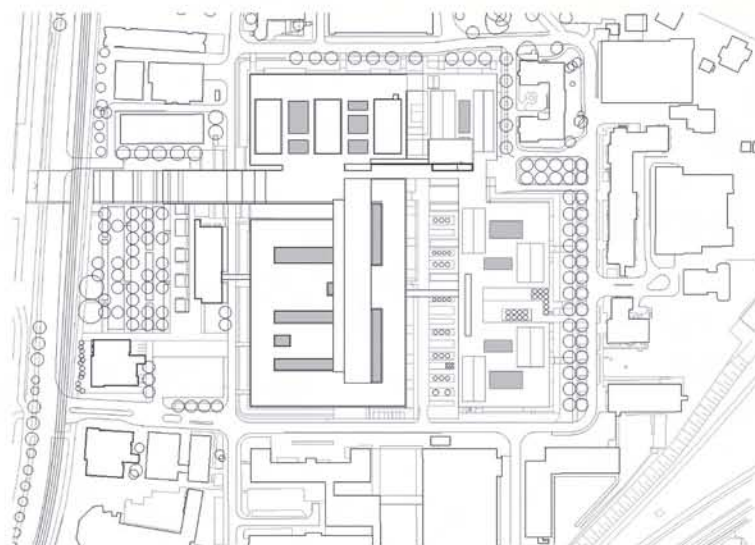


HEALING ARCHITECTURE IN EXISTING BUILDINGS— GOETHE UNIVERSITY HOSPITAL, FRANKFURT

治愈建筑改造 ——法兰克福大学医院

撰文 Nickl & Partner Architekten



总平面图

如今在医疗建筑行业领域，那些能够提升医护人员工作环境满意度，增进病人或访客幸福感的优秀建筑设计越来越多了。医院业主及管理者们也意识到，一个以病人感受为导向的、对员工友善的环境是治愈建筑的基本要素，这对医院的经营与效益都有所助益。因此，医院建筑设计可以视作各种社会元素交汇的舞台，包括社会、文化、政治、医药、空间、结构以及经济收益、商业运营。

然而，我们所面临的挑战是如何将治愈建筑付诸实现。当我们提到“实践运用”，一般是指在已有建筑上的运用。在世界上许多国家的医疗建筑项目中，新建建筑的比例非常有限，大部分是扩建、改造、转化或整修。同时，我们也意识到必须将治愈建筑概念与现有的医疗建筑相结合，这些建筑多为20世纪50~70年代所建，这段时期是战后德国医疗建筑大兴建的时期。

这些早期医疗建筑在过去并没有得到很好的维护。由于负责规划与投资支持的政府有关部门和医院自身经营者的财务状况等因素，产生许多不协调且缺乏规划的扩建，从而导致医院建筑杂乱无章。这使得日后还在考虑中的可持续医院建筑结构及技术改造变得难上加难。要完成这项艰巨的任务必须着眼于长期的战略规划，这需要业主和建造方的同时参与和支持。

20世纪50~70年代的医院设施建造受到激进的功能主义意识形态的主导，结构工程和医学技术的革新使医院建筑朝紧凑、高层的方向发展。尽管遭到第二次世界大战的中断，现代主义的自由风格仍在基本的几何组合形式上产生新的突破。医院的规模伴随许多昂贵医疗器械的投入而成倍增长。典型的20世纪60年代的医院是这个

The realization that a well-designed building can improve staff satisfaction and increases the well-being of patients and visitors has become widespread in hospital construction. Fortunately, operators and owners have also realized that a patient-oriented and staff-friendly environment, summarized in the expression Healing Architecture, benefits the enterprise in business and economic terms. The design of a hospital can, therefore, be regarded as an interface where a wide range of issues intersect: socio-cultural, political, medical, structural-spatial and, not least, economic and business aspects.

However, the challenge that we face is the question of how Healing Architecture can be implemented in practice and, when one says "in practice", that often means existing buildings. In many countries around the world, only a limited percentage of all healthcare construction projects consist of new buildings. The majority involve expansion, modernization, conversion or renovation. We find ourselves compelled to integrate our current concept of Healing Architecture into an inventory that is primarily characterized by buildings from the 1950s to 1970s; a period in which a hospital building boom took place in post-war Germany.

