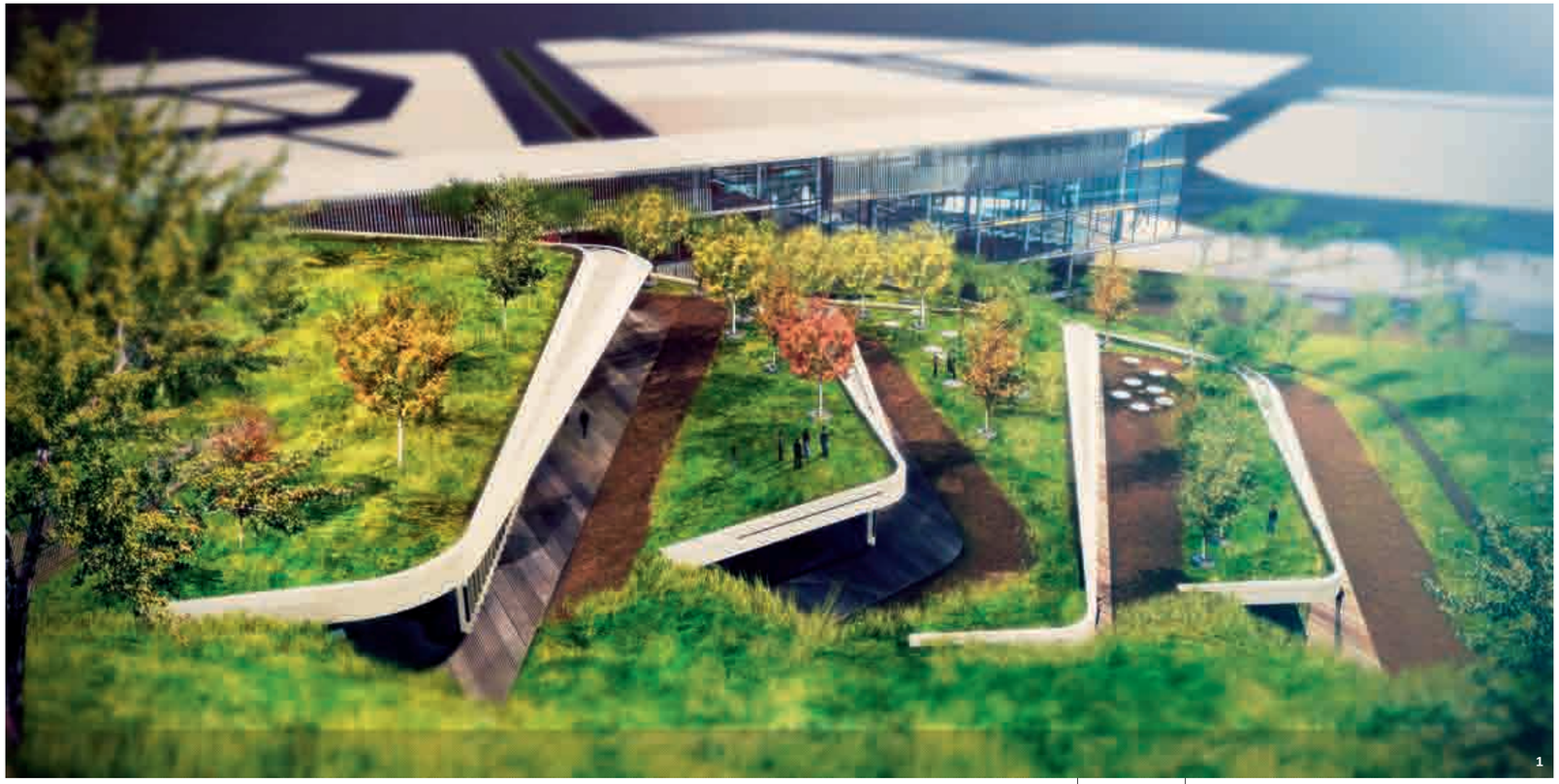

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收稿时间 / Received Date
2014-03-01
中图分类号 / TU986.2
文献标识码 / B

