

# 专科医院设计与规划

Specialized Hospitals Design and Planning



The consideration for designer of modern healthcare facilities is not only to provide a clean and efficient healthcare environment, and patients' health, safety and emotions don't depend on the staff's professional skills only. The environment of a hospital also has its healing benefits, which has won more recognition nowadays. A specialized hospital focuses on one medical discipline, and thus for its space design, one must carefully consider the specialized medical and procedure model and patients' special requirements. The children's hospitals (pediatrics/adolescent), women's hospitals (obstetrics and gynecology), cancer centres (radiotherapy and chemotherapy) and mental health hospitals included in the book are "artworks" with healing functions, created by architects, interior designers, artists and healthcare staff together.

现代医疗设施的设计者需要关注的不仅仅是一个清洁、有效的医疗环境，患者的健康、安全、心理情绪不仅仅依赖于医护工作人员的专业技能，环境对治疗效果的促进作用也日益被重视。专科医院专注于某一类学科，其环境设计应更多注重专业学科的医疗服务模式和患者的诉求。本书涉及儿童医院、妇产医院、肿瘤及放化疗、精神病医院。这些项目是建筑师、室内设计师、艺术家与医护工作者共同完成的有治愈作用的艺术品。

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# SPECIALIZED HOSPITALS DESIGN AND PLANNING

Edited by Rebel Roberts Translated by Catherine Chang & Janice Yang

## 专科医院设计与规划

(美) 瑞贝尔·罗伯茨 / 编 常文心 杨子玉 / 译

辽宁科学技术出版社



# PREFACE

## 前言

The healthcare profession's design philosophy is based on our commitment to improve the human experience in healthcare settings through design. This includes better experiences for patients, their family and friends, and clinicians and staff, recognising their different experiential (emotional, cognitive and spiritual) needs. Our skill as designers is in melding proven design principles with how people move through, use, and are affected by space. We take a "people-first, human-centred" approach.

Our profession and the designers within this book are experienced in highly specialized projects that include women and children's healthcare environments, Proton Therapy centres and state-of-the-art cancer centres. The approach to healthcare design begins with the development of a full understanding of the vision, business case and goals and objectives relevant to the specific project. We then form a concept that fully reflects the function and the feeling that those factors evoke. Architects, planners and designers spend significant time with hospital leadership, clinicians, staff and other key project leaders to validate and test the design responses. The resulting design is rigorously tested against the practical and operational components of the specific space type with current best practices applied. Specialized requirements for healthcare environments are often applied and refined to accommodate the project budget. And then the designers involved provide options and recommendations to ensure that the facility will serve its intended function well into the future.

The design solutions within this book are based on the contemporary concerns of healthcare providers. Among these issues are financial viability, patient safety, staff satisfaction, environmental responsibility and operational efficiency. We recognise that difficult resource allocation decisions must be made. We consider it our profession's responsibility to provide a

作为医疗保健专业人士，我们的设计原理是建立在“通过设计提升人们在医疗保健设施中的体验”这一基础之上的。这包括患者、患者家人和朋友以及儿童、医护人员的更优质体验，认识到他们不同的体验需求（情绪、认知和精神）。作为设计者，我们的技能是将改进的设计方法与人们如何在空间中移动，如何利用空间，如何受空间影响融合在一起。我们采用了“以人为本”的设计方法。

我们的专业团队和本书中其他设计师都经历了非常专业的设计项目，包括妇女儿童医疗健康环境、核质子治疗中心和一流的癌症治疗中心。医疗保健项目设计方法从全面理解愿景、业务案例和目标、与特定项目相关的目标开始。于是，我们制定了一个设计概念，全面反映功能以及由那些因素引发的感觉。建筑师、规划师和设计者花费大量时间与医院领导者、临床医生、工作人员、其他主要的项目领导者沟通，以确认和检验他们对设计方案的反映。设计结果经严格的实践检验，满足特定空间类型现行最佳运营方案的实施要求。医疗保健环境的专业化要求经常被改进、再应用，以满足项目的预算。这样，设计者们需要提供多种选择和建议，以确保医疗设施能更好地满足其预期的未来功能需要。