This legacy was not always carefully maintained in the past. Uncoordinated expansion projects and aimless patchwork planning depending on the financial situation of the operator and authorities responsible for planning and investment support led to literal trashing of hospital sites. This makes further sustainable structural and technical development of the buildings in question more difficult. It is a task that can only be resolved on the basis of long-term strategic planning with the participation of all stakeholders from both the operational and construction sides.

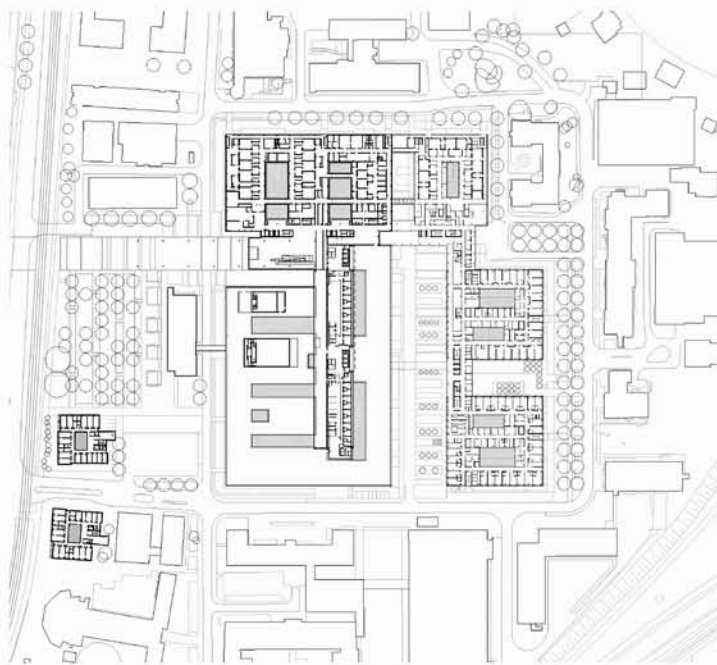
The hospital facilities of the 1950s to 1970s arose from the ideology of a radical functionalism. Structural engineering and medical technology innovations made development of the hospital into a compact, upward reaching building possible. The stylistic freedom of modernism, interrupted by the Second World War, broke new ground in compositions of basic



入口大厅



首层平面图



三层平面图

时期的主流建筑形式，大都是在较宽的建筑底座裙房上竖立高层病房楼，被形象地称作“麦芬蛋糕上的火柴盒”。

如果你听过1946年英国卫生部长说的话，或许就能够理解导致这种建筑模式的原因。他说“宁愿在高效的、利他主义的大医院存活，也不要再在充满同情心的小医院死去”。当时，大规模、高效率的环境与人道低效的环境形成了鲜明对照，并得到肯定的评价。人们依赖着医学、科技和功能主义的巨大力量，但社会心理学方面却被忽视了。周围环境的重要性、建筑配套的绿化景观、自然日照对于病人和医护人员的影响等都受到质疑。如今，我们可利用的神经学中关于环境对人类感知影响的研究越来越多——空间会影响人们的幸福感，以前这仅仅是猜测，现在则有了科学依据。

因此，关怀个人利益的当代社会不愿意将人类福祉仅仅依靠于医疗护理技术。自从建筑师与医生们意识到环境心理学的影响和作用，就将医院的规模、效率与温暖的治愈环境相互结合成为双方的共同目标，并力图证明这种结合将有助于治愈，这也是循证设计的目标。