土耳其安卡拉市奥斯迪姆生态园技术开发区

Ostim Eco-park Technology Development Region in Ankara, Turkey

ONZ建筑设计事务所 / ONZ Architects

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摘要 ……

奥斯迪姆生态园位于土耳其安卡拉市的一个规划工业区，设计追求自然与发展之间的完美平衡，通过在台地形绿色屋顶、动态照明系统、雨水收集及循环利用等方面采取的可持续措施，实现了对资源和开敞、健康的绿色空间的高效利用。

关键词 ……

生态园；绿色屋顶；能源高效利用；可持续性；台地建筑；多功能

Abstract ...

Ostim Eco-park is an organized industrial region located in Ankara, Turkey. The design strikes the perfect balance between nature and development with prioritizing efficient use of resources and spacious, healthy green environments through sustainable approaches in terraced green roofs, lighting, and rain water collection and reuse.

Key words ...

Eco-park; Green Roof; Energy Efficient Use; Sustainability; Terraced Building; Multi-function

项目地址：土耳其安卡拉市
项目面积：84 639m^2
项目委托：奥斯迪姆规划工业区总办公室
景观设计：ONZ建筑设计事务所
首席设计师：Onat Öktem
项目团队：Zeynep Öktem、Okan Can、Esat Can Meker、Loed Stolte

Location: Ankara, Turkey
Area (size): 84,639 m^2
Client: Ostim Organized Industrial Region Head Office
Landscape Architecture: ONZ Architects
Chief Designer: Onat Öktem
Project Team: Zeynep Öktem, Okan Can, Esat Can Meker, Loed Stolte

1. 绿色屋顶 © ONZ Architects
2. 概念设计图 © ONZ Architects
1. View of the green roofs © ONZ Architects
2. Concept scheme © ONZ Architects

奥斯迪姆生态园

奥斯迪姆是位于土耳其安卡拉市的一个规划工业区。为该地区建设一个用于可持续研究和技术开发的生态园旨在提升该地区利益相关者的全球竞争力，从而在全球范围内的新能源与环境技术输出领域占有一席之地。为顺应以上发展趋势，需要在优美的自然环境中营造出大量明亮、开敞的空间，因为在阴暗、隔绝的房间中难以迸发出灵感的火花。设计可以使人们在行走中相遇，开启对话，激发新思维，这一点至关重要。

ONZ建筑设计事务所受邀参加了奥斯迪姆生态园的设计竞赛。他们在考虑了所有要求后，提出了一项精湛的设计方案，其中包含一系列台地，以及隐藏于山脚的绿色屋顶建筑。ONZ追求自然与发展之间的完美平衡，在注重对资源和开敞、健康的绿色空间的高效利用的同时，实现了现代设计。

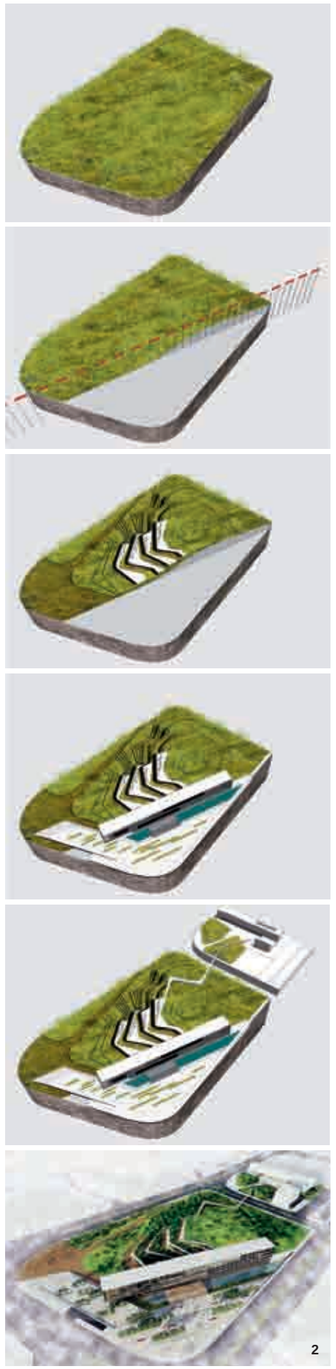
奥斯迪姆生态园的首要设计定位是创造一个怡人的共享空间，并尽可能避免对自然的干扰。为了使大部分场地保持葱郁，项目选址于人工和自然环境交界处。因此，场地内的山丘地形以遍布绿植的台地形式呈现，其中容纳了办公、会议和创作空间。坐落于场地南部的建筑被设计成该区域的地标，并与拥有不同水平面的台地结构形成了紧密联系。台地建筑提供了一个与自然交融的工作环境，建筑前方的大面积空间还为诸如创作及实验等多种活动提供了合适的场所。