本书中的设计解决方案以现今医疗保健服务的提供者的关注事项为基础。这些问题包括：财务的可行性、患者安全、员工满意度、环境永续责任和运营效率。我们认识到必须做出艰难的资源分配决定。我们认为提供一个协商的方法改善这些资源分配是我们的专业责任。我们也认识到根据医疗实践、技

# The Healing Wheel of the Environment

## 环境康复轮

"The effect in sickness of beautiful objects, of variety of objects, and especially of brilliancy of colours is hardly at all appreciated. People say the effect is only on the mind. It is no such thing. The effect is on the body too. Little as we know about the way in which we are affected by form, by colour and light, we do know this, that they have an actual physical effect. Variety of form and brilliancy of colour in the objects presented to patients is an actual means of recovery." Florence Nightingale, 1885.

### Evidence-Based Design

Internationally, there is an increasing focus on Healing Architecture and Evidence-Based Design (EBD). EBD is seen as a parallel to evidence-based medicine, and is defined as "the deliberate attempt to base design decisions on the best available research evidence... Evidence-based healthcare designs are used to create environments that are therapeutic, supportive of family involvement, efficient for staff performance, and restorative for workers under stress. An evidence-based designer, together with an informed client, makes decisions based on the best information available from research and project evaluations." Hamilton DK (2003) The Four Levels of Evidence-Based Practice. Healthcare Design, Nov 2003.

### Evidence-Based Design and the Healing Wheel of the Environment

On the basis of EBD, the DNU consultant group has developed "The Healing Wheel of the Environment", which forms the planning foundation for the entire project. As EBD is a relatively new discipline, and limited in many respects in its scientific foundation, the logical consequence is that only "evident" areas are included in the wheel, which can be extended at any time.

The twelve components of the Healing Wheel of the Environment are:

- Empowerment and ergonomics

"美丽的事物，多变的事物，尤其是色彩的光辉之于疾病的影响很难说都是值得肯定的。人们说影响只在心智精神，不是某个事物。影响也作用于身体。我们对形状、色彩和光之于我们的影响知之甚少，但是它们对我们的生理产生切实的影响。呈现在物体中的形状多样性和色彩的光辉再展现给病人是一种切实的康复手段。"（弗洛伦斯·南丁格尔，1885年）

### 循证设计

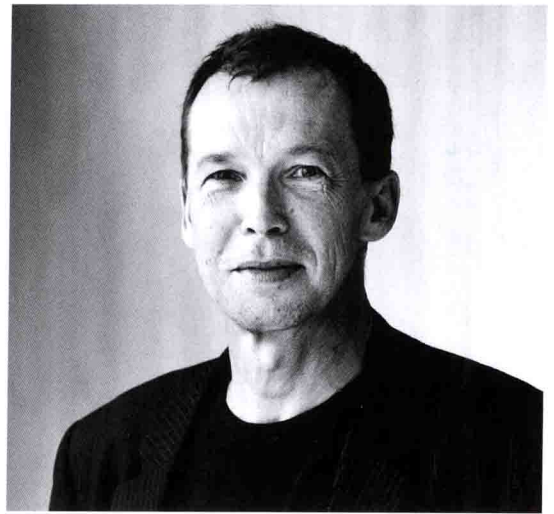
国际上日益重视治愈建筑和循证设计（EBD）。循证设计类似于循证医学，其定义为“着意将设计结果建立在最佳的可用调研证据上……循证医疗保健设计用于创建治疗环境、家庭参与支持性环境、员工高效履职环境，并有助于工作者从压力中恢复。循证设计者，与见多识广的客户一起，基于通过调研和项目评估而得到的最佳可用信息，做出决定。”【汉密尔顿·DK（2003）《循证实践的四个标准》刊载在《卫生保健设计》2003年11月】

### 循证设计与环境康复轮

以循证设计为基础，奥尔胡斯大学新医院的顾问团队制定了“环境康复轮”，即为整个项目奠定了规划设计的基础。因为循证设计是一个较新的学科，其科学基础在很多方面有限，逻辑结论是轮中唯一“显而易见”的区域，可以随时扩展。