法兰克福大学医院改造项目竞赛开始的时候正值世纪之交，两代人不同的社会文化背景导致的观点差异是我们在设计竞赛中所要面对的难题。该大学医院的中心大楼是一栋典型的“麦芬蛋糕上的火柴盒”式建筑。这栋建于1970年前后的大楼当时作为校园新增的中心大楼以塔楼的形式坐落于Theodor Stern码头。医院的护理及治疗区域安置在大楼宽大的底座中，病房则安排在高层部分。到了20世纪90年代，尽管大学校园坐落于景色宜人的美因河畔，医院也有着一流的医疗水平，但依然阻止不了日趋退化的结构形式及其对建筑美感的破坏。原有的大楼已经无法满足现代医疗器械与建筑标准。现代的医疗程序需要新的部门及功能合并，因而需要对原有建筑进行改造与扩建。于是，在把医院转化成公共法律机构的同时，一场关于旧楼改建的设计竞赛就此展开。改建的主要任务之一是通过适当的医院建筑形象来传达法兰克福大学医院在整个社区中的医疗作用。

geometric forms. The size of hospitals grew in parallel to the installation of expensive medical technology equipment. The dominant type of this period, the ideal 1960s hospital, was the “matchbox on a muffin” model that arranged nursing wards in a high-rise slab above a wider plinth building.

The attitude that gave rise to these buildings may become comprehensible if one looks more closely at the words of the then British minister of health in 1946. He “would rather be kept alive in the efficient altruism of a large hospital than die in a smaller hospital’s outpouring of warm sympathy.” Here, size and efficiency are diametrically contrasted with a humane, but inefficient, environment and evaluated positively. People counted on the power of medicine, technology and functionalism. However, psychosocial aspects were neglected. The importance of the surrounding space, integration of green areas into building complexes and the impact of daylight on patients and staff were questioned. Today we can fall back on the increasingly detailed findings of neurosciences about human perception of surrounding space. Spatial impact on well-being, which could previously only be guessed at, now appears to have a scientific basis.

Consequently, our individualistic society declines to make human well-being dependent solely upon proper medical care. Since the findings of environmental psychology entered the thinking of architects and doctors, there has been an attempt to link size and efficiency with a healing environment – and prove this symbiosis to be health-promoting, which is the objective of evidence-based design.

We were faced with this disparity, which arose from the different socio-cultural viewpoints of two different generations, at the beginning of the competition for the university hospital in Frankfurt at the turn of the century. The university hospital’s central building is a classic representative of this “matchbox on a muffin” type. It was built about 1970 as an addition and new centre for the campus, which was originally erected on the Theodor Stern Quay in pavilion style, and contained wards in a high rise slab that sits on a broad care and treatment plinth. The campus lies in a prominent position on the banks of river Main, which could not prevent the hospital experiencing a loss of image at the end of the 1990s due to structural aging and inefficiency, despite top medical performance. The existing building no longer met modern requirements for medical technology equipment and structural standards. Changed work procedures required new departments, the merger of functions and, thus, renovation and building extensions. Consequently, parallel to the transformation of the hospital into a public law institution, a competition for the re-organisation and revitalisation of the building inventory was announced, a major component of which was the task of communicating the university hospital’s reputation for medical performance to the community through an appropriate corporate identity.



外部庭院

我们于2001年赢得这个竞赛，方案获胜的关键是在整体建筑设计概念中考虑了两个简单的基本元素：采光与朝向。我们为46ha的校园设计了新的大楼结构，并且建立了长远的规划目标。改造方案将摒除原有建筑不合理的结构划分，整改医院运营上的不便之处，将原本散乱的各个部门整合集中。

