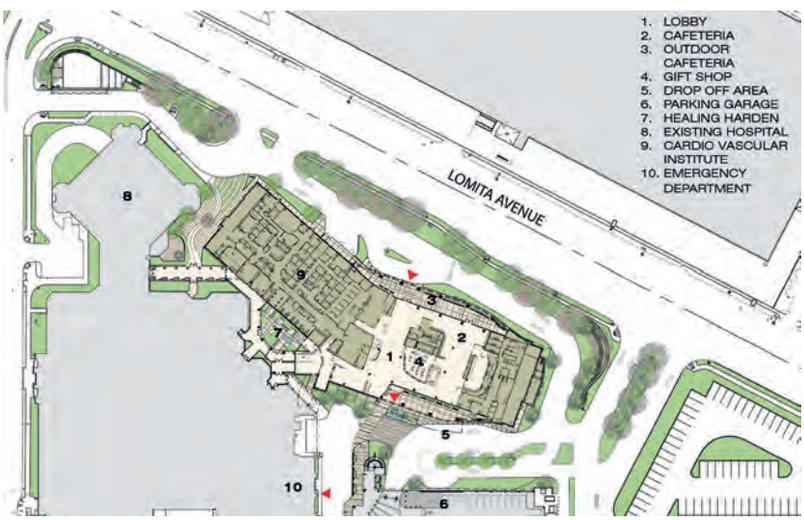
摄影：David Wakely

TORRANCE MEMORIAL MEDICAL CENTER, LUNDQUIST TOWER

托伦斯纪念医疗中心，伦德奎斯特大楼

业主：托伦斯纪念医疗中心
地点：美国，加利福尼亚，托伦斯
建筑面积：390 000平方英尺
建成时间：2014.09
建筑设计：HMC Architects
建筑设计负责人：Raymond Pan（Atelier R Design and HMC）
建筑设计团队成员：Chuck Eyberg，Jimmy Macias，Esteban Colmenares，Olivia Graf，Wilkie Chol，James Woolens，Jessica Liu，Jennifer Chiang-Lin，Isreal Pena，Max Lobo，Steve Prince
结构设计：KPFF Consulting Engineers
BIM设计：HMC Architects
摄影：David Wakely，Francisco Penaloza



首层平面图

项目背景

美国最近启动了一项“经济适用医疗法案”，这一新法案的一大基本要点是医疗补贴体系的改革。此前，对医院的经济补贴是根据诊治数量来发放的，“经济适用医疗法案”改变了原来的模式，将补贴金额建立在医院诊治的质量上。如今，美国的医院如果能够提升病患的诊疗体验，就能获得财政奖励。而且从2015财政年开始，医院在减少患者伤害方面的能力也被纳入补贴金额的评定考量。托伦斯纪念医疗中心急诊大楼——伦德奎斯特大楼即是按照新法案的多方标准进行设计的。

项目概况

低于一千万美元的预算，早于预计工期6个月竣工，这栋新建的7层390 000平方英尺的伦德奎斯特大楼全方位体现了对于21世纪医院的远见，超越一般传统医院，为病患和医护工作人员营造了一个温馨的治愈环境和犹如世界一流酒店般的舒适氛围。新建大楼拥有245间私人病房、12间手术室、44张功能性护理床、6间介入放射室、1间住院病人药房以及1间无菌处理室。作为这家医疗中心未来的门户，大楼将拥有一个可以通往整座医院园区的新入口，一个崭新的多功能大厅或者“豪华起居室”、咖啡馆、厨房、礼品店和等候区，一座治愈花园以及一条通往已有建筑的玻璃走廊。

设计灵感源自于起伏的海浪，也是托伦斯这座沿海城市的象征，伦德奎斯特大楼优雅的弧形建筑表皮定义了托伦斯纪念医疗中心的新入口，并突出了这座建筑在周边密集社区环境中的形象。金属以及玻璃表皮还能捕捉天空的微妙变换，使这栋24小时开放的大楼在一天中展现出变化的美感。

创新的整体式建筑外围护结构采用了金属板、玻璃以及薄型预制板，施工仅用了4个月，显著缩短了建筑外墙的建造时间，并大大

Project background

The newly adopted Affordable Care Act in USA transforms just about every aspect of healthcare delivery. One of the fundamental components of the law is the transformation of the reimbursement system. Instead of only paying hospitals based on the volume of care provided, the Affordable Care Act shifts the reimbursement model to one based on care quality. US Hospitals are now financially rewarded for improving the patient experience. Beginning in Fiscal Year 2015, hospitals will also be reimbursed based on their ability to reduce patient harm as a result of hospital-acquired conditions. The design of this new acute care tower tackles the effect of this new Law through its various design innovations.