环境康复之轮的12个组成部分如下：

- 赋能与人类工程学



Tom Danielsen 汤姆·丹尼尔森

- Daylight
- Single-bed rooms
- Acoustics
- Artificial light
- Access to the landscape
- Communication and logistics
- Textures
- Indoor climate
- Art
- IT
- Design and decor

### Empowerment and Ergonomics

The patient must as far as possible be able to regulate the light, heating and music in the patient room. Via bedside PCs, patients will have access to their own journals and will be able to see the times of planned examinations, test results, etc. Improved ergonomic design will help to ensure less fatigue and stress.

### Daylight

Daylight is not just important for our sense of well-being, but also for our health. Daylight helps to ensure that our circadian rhythms are correctly adjusted; it also lifts the general atmosphere, and has an antidepressant effect. Patients in rooms with windows, particularly windows with green landscapes outside, have shorter periods of convalescence and fewer complications, and require less pain-relieving medicine. Careful and early planning of natural light can reinforce the positive effect of daylight and help to prevent the problems that natural light can also cause, such as overheating and dazzling. Besides improving personal comfort, the conscious use of daylight also helps to save power consumption on artificial light. The optimum use of daylight thus has both an environmental and an economic dimension.

- 日光
- 单人病房
- 声学
- 人工照明
- 风景的可见性
- 信息与流动
- 质地
- 室内气候
- 艺术
- 信息技术
- 设计与装饰

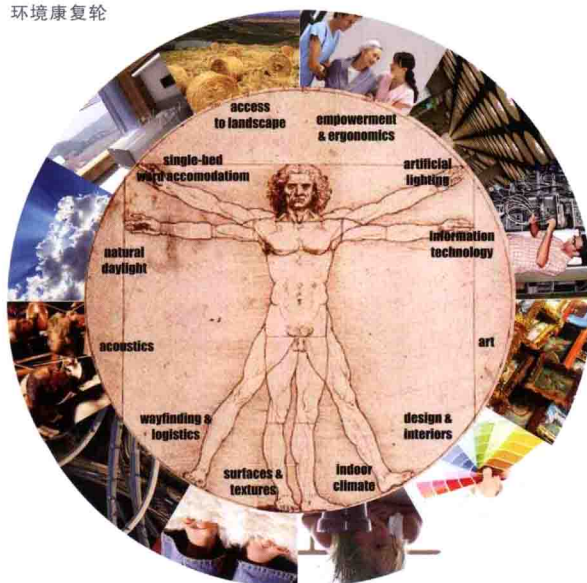
### 赋能与人类工程学

病人必须尽可能地自行控制病房内的光照、制热和音乐设施。通过病床旁的个人电脑，病人将有权使用自己的住院日志，将能看见预订检查的时间、检测结果等。提升人类工程学设计将有助于降低疲劳和压力。

### 日光

日光不仅对我们感官的安宁产生重要作用，对我们的健康也很重要。日光有助于正确调整我们的生物钟，也能提升整体的氛围，起到抗抑郁的效果。病人处在有窗的房间，尤其是窗外有绿色的风景，这样会缩短康复周期，减少并发症，对止疼药的需求也会减少。尽早、认真地对自然光进行规划可以增强日光的积极影响，有助于防止产生由自然光照引发的问题，例如过热和刺眼。除了提升人的舒适度，有意识的利用自然光也有助于节约人工照明耗费的能源。因此，对日光的优化利用有环境 and 经济方面的因素。





## Single-bed Rooms

Research shows that single-bed rooms confer a number of benefits, including fewer hospital-acquired infections, fewer medication errors and a lower noise level. Single-bed rooms also mobilise the patients when they get up to eat, or meet other patients. They also provide privacy for conversations with hospital staff, and thereby a basis for better treatment. The arguments in favour of multiple-bed rooms are usually that they are less expensive (to build and operate), but in fact the shorter periods of admission to hospital indicate that single-bed rooms are more economic from the point of view of society.