通过房间隔断系统可根据需要对空间进行划分，因此，模块化的露天剧场拥有承接各种大小规模活动的服务功能。

可持续性标准

（1）绿色屋顶

绿色屋顶系统是生态园的主题花园，该设计还创造了贯穿于整个场地的连续的自然纹理。作为生态设计系统的重要部分，屋顶的雨洪管理措施可使这些屋顶吸纳90%的降水。因此，绿色屋顶承担着防洪的重要功能。同时这些屋顶在房屋隔热



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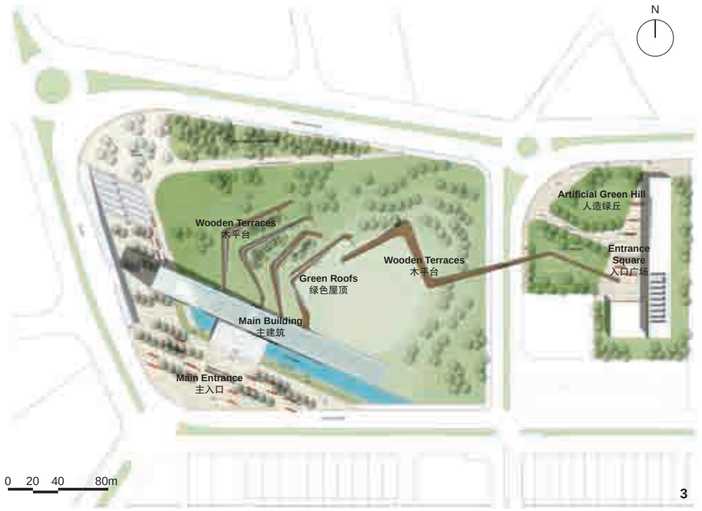

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保温方面也发挥着巨大功效。

屋顶种植的植被成为了提升空气和水体质量的过滤网。采用这种绿色屋顶的另一个原因是由于其能降低局地气温，减弱城市环境中的热岛效应。其中，植被种植的重要选择标准是低耗水和易养护，以此标准来看，自播繁衍的蔓生植物能够在屋顶40cm厚的土层中生长，例如薄雪万年草（*Sedum hispanicum*）、垂盆草（*Sedum sarmentosum*）、高加索景天（*Sedum spurium*）和土耳其景天（*Sedum palmeri*）等都是不错的选择。

（2）照明

建筑物内部的照明和温度控制由建筑立面上的传感器调节。研究表明，对室内环境质量进行自主控制能够提高工作效率，因此该系统并不是完全自动化的。然而，这也会导致不必要的能源消耗，因此需要对已安装系统格外注意，从而使这两方面的需求得以平衡。模拟自然光的动态照明系统可用于对采光品质具有不同要求的办公环境中，以满足各种活动的需求。采光和温度调控亦可通过植被种植实现。落叶树木在冬天能够使更多阳光渗透进来，而在夏季则能够提供荫蔽。

（3）取暖和制冷

生态园的取暖和制冷采用地热泵实现。在该系统中，埋于地下的管道中流动着与地表温差达10℃的液体，使热能在地下和地表间相互输送。太阳能可能无法在供暖或制冷方面发挥明显功效，但能够为地热泵提供充足的运行能量。因此，该混合系统可在无额外能源消耗的条件下，为建筑提供供暖和制冷服务。