Project outline

Coming in at $10 million under budget and completed six months ahead of schedule, the new seven-story, 390,000-SF Lundquist Tower for Torrance Memorial Medical Center fulfills their vision of a 21st century healing environment for patients and staff while invoking the ambience of a world-class hotel resort rather than a hospital. Lundquist Tower houses 256 private patient rooms, 12 operating rooms, 44 prep and recovery beds, 6 interventional radiology rooms, inpatient pharmacy and sterile processing. As the future gateway to the medical center, it also features a new entrance to the hospital campus; a combination new lobby or “Grand Living Room,” cafeteria, kitchen, gift shop and waiting area; and a healing garden and glass walkway that connects to the existing facility.

Drawing inspiration from the form of a wave, a reference to the coastal community of Torrance, the graceful, curved façade of Lundquist Tower defines a new gateway to Torrance Memorial Medical Center and reinforces its presence to the surrounding community with a thoughtfully articulated and scaled building mass. Lundquist Tower’s metallic and glassy skin captures the subtle changes of the sky, making the aesthetics of this 24-hour facility an evolving phenomenon throughout the day.

The innovative unitized building envelope system of metal panel, glass and thin-set precast panels drastically reduced the envelope erection time by four months and greatly increases the durability of the building’s exterior envelope. Designed as rain-screen exterior envelope system, the building’s skin incorporate the most advanced passive solar protection and rainwater

摄影：David Wakely

治愈花园

提高了建筑外墙的耐久性。大楼的外墙采用了最先进的被动太阳能保护板和雨水管理技术来设计防雨幕墙外围护体系。这座建筑是南加利福尼亚州地区最早几所采用如此先进的外围护结构体系的医院之一。

提升治愈环境

伦德奎斯特大楼代表了未来的病患护理水平，通过增加、巩固和重新配置住院病人、门诊病人、重病看护等各项设施功能来更好地为病人以及医护人员提供服务。新建大楼的功能通过精心设计的由空中桥梁和走廊组成的交通系统与已有建筑的功能完全衔接在了一起。

综合服务区（包括挂号、价目咨询以及教育）毗邻于诊断功能区（包括心电图室（EKG）、实验室和X光放射室）。分散的护理站使护士们更加接近病人，与外科看护人员和麻醉师的办公室安排在一起，以更好地帮助病人和查看病情。介入放射室和手术室则位于同一楼层的术前术后病人区域。

新建的这些手术室面积比医院原有的手术室平均要大35%，可以摆放那些最先进的仪器设施。对于诊所工作人员而言，新监护病房的设计减少了转移病患的需要。所有的病房都是单人间，并且比医院原有病房大了30%的面积，可以在病房里容纳探病家属的活动区域。112间病房提供透析设施，另外88间病房内含病人升降梯。

新建大楼拥有该地区最先进的人机混合手术室，面积几乎是传统手术室的两倍。混合手术室拥有复杂的成像系统，为使用导管的手术提供影像，符合无菌标准，并且拥有常规手术室的一切设施。它使医生在进行高风险的微创手术时，如果病人不幸发生了可怕的

management technology. The building is one of the first hospitals in the Southern California region to implement such innovative exterior envelop system.

Enhanced Healing Environment

Lundquist Tower represents the future of patient care by increasing, consolidating and reconfiguring inpatient, outpatient and acute-care functions to better serve patients and staff. The new tower's function is fully integrated with the existing facility through a network of precisely planned bridges and corridors connecting the old and new on multiple levels.

General services, including patient admission, financial counseling and education are housed alongside diagnostic departmental functions including electrocardiogram (EKG), laboratory and x-ray. Decentralized nursing stations place nurses closer to their patients, with surgery nursing staff and anesthesiologists co-located to facilitate patient and case review, Interventional radiology and perioperative services share a common prep and post-procedure patient area on the same floor.