## Acoustics

A room's acoustic properties determine how sounds are disseminated there. The noise level of hospitals is notoriously high, with many simultaneous and different noise sources, such as people walking, talking or working, beep-sounds from equipment, and transportation noises – all in spaces with hard surfaces, due to cleaning requirements. A lower noise level can reduce stress for both patients and staff and help to give patients the peace and quiet they need. Good acoustic qualities contribute significantly towards a good indoor climate, and are best secured by selecting the right construction principles, an appropriate internal organisation and good surface materials.

## Artificial Light

Artificial light must fulfil both functional and aesthetic needs. It must be flexible and variable and provide a sense of well-being, but must also be capable of being switched to diagnostic lighting, for example to examine changes in skin colouration. The choice of fittings and light sources must comply with both functional and atmospheric needs. Artificial light will be used in combination with daylight, and will take over the illumination function when daylight alone is insufficient.

## 单人病房

研究表明，单人病房有许多益处，包括减少医院内感染，减少用药错误，降低噪音级别。单人病房还会鼓励病人起床用餐，或者会见其他病人。单人病房为病人与医院工作人员的交谈提供隐私保护，因此有更好的治疗基础。支持多床病房的人其依据通常在于花费少（建设和运作），但是事实上，从安全角度看，入院时间短住单人病房更节约。

## 声学

一个房间的声学特性决定了声音在其中如何散播。医院的噪音级别非常高。并伴有很多同事产生的、不同的噪音来源，例如人们的脚步声、交谈或工作的声音、设备的嘟嘟声以及运送物品的声音——全都集中在出于清洁需要而采用硬质表面的空间中。较低的噪音级别能减少病人和工作人员的压力，有助于满足病人平和、安静的需要。良好的声学品质对良好的室内气候贡献极大，可以通过选择正确的建筑方法、适当的内部构建和优质的表面材料。

## 人工照明

人工照明必须同时满足功能和美学需要。人工照明必须灵活多样，给人以安宁感，但同时必须可以转换到诊断照明，例如检查皮肤着色变化。照明装置和光源的选择必须满足功能和氛围的需要。人工照明的应用必须与自然光相结合，当自然光不足时，由人工照明替代。

### 3. Design

#### 3.1 Access

##### EXTERNAL

Entrances to the hospital and routes to the Paediatric/Adolescent Unit should ensure minimal contact with sick or injured adult patients.

##### INTERNAL

Internal access to the Unit needs to be controlled by either human or physical means at all times to prevent unauthorised access or patient egress. This may be by appropriate location of Staff Station or Reception or by video surveillance and electronic door controls, particularly after hours. However, the Staff Station is not always occupied and in the absence of a ward clerk, the impact of monitoring video monitors on staffing levels needs to be considered.

#### 3.2 Infection Control

The infectious status of many patients admitted to the Unit may be unknown. All body fluids should be treated as potentially infectious and adequate precautions should be taken particularly with small children. Linen trolley bays must have doors to prevent contamination.

#### 3.3 Environmental Consideration

##### ACOUSTICS

Babies, toddlers and children are naturally boisterous at play and noisy when distressed. The sounds of children crying or in pain, the noise of unfamiliar equipment or, conversely, extreme quiet are all anxiety-provoking. Ceiling acoustic tiles, absorbent panels, curtains, upholstered furniture and carpets can be used to absorb and soften sounds in all patient and most other areas. The Treatment Room will require maximum acoustic containment to prevent the sounds of distressed children reaching those in the other patient areas. (In paediatric units, painful procedures are performed in the treatment room rather than at the bedside.)

Auditory privacy will be required in the Interview Room and NUM office.

