstrations would lead to a more realistic confrontation which in turn could contribute to considerable improvements. A spacial situation could be compared 'before' and 'after' and be evaluated. Two versions of a hotel room, for example, could be built next to each other for comparison.

Furthermore, "optical illusions" make up a substantial field for experimentation at a full-scale laboratory. Therefore we want to rebuild some of the "distorted rooms" known from literature. These rooms are based on the principle of the strong impact the right angle has in our world, so that a distorted room is perceived as a rectangular room.

A competition is going to be held for students at our institute in this coming term. Following an inquiry of a company which produces electric and electronical equipment this competition dealing with the erection of an exhibition stand came into being. Our objective is to carry out experiments in life-size with the prototypes at the temporarily adapted full-scale laboratory. As far as this project is concerned it will be very important to be using the materials also used in practice.

Hoping this report will prove useful to you with regard to an exchange of experience we are looking forward to acquainting you with our future work experience one of these days - when the ever-so-wanted full-scale laboratory is in full operation.





9. Cross section (scale 1:100)

- 1= Variable Floorinstallation
- 2= Working Gallery
- 3= Movable Stage
- 4= Lighting installation