Operating rooms are on average 35 percent larger than operating rooms in the existing hospital to accommodate the most advanced equipment. For clinical staff, patient care units are designed for fewer patient transfers. All patient rooms are private and are 30 percent largerthan in the existing hospital to accommodate a family area in the room. In-patient room dialysis is provided in 112 rooms and 88 patient rooms have built-in patient lifts.

The tower features the region's most advanced Hybrid Operating Room. Nearly double the size of a traditional operating room, it offers sophisticated imaging systems for catheter-based procedures, but also meets the sterility standards and has the equipment of a traditional operating room. This will enable providers to perform high-risk, minimally invasive procedures and switch to open surgery without moving the patient if a dire complication arises. Minimally invasive surgery is advantageous to older patients with complex health problems, who would face difficult recoveries with open surgery or are not candidates for it.

The working environment for staff is greatly optimized to reduce fatigue and increase care effectiveness. As opposed to the conventional approach of


摄影：Francisco Penaloza

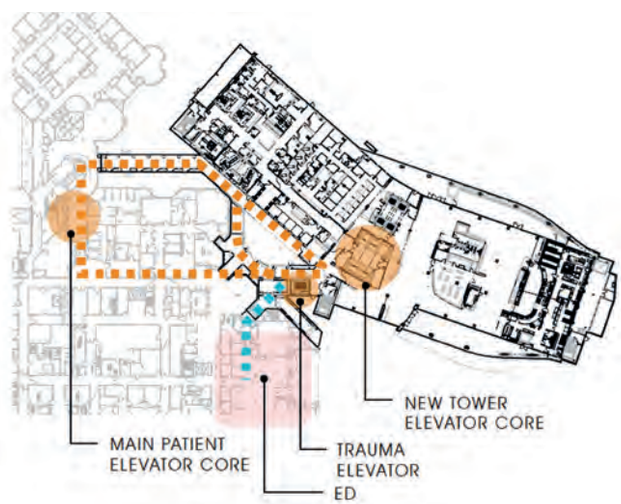
主入口

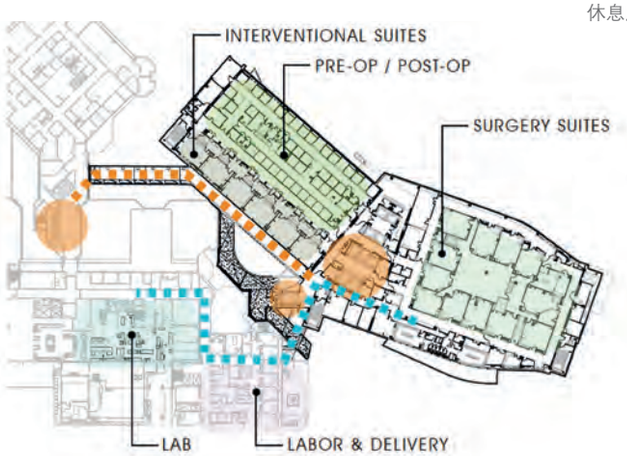
摄影：Francisco Penaloza

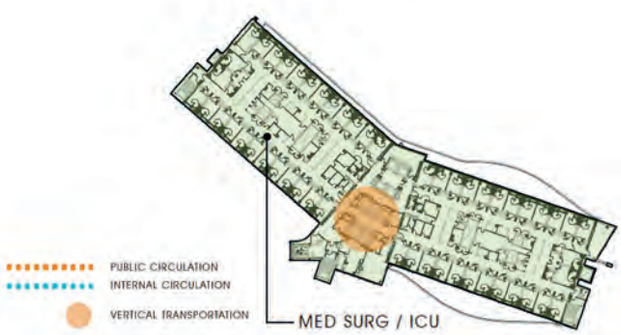
外墙细部

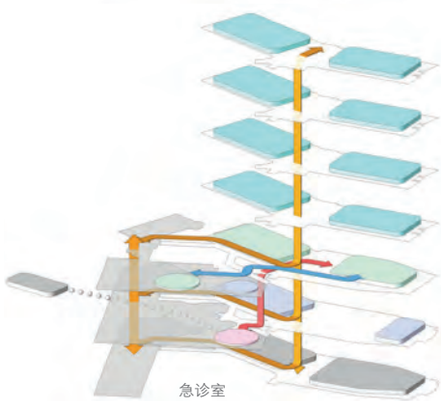
摄影：David Wakely

休息厅









各层平面及流线分析

摄影：David Wakely

病房

并发症，也无需被移动到其他地方，可以直接进行开腹手术。对于体弱多病的老年人而言，微创性外科手术更适合他们，因为他们更难从一般的开腹手术中恢复过来，甚至有些老年人根本不符合开腹手术的条件。