（4）通风

为实现建筑通风和取暖，办公区两侧的走廊系统在冬季形成了“温室效应”，从而有助于为环境增温。走廊中温暖的空气通过通风口循环，形成被动式加热。在夏季，打开立面的窗户就可实现自然通风。由于这些系统既能保持室内温度又能实现高效通风，因此过热回收式通风系统在生态园中得到了广泛应用。

自动二氧化碳传感器在二氧化碳浓度超过1 000ppm时会被激活，生成更高质量的室内空气，从而确保了使用者的舒适度和工作效率。

（5）雨水与灰水

场地内所收集的雨水和灰水将在整个建筑体中得到循环利用。这部分水通过简单的机械滤膜得到净化，并通过高效滴灌系统用于景观灌溉。此外，节水卫生间、免冲水式小便器、节水阀门和节水管道部件均有利于节约水资源。

主建筑南部的水池除了用于雨水收集外，还可用于进行水培和栽培生产生物燃料的植物等实验活动。**LAF**

3. 平面图 © ONZ Architects
4. 鸟瞰图 © ONZ Architects
5，6. 设计可以使人们在优美的自然环境中相遇，开启对话，激发新思维。© ONZ Architects
3. Site plan © ONZ Architects
4. Aerial view © ONZ Architects
5, 6. The design allows for people to meet in an aesthetically-pleasing natural environment, striking up conversation and stimulating new thinking. © ONZ Architects

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Ostim Eco-park

Ostim is an organized industrial region located in Ankara, Turkey. An Eco-park for sustainable research and technology is planned for the region to promote sector stakeholders to compete in a global level and attain a position where they would export to the world new energy and environment technologies. Such an environment requires a great deal of light and open space in an aesthetically-pleasing natural environment, because inspiration rarely strikes in dark, cloistered rooms. It is essential that the design allows for people to cross each other’s paths, strike up conversation, stimulate new thinking.

Invited to participate in the competition to design the Ostim Eco-park, ONZ Architects have accounted for all of these requirements with an exquisite design comprised of a series of terraced, green-roofed buildings tucked into the hillside that host offices, conference and workshop spaces. ONZ strikes the perfect balance between nature and development with prioritizing efficient use of resources and spacious, healthy green environments without compromising contemporary design.

The primary design decision in Ostim Eco-park is to create a pleasant sharing space for its users with minimum interference to the nature. The project, designed in the intersection of man-made and natural, aims to leave most of the site to the green therefore the hill in the site is used for housing offices, conference and workshop spaces in terraces underneath the green texture. The building situated on the south of the site is designed as a landmark for the area and is in close contact with the terrace structures in different levels. The terrace buildings offer a working environment intertwined with nature while the large spaces in front of them provide a suitable place for a wide range of activities like workshops or sustainability experiments.

There is also a modular amphitheater that can be used for both large and small functions thanks to a system of room dividers that cut up the space when necessary.

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Sustainability Criteria

(1) Green Roofs

Green roof systems are intended to be used as theme gardens for the Eco-park. This design also creates a continuation of natural texture throughout the site. Being an essential part of the ecological design system, these roofs can hold up to 90% of rain water due to storm water management. Thus they play an important role for the prevention of floods. The green roofs are also preferred for their contribution to the insulation of the building.

Plantation on the roofs act as a filter improves the air and water quality. Green roofs are also chosen because they help to lower local air temperatures and combat the heat island effect in urban settings. Requiring less water and care are important criteria for the plantation of these spaces. In this respect self-renewing trailing plants that can adapt to a 40 cm soil thickness on the roof are favored such as *Sedum hispanicum*, *Sedum sarmentosum*, *Sedum spurium*, and *Sedum palmeri*.

(2) Lighting

The lighting and temperature control in the buildings are provided by sensors placed on the facade. The system is not fully automated since studies show that having control over the indoor environment quality increases working efficiency. Nevertheless this can lead to unnecessary energy consumption. Consequently special attention will be given for the installed system to balance these two requirements. A dynamic lighting system simulating natural light is considered for various activities in an office environment requiring different lighting qualities.