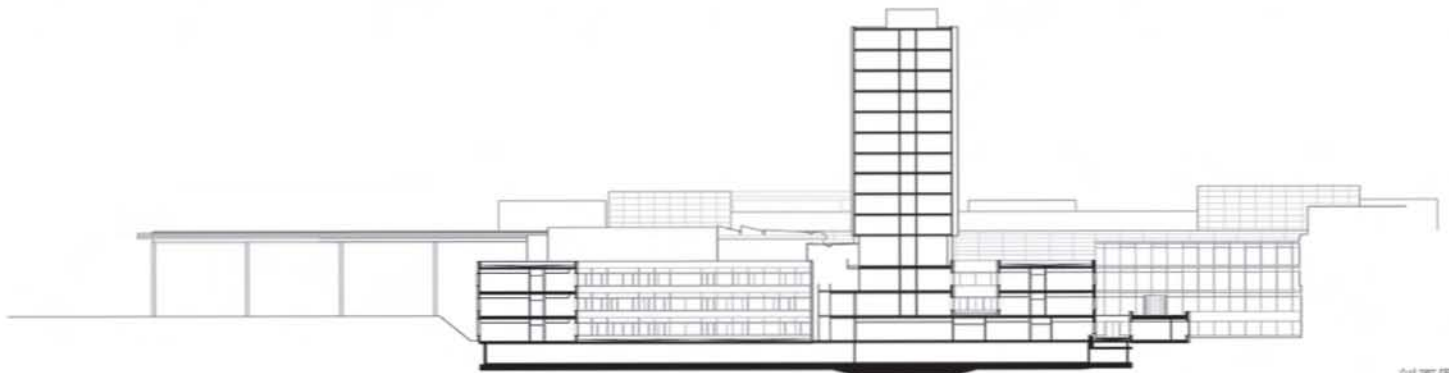
在我们的现代化改造方案中，主要设计思路是不去改变这栋校园中心大楼原有的简单几何造型，保持原有建筑的形式语言。我们在屋顶和表皮增添了支点和天蓬，这些新增的元素将校园打造成为一片城市公共区域，面向美因河畔开放。深深外悬的天蓬作为主要走廊的延伸，犹如张开的臂膀欢迎着前来的病人、访客、员工和学生。

室外新建的设施也是该城市改造项目的一部分，将医院与旁边的公共河岸区域连结起来。项目的新焦点被设计建立：在东南角，

We won this competition in 2001 by adding two very simple but fundamental components to the overall concept: light and orientation. Clear structures were created for the 46-hectare campus and long-term perspectives for future development were established. The reorganization would eliminate operational and structural shortcomings and centralize scattered departments.

In doing so, our main overall concept for the campus' central building did not question the architectural stylistic device – the simple geometric forms – of the modern movement. In fact, this formal language was continued. We added point and canopy to slab and surface and these are now the elements that form the campus and organize it as an urban space open to the banks of the Main. The deep overhanging canopy as an extension of the overall organizing main corridor is the grand welcoming gesture that invites patients, visitors, staff and students to enter.

The outside facilities are part of this urban development intention to fully network the hospital grounds and public riverbank zone. New focal points



剖面图



接待厅

为病患新建了一个宽敞的花园；同时在西北角，构思并设计了一个广阔的前院作为公共空间。生机勃勃的草木、座椅与小径、阳光与绿荫，还有睡莲绽放的池塘为病人及访客们打造了一片多姿多彩的休闲空间。

设计方案中试图将中心医院大楼融入公共城市空间的想法也在巨大的入口大厅设计中得以延续体现。入口大厅令患者与医护人员感受到，他们所处的这个地方将会认真处理他们的诉求，他们步入的这个地方是从事医疗护理这种重要社会活动的场地。20世纪70年代装饰简朴、令人压抑的医院入口被这个宽敞的、通风的、明亮的崭新大厅所取代。

我们还为原有建筑的底座部分引入了采光。通过分析发现，原有的建筑建立在一张7.2m的平面网格上，这种形式在如今的建筑中也常被采用，十分适合进行改造和扩建。这种20世纪70年代的可持续设计也是我们决定在原有建筑上进行改造和扩建，而不是推倒新建的一大主要原因。医院内主要的交通区域和主要走廊（一条采光充沛的东西向的通往中心入口大厅的轴线）相互垂直，形成了整个底座区域的交通“脊柱”。人们从这里可以通往医院内的各个方向，步行在走廊上可以看到庭院里的绿树青草。从“脊柱”走廊延伸而出，通往各个科室的主要通道形成了中心大楼的“腰椎”。事实证明，一组条理清晰、层次分明的交通网络会使得建筑的内部定位简单而明确，并且把紧凑的大楼底座空间分割成符合人体尺度的功能空间。新的主要走廊及其新外观恢复了底座区域作为中心大堂的功能，连接了病房、入口大厅和教学区域。

are established by a spacious patient garden in the southeast of the ensemble and, in the northwest, an expansive forecourt that is conceived and designed as public space. Green areas, seating and pathways, sunny and shady places and areas of water with lily pads offer varied leisure activities and uses for patients and visitors.