新的工作环境最大化地减轻了医护人员的疲惫感，并且提高了他们的工作效率。有别于传统设计中把护士休息室布置在楼层平面深处的做法，此设计将休息室布置在大楼外沿的一角，护士们在此可以享受阳光和四周景色，也有助于调节他们的生物钟。

以病患为核心的医疗看护

最重要的设计理念是以病人为核心。人情味、艺术与娱乐、信息与教育以及为医护人员创造健康的工作环境只是设计理念的一部分。这些设计理念被用于创造一个以病人及病人家属为核心的看病环境，力求打造一个个性化及人性化的信息透明的医疗过程。

室内设计采用了柔和的色彩、间接照明和弧线元素。室内设计的风格、材料、颜色与建筑外观协调一致。大楼的外立面呈棕褐色，外墙材料为薄贝壳形预制混凝土板、玻璃防雨幕墙系统与金属板。通过采用这些颜色和材料，大楼的外形令人联想起独特的Palos Verdes山石——一种带着微红色调的米黄色石灰岩。在每间病房中，病人可以透过12英尺高的落地窗将附近帕洛斯弗迪斯山和太平洋的美景尽收眼底。

表皮材料及视觉连接上的合理构造，以及充足的自然采光使室内外的界线变得模糊。建筑外立面通过不同材料间的色彩搭配，体

embedding the nurse's lounge deep inside the floor plate, the lounges are instead pulled out to the outboard corner of the building where staff can enjoy great views and natural daylight, and also regulate their circadian rhythms.

Patience Centered Care

Our design philosophy is first and foremost patient-centered. Human touch, arts and entertainment, information and education, and healthy work spaces for staff are just some of the Planetree concepts we incorporated. These concepts are used to then create a patient and family-centered care environment with the goal of personalizing, humanizing, and demystifying healthcare.

In support of Torrance Memorial Medical Center's patient-centered care initiative, the interior design incorporates soft colors, indirect lighting and curved elements. Interior styles, materials and colors successfully integrate with the exterior, which feature a tan-colored, thin-shell precast concrete panel, rain screen glass curtain wall system and metal panels. The building exterior establishes a sense of place through the use of colors and textures reminiscent of the unique Palos Verdes stone—a beige limestone with reddish hues. In each patient room, the 12-ft-tall, floor-to-ceiling windows connect patients with wonderful views of nearby Palos Verdes Hills and Pacific Ocean.