Lighting and temperature control is also achieved through vegetation. Deciduous trees enable more light in winter and shade during summer.

(3) Heating and Cooling

Geothermal Heat Pumps are considered for the heating and cooling of the Eco-park. In this system, pipes buried underground containing liquids with approximately 10℃ temperature difference, transfer heat to or from the ground. Solar energy gain may not be efficient for heating or cooling however they can provide enough energy for geothermal heat pumps to function. Consequently a hybrid system will resolve heating and cooling without any additional energy consumption.

(4) Ventilation

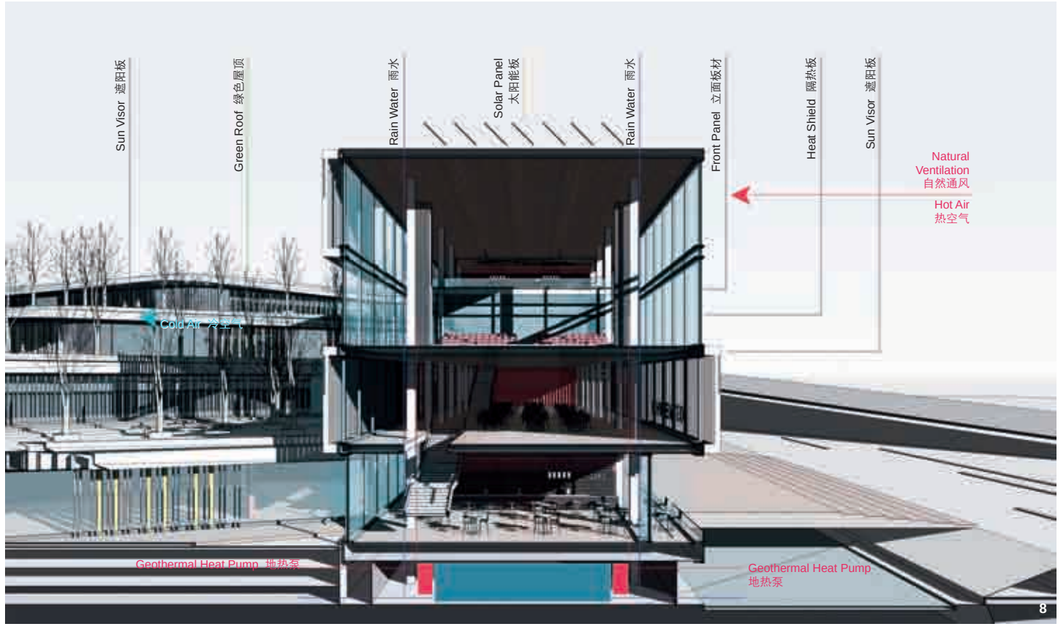
For the ventilation and heating of the building, the corridor system on both sides of the office block creates a greenhouse effect in winter thus contribute to heating of the environment. The warm air in the corridors is circulated in working spaces through air vents and provides passive heating. In summer, by opening the windows on the facade natural ventilation is attained. Heat recovery ventilation systems are recommended for Eco-park since these systems create high efficiency ventilation while maintaining indoor air temperature.

The automated CO_2 sensors activated by CO_2 concentrations above 1,000 ppm create a better indoor air quality thus endorse user satisfaction and working efficiency.

(5) Rain Water and Grey Water

The rain water and grey water collected on the site will be reused for the complex. This water will be purified by a simple mechanical filter and will be used for the irrigation of the landscape with a high efficiency drip irrigation system. Additionally low-flow toilets, waterless urinals, low-flow faucets and water-efficient plumbing fixtures all contribute to water savings.

The pool positioned on the southern side of the main building is designed for the collection of rain water. This pool can also be used for experimentations on hydro-culture or cultivating plants for biofuel. **LAF**



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7. 奥斯迪姆生态园的首要设计定位是创造一个怡人的共享空间。© ONZ Architects
8. 可持续性结构剖面图 © ONZ Architects
7. The primary design decision in Ostim Eco-park is to create a pleasant sharing space for its users. © ONZ Architects
8. Section of structures of sustainability © ONZ Architects