The idea of integrating the central hospital building more strongly into the public-urban space is continued in the design of the generously dimensioned entrance hall. The hall tells patients and staff that they are in a place that takes their concerns seriously and that they are entering a significant space for an important socio-cultural event—healthcare. The austere and often quite literally spatially depressing objectivity of the 1970s entrance was replaced by this broad, airy, transparent hall.

We also brought light into the plinth building of the existing structure. Analysis found that the existing structure, based on a 7.2-metre grid that is still common today, was very suitable for conversion and expansion – a truly sustainable 1970s design decision, and one reason to decide upon expansion and renovation rather than completely new construction. Primary circulation is set at right angles to the main corridor and forms the backbone of the entire plinth, a light-filled east-west axis that opens into the central entrance hall, ensuring access to the entire hospital complex. It provides recurring views into the greenery of the courtyards. Extending from the ‘backbone’ corridor, the primary circulation areas of individual departments form the central building’s ‘vertebrae’. The result is a clear, hierarchical circulation that makes orientation in the building easy and straightforward and divides the compact volume of the plinth into human dimensions. The new main corridor and its new look restore the central role of the plinth as a hub between wards, entrance hall and teaching areas and thus the starting point for patients, staff, teachers and students.

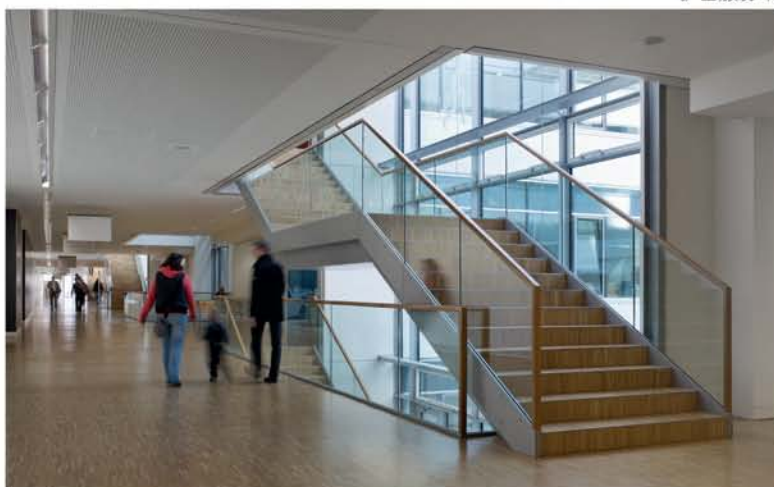
The organizational structure and the existing building’s 7.2-metre grid are also continued in a four-storey expansion to the east, the East Wing. It accommodates all of the surgical clinics, the new university hospital



疏散楼梯



护士服务站



交通空间

在项目的扩建部分中，位于东面的4层的东翼楼沿用了这种组织架构和原有建筑7.2m平面网格。东翼楼容纳了所有的外科门诊部、新的大学医院手术中心，其中包含16间手术室、拥有153张床位的重病特别护理病房。在这栋楼中，小型的门诊部被设计成阁楼的形式。门诊部之间由封闭的玻璃走廊连接，这些走廊穿过绿化区域。采光充沛的公共区域非但没有破坏人体尺度，反而不停地为人们创造了很多的私密空间。直升飞机起降场在直接通过下层楼层的升降梯与手术中心相连。

医院入口处的巨大天蓬同时笼罩了新（东翼楼）旧（底座层）建筑，在此通往各个楼层的流线显得清晰而明确。择期自行前来的病人可以通过地下室的楼梯抵达挂号处，紧急情况的病人则从另一个入口进入，而访客则可以通过一个轻缓的斜坡来到一楼。这里还配有各种服务与通讯设施，使学生生活与医院手术相交融。这里既是人们通往高层病房的起点，也是通往病患花园的起点。

作为一所大学医院，教学、科研和临床操作是其主要功能。因此，新校园应为科研人员和学生提供一种特别的功能与环境。两栋科研实验楼、一栋阶梯教室楼以及目前在建的Medicum大楼，都被加入到校园的改建设计中。这些独立的大楼通过巨大天蓬的连接，在视觉及功能上都与医院相互关联。这些建筑傲然矗立于美国河畔，与金融商业区隔岸相对，建立起一个科学与教学的世界。