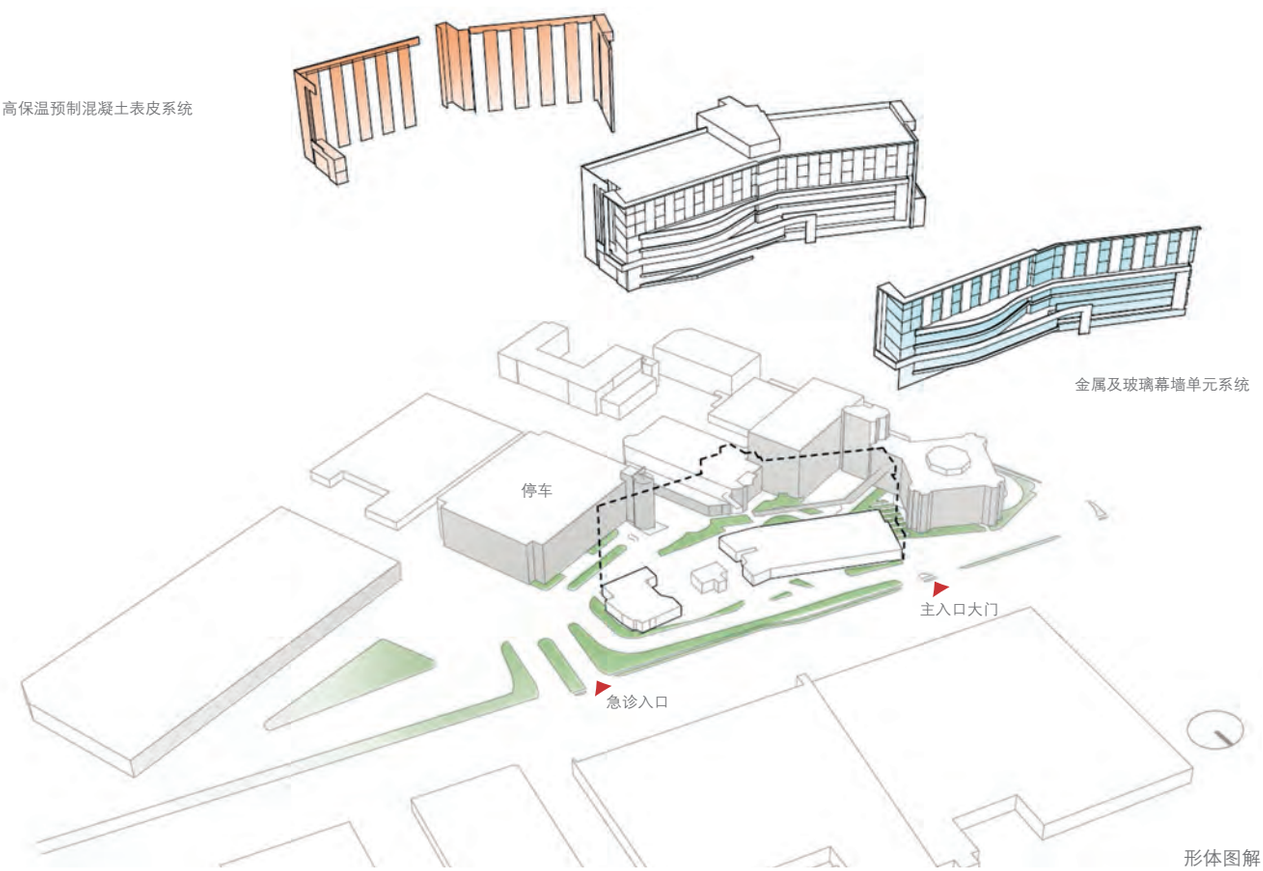
The boundary between indoor and outdoor spaces is blurred by a coherent tectonic of surface materiality, visual connections and abundance of natural light. The surface material palette represents a balance of high-tech sensibility, sleek transparency and natural tectonics to evokea calming, spa-like ambience.

Access to nature in the gardens and natural light create a sense of life and energy for patients and staff. A series of outdoor green spaces fills the void between the existing hospital and the new tower and functions as a serene healing garden, enabling patient access to a protected outdoor space.