### 3. 设计

#### 3.1 通道

##### 外部:

进入医院的入口和进入儿科/青少年疾病治疗部的通道应确保最低限度地接触患病或受伤的成年病人。

##### 内部:

进入治疗区内部通道应全天候安排人员或通过物质手段进行控制,防止未经许可的人员接近或者病人随意外出,可以在员工工作站或接待站旁边选择适当的位置,或通过视频监控或者电子门控制,尤其是在工作时间之外的时段,然而,员工工作站不是一直有人,在病房区工作人员不在时,考虑采用值班员工视频监控的手段。

#### 3.2 传染控制

医疗部接收的病人很多,其带来的可传染程度可能无法知晓。所有体液应被视为潜在的污染源,对幼小的儿童应采取适当的防范措施。医用被服推车存放处应有门,防止外来污染。

#### 3.3 需要考虑的环境问题

##### 声响:

婴儿、初学走路的幼儿和儿童玩耍时自然会很吵闹,不开心时通常很聒噪。孩子哭泣或疼痛时产生的声音、不熟悉的设备的声音或极端安静都会激起人的不安情绪。天花板吸声瓦、吸音板、窗帘、装有软垫的家具和地毯可用于吸收和弱化病房区和绝大多数区域的声音。治疗室需要采取最大限度的降噪措施,以防止患儿在治疗过程中产生的令人不愉快的声音传到其他病人所在的区域。(在儿科,在治疗室内实施那些会使患儿产生痛苦的治疗过程要比在病床旁进行要好。)

会见室和数字化办公室需要进行声音保护。

## WINDOWS

- The height of the windows should enable children in their cots/beds to see outside.
- Natural ventilation to all patient bed rooms (with means of restricted opening for patient safety) provides fresh air, cross-ventilation and enables the children to hear and smell the outdoors. However, insect screen must be provided to all external doors and openable windows and glass must comply with relevant regulation on safety glazing material in buildings.
- A low and wide internal window ledge will be well used by children.
- The Treatment and Tutorial Rooms will require provision for blackout.

## DOORS

Door swings must be planned and arranged so that there is no danger of hitting a small child on other side.

## 3.4 Safety and Security

### SAFETY

The design of the unit environment should be such that all possible risks to the safety of the children are minimised including risks of abduction, and take into account the natural curiosity of children.

Design and layout must prevent access by children to areas containing equipment or material likely to be harmful to them, including:

- beverage pantry and heated food trolleys
- utility rooms, cleaners rooms, storage rooms, linen bay
- resuscitation trolley
- disposal room
- treatment room
- medication room
- ward exits

In order to prevent injury whilst patients undertake their normal daily activities in the ward area, surface finishes, furniture and glazing must be of design and material appropriate to their use (e.g. rounded edges on furniture at low levels, safety glass in patient areas).

### 窗户:

- 窗户的高度应当以患儿在其婴儿床 / 病床上可看到户外为准
- 为所有病房提供自然通风 ( 需要有一定的开启限制措施保护病人的安全 ), 提供新鲜的空气、交叉通风, 使孩子们可以听到户外的声音, 闻来自户外的气味。但是, 所有外侧的门和可开启的窗应加装防蚊虫的屏障, 选用的玻璃应符合相应的建筑用玻璃安全标准
- 低而宽的室内窗台可被孩子们很好地利用
- 治疗室和教室需要配备应对突然断电的装置

### 门:

门的摆动或旋转必须经过精心的设计和安排, 这样就不会有在另一侧撞到小孩子的危险。

## 3.4 安全与安保

### 安全:

儿科/青少年疾病治疗部的环境设计应将全部可能危及孩子安全的风险隐患降至最低, 包括诱拐的风险, 同时应当考虑到孩子们有好奇的天性。

设计与布局必须防止儿童进入那些存放着可能伤害他们的设备或材料的区域, 包括:

- 餐饮室和加热食物推车
- 杂物间、洗衣室、储藏室、医用被服间
- 复苏担架车
- 处置室
- 治疗室
- 药物处理室
- 病房出口

为了防止病人在病房区进行日常活动时受伤, 室内表面装饰、家具和玻璃的设计和选材应适于病人使用 ( 例如较低的家具边缘为圆形, 病人区采用安全玻璃 ) 。



The patients may be:

- ambulant/crawling
- in bed/cot/bassinet
- in a stroller/pram
- on a tricycle
- on crutches
- in a wheelchair
- in a playpen
- oxygen-dependent
- on IV therapy
- in traction

#### LOCATION AND RELATIONSHIPS

Access must allow for a bed with orthopaedic fittings.

Direct access to the Outside Play Area

Good observation from Staff Station and general nursing circulation areas required.