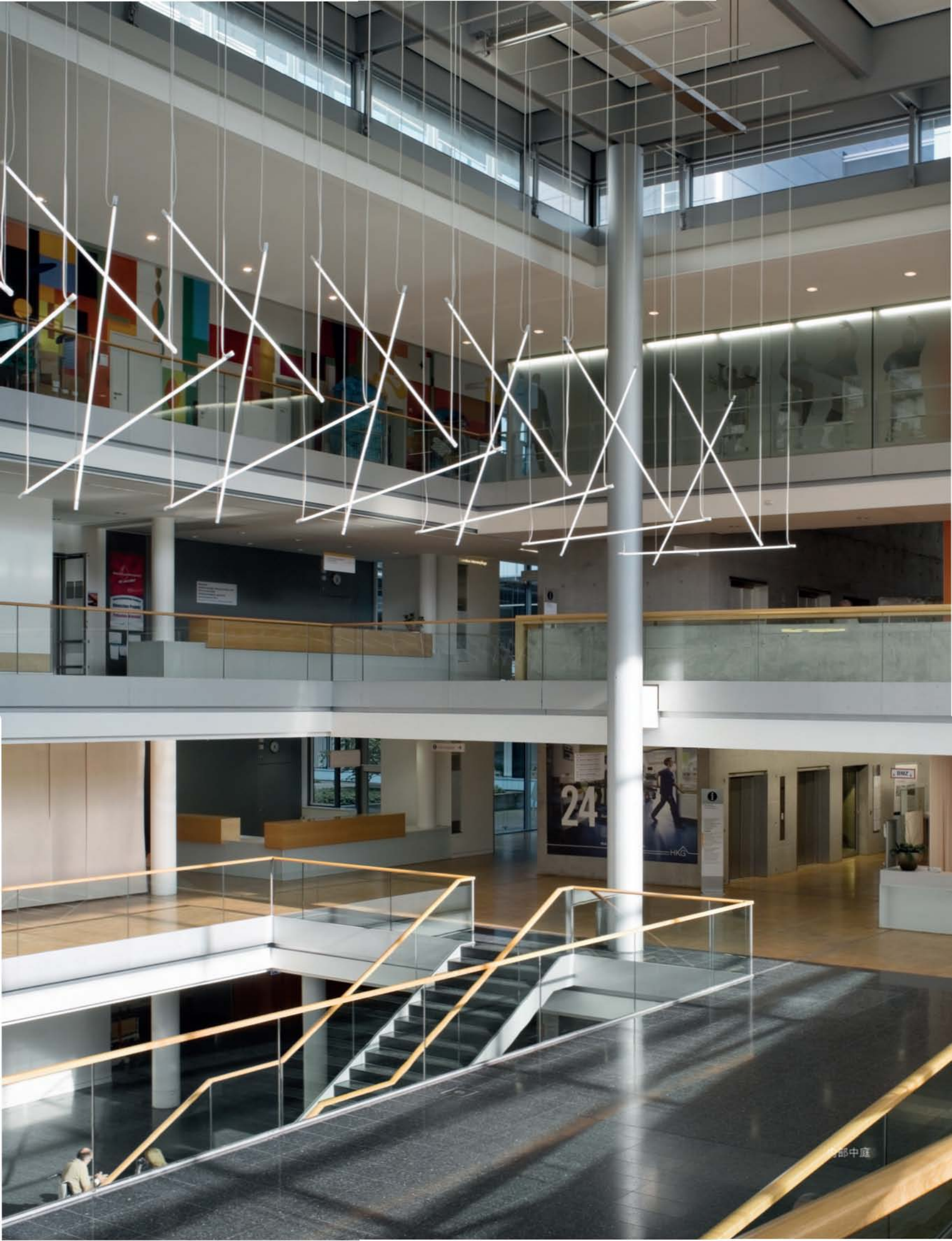
该项目的一大重要任务是通过新当代风格的建筑形象将法兰克福大学医院的盛名再次远播。因此，建筑改造要在建造及结构方面都要达到一定的水平。对一些承重结构的加固，将原建筑中的有害

operations centre with 16 operating theatres and the intensive care ward with a total of 153 beds. In this building, the small clinics are arranged pavilion-style. They are connected by glass-enclosed passages and interspersed with green areas. Light filled public areas result that nevertheless do not destroy the human dimensions, instead repeatedly offering opportunities for privacy. A helicopter pad is connected directly to the operation centre on the lower floors by lifts.