摄影：David Wakely

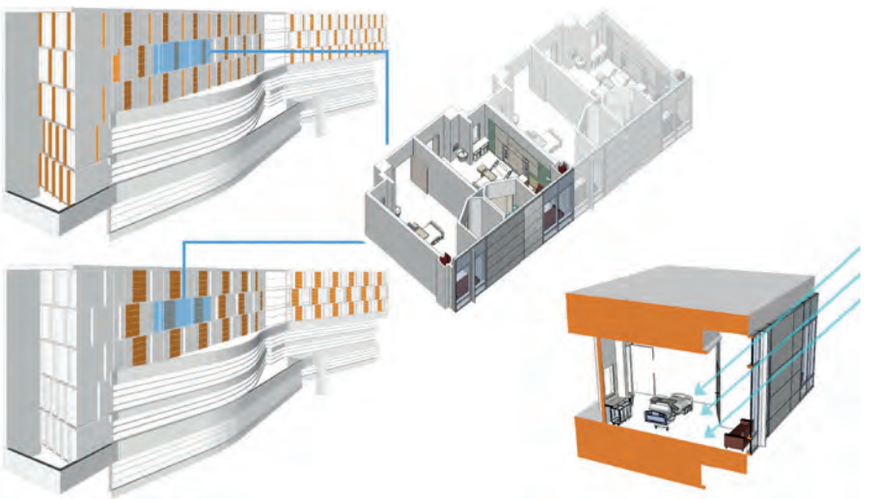
咖啡厅

高保温预制混凝土表皮系统



形体图解

幕墙单元



标准病房模型

防雨幕墙单元模块

现了高科技、透明度与自然构造之间的平衡，最终打造了一个犹如温泉疗养般的舒适氛围。

花园与阳光为病人和医护工作人员带来了生活的氛围和能量。在室外设计了一系列的绿化景观以填补医院原有建筑与新建大楼之间的空地，同时又起到了治愈花园的作用，让病人可以在一个受保护的室外环境中休息。在新建大楼到原有建筑之间的通道上可以看到治愈花园和绿地。

可持续设计

伦德奎斯特大楼的可持续设计旨在达到等同于LEED白银级别的标准。为了使节能效应最大化，在建筑外墙的向阳面采用了高储热性材料，如预制混凝土板系统用以吸收太阳能。而在建筑背光的一面，则采用了金属和玻璃的墙体系统以求最大化的自然采光和户外景致视野。其他非设计及建造方面的可持续策略包括：建筑垃圾回收（接近80%）；室内温度分区管控；白色的屋顶以最小化热量吸收；低亮度的建筑四周照明以减少光污染；回收材料与环保涂料；节水浇灌的绿化；治愈花园以减少热岛效应。

技术挑战/解决方案

为了优化设计与施工之间的协调过程，设计方和施工方共同建立了建筑信息模型（BIM）。这种设计方法显著缩短了施工周期，并使现场施工造成的浪费降到最小。该设计工具被用于计算材料的需求量，为每个施工阶段安排作业流程，减少由于施工误差所导致的问题，并且防止各个方面的施工冲突。

该项目面积仅有2.6公顷，空间有限，为了避免影响医院原有建筑的正常运营，一间新的自给自足的中心机械工厂被设计在了新大楼的地下室和屋顶层，保证了大楼即使在地震中也能继续维持运营。这些就近设置的机械、电力和水管设施在很大程度上减少了能源传输导致的浪费。应急发电机室设计在了较为隐蔽的地方，与医疗中心纪念碑和景观融为一体，使噪音和视觉方面的影响最小化。

为了最大程度优化空间的利用率，放置位于手术室和介入放射室上方静压空间的MEP系统，设计团队在主结构楼板上设计了额外的一组钢结构。天花板以及悬挂在天花板上的设备都通过这个额外的钢结构来承力，暖通空调系统和其他管线设备也能穿过这个额外的钢结构，不会影响对天花板和设备的支撑。

Circulation routes between the new tower and the existing hospital provide views to the healing garden and the green spaces. The healing garden is designed to relieve stress and support the healing process by connecting patients, visitors and staff to nature and daylight. An outboard nurse lounge with large windows to outdoor spaces and ample natural daylight supports healthy circadian rhythms for care staff.

Sustainability

Lundquist Tower was designed to achieve LEED Silver equivalency. The tower's exterior skin is composed of unitized metal panel, thin-set precast concrete and a glass curtain wall system to optimize solar orientation and reduce energy consumption, while imparting a contemporary and elegant aesthetic to the tower. To optimize energy performance, high thermal mass material such as the precast concrete paneling system is used on high solar exposure sides of the building to absorb solar energy. On the cooler side of the building, the metal and glass wall system are used to harvest natural daylight and maximize views to the outdoors and nature.

Other sustainable strategies that were incorporated in the design and construction include construction waste recycling (approximately 80 percent); individual temperature controls to reduce energy consumption; white roof to minimize heat gain; low-level perimeter building lighting to reduce light pollution; recycled content and environmentally friendly finishes; and water efficient landscaping and a healing garden to reduce the heat island effect.

Technology Challenges/Solutions

To optimize design and construction coordination process, a comprehensive Building Information Model (BIM) was built by both the Architect and the Contractor. This design approach greatly reduces the construction time frame and minimizes construction material waste. It was used to calculate the need for materials, to schedule work flow in each section and to reduce negative constructability issues and also to prevent constructability clashes in the field between different trades.