#### CONSIDERATIONS

The following are required:

- Natural light (northerly aspect where possible)
- Bright and cheerful decor
- Acoustic absorption
- Means of restricted window opening for natural ventilation when required

Corridor wall and door to be glazed to allow observation of patients.

Dividing walls may be glazed to a height suitable to allow observation of patients.

Storage (not necessarily within the Play Area) required for:

- hospital-provided toys and games
- books, education material and CDs/DVDs
- chairs (stacking, in several sizes)
- high chairs
- tricycles
- playpen (fold-away)
- strollers and prams
- computers

患儿可能:

- 走动 / 爬
- 在病床 / 婴儿床 / 摇篮车中
- 在婴儿车中
- 骑三轮童车
- 使用拐杖
- 坐着轮椅
- 在婴儿用围栏中
- 需要吸氧
- 接受静脉治疗
- 被牵引

选址与功能关系:

通道须能通过配有整形外科装置的病床。

直接通向户外游戏场地

从员工工作站观察游戏区的视线良好, 且有一般护理所需的移动空间。

需要考虑的事项:

以下为设计者需要考虑的事项:

- 自然光照 (在可能的情况下北侧也有自然光照)
- 明亮、欢快的装饰
- 吸声
- 限制开窗的装置, 在必要时进行自然通风

走廊的墙壁和门应该如玻璃般光滑, 以便对患儿进行实时观察。

储藏空间 (游戏区内不是必要存在的部分) 需要存储:

- 医院提供的玩具和游戏设备
- 书籍、教学材料和CD、DVD
- 椅子-堆叠-不同尺寸
- (小孩吃饭时坐的) 高脚椅子
- 三轮童车
- 婴儿用围栏 (可折叠起来)
- 婴儿学步车和婴儿车
- 电脑







# King Edward Memorial Hospital Intensive Care Unit & Maternal Foetal Assessment Unit

爱德华国王纪念医院重症监护病房和母婴评估中心

## Architects:

Bateman Architects

## Location:

Australia

## Project year:

2012

## Photographs:

© Courtesy of architects

建筑师：贝特曼建筑事务所

项目地点：澳大利亚

完成时间：2012年

摄影师：◎ 贝特曼建筑事务所

The King Edward Memorial Hospital required expansion of its Neonatal Intensive Care and Foetal Monitoring Assessment Units. These new facilities were built to replace existing accommodation and to cater for an expected increase in future demand.

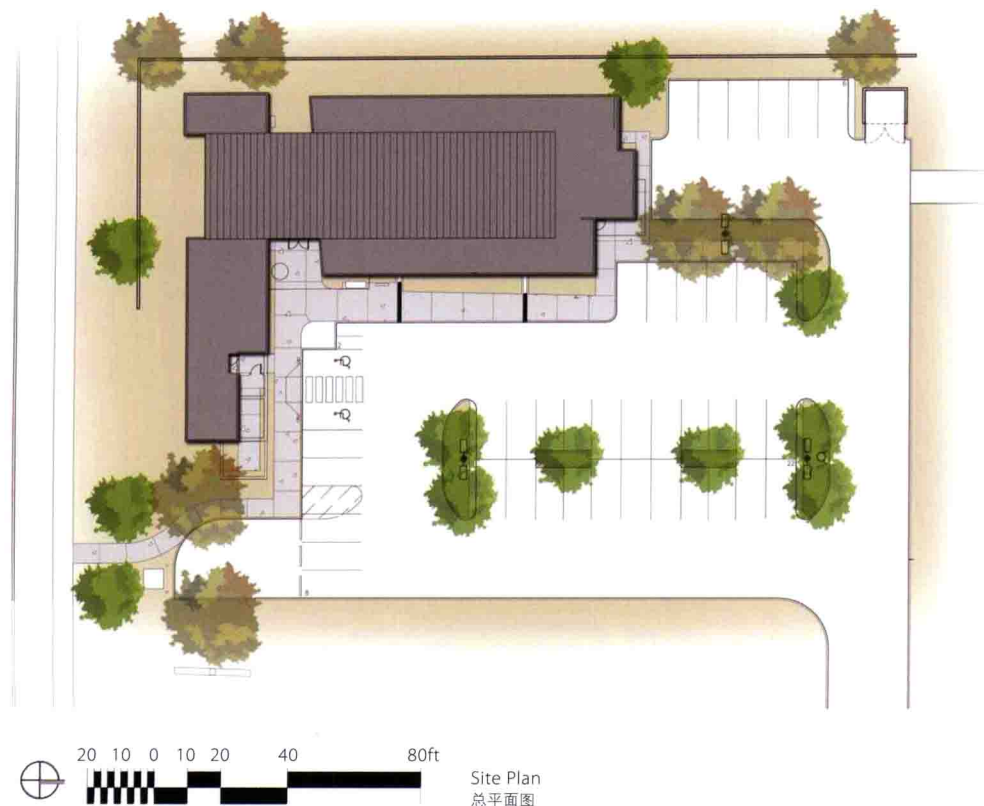
KEMH is a heritage listed site, with a group of buildings that date from the 1890's to the 1980's, and these buildings have been rendered in a diverse range of architectural styles that reflect the period of its time. Bateman Architects' design approach was to introduce a new architectural vocabulary to the surrounding architecture.