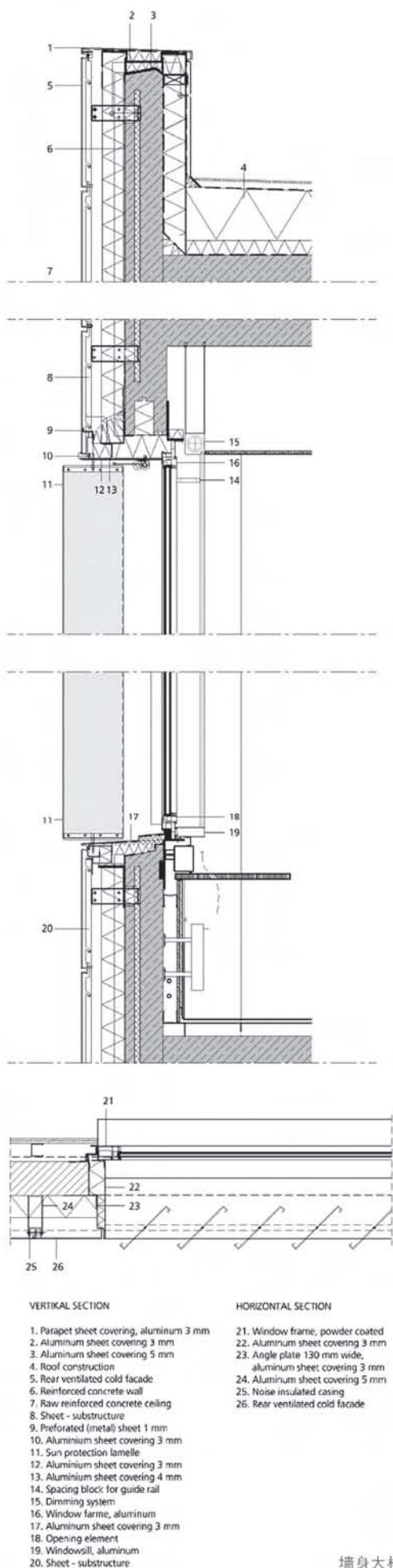
The entrance zone with its all-embracing canopy stretches between the old (plinth level) and new (east wing) buildings. The movement of people in the hospital through the various levels of the building complex becomes clear here. The elective patient takes a staircase to reach registration in the basement while emergency patients are admitted at a separate entrance. The visitor reaches the first floor via a gently sloping ramp. All of the service and communication facilities are here. This is where student life meets hospital operation. In expansive surroundings, the connection to patient rooms in the high-rise slab begins here. This is also where the building opens onto the patients' garden.

A university hospital naturally lives by linking teaching, research and clinic operations. Therefore, a special role on the new campus should also be assigned to researchers and students. Two research and laboratory buildings, a lecture theatre building and a future Medicum, currently under construction, were added to the campus composition as freestanding buildings, functionally and visually connected to the hospital by the organising element of the canopy. They stand confidently at the edge of the river, placing the world of science and teaching across from the world of banking and business on the opposite bank.