Due to the tight 2.6-acre site and limited available space, to avoid interrupting the service of the existing hospital, a new self-sufficient central mechanical plant is designed into the basement and rooftop levels of the new tower. This ensures the tower can be self-sustaining during seismic events. These readily accessible mechanical, electrical and plumbing services greatly reduce the energy wasted in transporting them. The emergency generator room is also housed in a subterranean building integrated with the medical center's monument sign and landscape to minimize its noise and visual impacts.

To optimize the spatial management of the MEP systems in the plenum space above the operating rooms and interventional radiology rooms, the team developed a secondary steel frame attached to the structural deck above. The ceiling and the ceiling-hung equipment are all supported on the secondary frame. This allows the HVAC system and other systems to pass over the secondary frame and not impact the support of the ceiling and ceiling-hung equipment.

摄影：David Wakely

多功能医护中心——整体规划策略

项目的整体规划旨在通过医院的新老建筑打造一个整体的医疗服务设施，将整所医院塑造成一个集各项功能于一身的多功能医护中心，包括急救护理中心、妇科中心、门诊医疗中心、烧伤资料中心、癌症研究所、外科中心以及放射科中心，使手术、护理和员工组织都达到最优效率。

由于伦德奎斯特大楼需要依赖原有建筑的一些功能，所以两栋建筑之间的连接方式需要设计得既有新意又方便使用。医护中心的各个功能通过类似于“跑马道”的各楼层走廊和空中桥梁相互连接。

伦德奎斯特大楼的一楼和医院老楼的一楼通过一条穿过整个治愈花园的蜿蜒走廊相连。这条走廊在充当两栋大楼之间主要通道的同时，也是一条治愈花园内的景观走廊。一楼走廊一直延续到医疗中心的北大楼，穿过一个小花园，并通往两栋大楼之间的广场。

伦德奎斯特大楼还通过二层的空中桥梁与另外三栋老建筑相连。二楼空中桥梁有两个功能：将医疗中心东大楼、中心大楼和医疗中心北大楼相连；工作人员可以通过它将病人从医院原有建筑中转移到伦德奎斯特大楼，而无须穿过一楼的公共走廊。

这些从伦德奎斯特大楼延伸出去的走廊通道，不仅作为连接不同大楼之间的交通要道，也使得医院的各栋建筑不仅在地面，而且在二楼层面都是一个连续的整体。除此之外，后勤服务在新设计中得以整合。伦德奎斯特大楼利用医院已有建筑现有的装载口用于输送产品物资，因此设计师还设计了一条直达伦德奎斯特大楼的地下通道。（译/严佳钰，校/张洁）

Centers of Excellence–A holistic planning strategy

The planning strategy is to create a holistic medical service between the new and existing hospital buildings by organizing the overall campus into Centers of Excellence such as Critical care center, Women center, Ambulatory care center, Burn Center, Cancer Institute, Surgical Center and Radiology Center. This planning strategy allows the most effective management of operation, patience care and staff utilization logistics.

Since Lundquist Tower relies on the existing hospital for some of its services, the connections to the existing hospital had to be strategic and innovative. These Centers of Excellence are intuitively connected by an intuitive network of “Racetracks” in corridors and bridges.

The first level of Lundquist Tower connects to the first level of the existing hospital utilizing a serpentine corridor configuration, which incorporates the healing garden. This corridor provides the main connection from Lundquist Tower to the existing hospital while providing views to the healing garden. The first floor corridor continues on and connects to the existing North Wing, while passing by a small garden and opening up to the plaza between the two buildings.

Lundquist Tower is also connected to the three buildings of the existing hospital at the second level via an elevated bridge. The second level connection serves a dual purpose. First, it connects Lundquist Tower to the existing hospital and completes a circular corridor system that ties the East Wing, Central Tower and the North Wing together. Second, it enables staff to bring patients from the existing hospital to Lundquist Tower without having to interface with the public on the first level of the hospital.

These connections from Lundquist Tower to the existing hospital integrate and complete the system of corridors that interconnects the multiple buildings of the hospital campus on the first level as well as the second level, thereby maintaining the continuity of the campus.In addition, support services are consolidated. Lundquist Tower utilizes the current loading dock at the existing hospital for the delivery of products and supplies. As a result, a tunnel was constructed at the basement level to allow the products and supplies to be transported to Lundquist Tower. AT