The new accommodation was achieved via a lightweight element, a "capsule", to provide

the required expansion to both the NICU and MFAU. The north and south elevations of the capsule are fully glazed to allow maximum light penetration to the interior, with an external sunscreen to prevent direct sun. The west façade has windows which are offset from the external and internal skin; this gesture prevents afternoon sun penetrating directly into the building. The building is configured to make the best use of passive solar design by controlling the sun penetration and thus heat gain. Supported on circular columns this extrusion is captured and contained by a floating alucobond sheet fabric punctured by colourful openings.

A constricted site gave way to this building proposal; the building is an extension of the





## After Hours Pediatrics II

### 非工作时间儿科医院

#### Architects:

Mullen Heller Architecture

#### Location:

Albuquerque, USA

#### Building area:

711.27m<sup>2</sup>

#### Project year:

2011

#### Photographs:

© Patrick Coulie

建筑师: 马伦·海勒建筑事务所

项目地点: 美国, 阿尔伯克基

建筑面积: 711.27平方米

完成时间: 2011年

摄影师: © 帕特里克·古丽

The design of After Hours Pediatrics was shaped by two driving forces: 1. a prominent site along one of Albuquerque's major arterial, Paseo del Norte, and 2. the Client's belief that "keeping kids in the game" is the best preventative medicine.

While the site enjoys high visibility along Paseo, it also presents the challenge with a high volume of traffic. To mitigate vehicular noise, the building programme was organised into two wings: an exam wing which is placed remote from the street and an administrative wing located parallel along Paseo. This arrangement provides a tremendous presence on Paseo while protecting the building entry from the busy traffic.

Inspired by the Client's emphasis on an

active lifestyle, the building is punctuated with a series of circular windows of coloured glass which reference various types of sports balls, and the polished concrete floors area articulated with coloured "hash marks" representing a sports field.

To further emphasise the importance of wellness, the façade along Paseo del Norte is adorned with a playful arrangement of text art encouraging well being and a healthy lifestyle.

The building's main entry has a vaulted ceiling to provide a bright and airy environment. The circular windows which are a strong feature on the outside of the building create "spotlights" on the floor



1. Main entrance night view
2. Back façade
3. Night view from the parking lot
1. 主入口夜景
2. 建筑背面
3. 从停车场看建筑夜景

that move throughout the day and provide individual "stages" for children to enjoy.

Separate waiting areas for well and sick children flank the waiting area and feed corresponding exam rooms. The exam room wing is organised around a central nurse's station which provides a sense of separation between the wellness exam rooms and those for sick visits.

The exterior of the building is expressed in strong geometric forms with low bars surrounding a metal-clad wedge which rises up to allow clerestory lighting into the interior spaces. The bold colours of the metal cladding coupled with the patio wall and circular windows create a striking composition that appeals to both toddlers and the young at heart.



- 7. Office area
- 8. Exam room
- 7. 办公区
- 8. 检查室



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