An essential component of the project was the task of making Frankfurt University Hospital's reputation visible to the outside world once more by means of a new, contemporary façade design. And, of course, the old buildings had to be brought up to the state of the art in terms of construction and structural engineering. Some reinforcement of the load-bearing structure



中庭



物质（如石棉等）移除都是必需的。从设计的角度考虑，我们希望为大楼底座设计一组风格统一的不连续的建筑外观，与高层病房楼上闪闪发光的白色平板相互呼应。

20世纪70年代的设计中，病房楼层的扶手区域是封闭式的，对应的典型外立面由三段式的露骨料预制组件组成。这种外墙因含有有害物质而不得不被拆除，并且另外安装了15cm厚的保温材料，再覆以不透风的白色铝板。铝板的狭长形状强调了原有外立面的水平布局。在高层病房大楼的南面，成排的阳台将白色外立面分解成两块区域。安装在条状窗户前的闪着微微光芒的金色薄板在这两块区域的中间增添了一笔浓重的色彩。同时，这些薄板也起到为走廊遮阳的作用。

大楼底座区域的原有外墙也做了同样的处理，并被覆以66cm×375cm的不透风金属板。金属板被漆成烟灰色，以与高层病房大楼的白色形成对比。条状窗户外安装了垂直的可旋转的铝制薄板，并与扶手区的外立面齐平。这些铝制薄板均可电动调节，既保护了病房的隐私，又有效遮挡了刺眼的日照。

所有的改造方案都在最大化节能的原则上实施操作，也正因为如此，最后的实际节能成果比德国联邦节能条例（EnEv 2014）上的技术参数还要高。

项目中最为重要的一个设计目标是将自然采光尽可能地引入大楼，这在实际设计中得到了严格的落实，任何有助于采光的可能性都被考虑其中。楼梯、走廊尾端及特别功能区域（如大厅、会议室）都采用了铝框的落地式的半透明上釉玻璃。在作为建筑重要区域的绿色内部庭院的采光设计中也十分注重环境的明亮度和舒适度，最终都采用了白色釉面玻璃和大量窗户。

改造后的法兰克福大学医院的环境让工作人员和病患都感到温馨和友善。项目将新与旧、城市生活与医疗护理都在面向未来的设计中相互结合，为后代的新想法与新意识形态留下可以继续改造和完善的空间。整个改造项目为法兰克福大学医院带来了附加值，不仅增添了视觉上的美感，而且也提升了校园运营者、病人以及医护人员的满意度。（译/严佳钰，校/张洁）

was necessary as was removal of harmful substances, such as asbestos. In design terms, a uniform, discrete appearance was sought for the plinth building with the gleaming white slab of the ward building rising above it.

In the 1970s the balustrade area of the ward building was enclosed with a typical strip façade consisting of three-part, exposed-aggregate precast components. This façade had to be cleared of harmful substances and, following installation of an additional 15 centimetres of insulation, clad in rear-ventilated white aluminium panels. Their elongated, narrow shape emphasizes the horizontality of the original façade layout. On the south side of the ward slab the white skin is interrupted by two large areas where the façade breaks down into rows of balconies in front of the patient rooms. The golden, shimmering sliding lamella elements in front of the strip windows create a coloured accent between these two areas. They provide sun protection in the corridor areas.

The existing façades in the plinth area were treated in a similar manner. They also received a rear-ventilated cladding of 66 cm x 375 cm metal panels painted in an anthracite shade that is reserved in comparison to the ward high rise. Here, vertical, rotating aluminium lamellas are installed in front of the strip windows and flush with the balustrade façade. They are motor-driven and ensure good privacy from outside and glare and sun protection inside.

All renovation measures were carried out with a view to optimizing energy consumption in the existing buildings. And it is thanks to resolute pursuit of this objective that the results are better than the specifications of the German Federal Energy Savings Ordinance (EnEv 2014).

The overriding planning goal of bringing as much light as possible into the building was rigorously implemented, making use of every possible opportunity. In stairways, corridor ends and special-use rooms such as halls, conference and meeting rooms, there is full-height glazing executed in aluminium transom and mullion framing. The green interior courtyards, important building blocks in the lighting concept, are designed to be particularly bright and friendly, with white enamelled glass and generous window spaces.

The Frankfurt University Hospital can now look forward to being evaluated as especially staff and patient friendly. It was possible to combine old and new, urban life and healthcare in a future-oriented concept that leaves room for the ideas and ideologies of future generations. The overall project was able to achieve added value for the Frankfurt University Hospital. This added value not only relates to visual quality, but also to the operational organization of the campus and greater patient and staff satisfaction.