INNOVATION AND APPLICATION OF GREEN BUILDING

MATERIALS — PUBLIC BUILDINGS

绿色建筑材料的创新与应用·公共建筑

VOL. I

深圳市艺力文化发展有限公司 编

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绿色建筑材料的创新与应用

Innovation and Application of Green Building Materials

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Preface

如今，很多建筑师是先创建建筑外观，再询问工程师如何施工以及使用何种材料。路易斯·康提出了疑问：砖块本身想要变成什么？我一向欣赏康对待材料的方式。我有一个近乎痴迷的习惯，当在小笔记本上画出建筑的第一条概念草图线时，它就已经包含了要使用的材料的构想。

若从材料选择的角度浏览本书的项目，那么很显然，在此方面，一千年来都未曾发生革命性的改变。不过，很多材料的使用方式，却有所变化。

新的技术解决方案已运用于玻璃，并且有色玻璃的使用也明显增加。借助计算机辅助数控切割，金属片可以变成任何形式的装饰，运用于立面的可视表面，且无需额外费用。与混凝土一样，钢材仍然是最重要的结构材料。

我的同胞，建筑师埃罗·沙里宁，最早于 1963 将耐候钢运用于建筑中，即美国伊利诺伊州约翰迪尔全球总部。之后，这一色调温暖、呈锈色的钢材几乎被遗忘，好在近年来，许多有趣的建筑中再度出现它的身影。

在未来，我们还可以看到利用纳米技术创造的新材料。2014 年索契冬季奥运会速度滑冰中心就是一例，它的纳米天花板，可以防止观众席的热量对场馆的冰质造成损害。

现在被广泛用于帆船和汽车行业的碳纤维，未来或许会在建筑中大放异彩。碳纤维具有强度比钢大、重量却轻得多的优点。

玻璃纤维增强混凝土，借助参数数字化建模和相关成型技术，可用于实现想要的形状。

若需更小的尺寸或更大的跨度，则可使用结构纤维混凝土来实现。

我有幸多次荣获“年度最佳混凝土结构奖”，其中四次在我的祖国领奖，一次在德国。首次获此殊荣是在 1983 年因拉赫蒂城市剧院，它是我的首座大型公共建筑项目。那时，混凝土作为建筑材料所提供的种种可能性，使我深深着迷，这座剧院也完全以清水混凝土建造而成。2003 年，我因设计哥特式红砖教堂的一座音乐厅而荣获德国混凝土建筑奖，该音乐厅再度使用清水混凝土饰面。我对这一材料的执著，源于我相信它足以媲美天然材料，建筑师可以如雕塑家一样筑造它，或如安东尼·高迪塑造天然石材一样打造它。

在追求可持续发展之路上，没有何种材料是被完全禁止的，尽管不同材料已按优先顺序进行排列。

木材得到越来越多的使用，这也许可以视作一个大趋势，即环保考量激发建筑师寻找新的表达形式。在一些国家，建造高层木制建筑的能力得到提升，这得益于相关研究成果以及消防安全法规的修正。不幸的是，在我撰写本序时，一场毁灭性的火灾将挪威一座历史悠久的木制村落烧毁殆尽，恐怕在短期内将给木制建筑带来负面的影响。尽管如此，新建筑物的建造，仍需以现代城市规划、材料开发以及安全法规的更新为主导。

显而易见，在未来，选择材料将越来越多地考虑到，它能在多大程度上支持可持续发展的目标。其中一个极好的例子，是覆盖整个立面的垂直绿化。

佩卡·萨米宁，教授，芬兰建筑师协会建筑师

PES 建筑设计事务所

There are a great many architects today who first create the form and then go and ask an engineer how to build it and what materials could be used. Louis Kahn posed the question: "What does the brick want to be?" I have always admired Kahn's approach to materials. It is almost an obsession with me that the first concept line for a building that I draw in my little Moleskin notebook already includes an idea of the material to be used.

When viewing the projects in this book from the perspective of material choice, it is obvious that nothing revolutionary has taken place in this respect in this millennium. However, the ways in which many materials are used have changed.

New technical solutions and uses have been developed for glass, and the use of coloured glass has clearly increased. With computer-aided CNC cutting, metal sheets can be turned into practically any kind of ornamentation in the visible exterior of the facade, without significant additional cost. Together with concrete, steel remains the most important structural material.

My compatriot, the architect Eero Saarinen, was the first to use Cor-Ten steel in architecture in the John Deere World Headquarters in Illinois, USA, in 1963. After that, this warm-hued, pre-rusted steel was largely forgotten, but in recent years it has appeared again in many interesting buildings.

In the future, we may also see new materials created with the use of nano technology. The Speed Skating Centre built for the Sochi 2014 Winter Olympics, for example, has a nano ceiling, which prevents the heat from the audience from damaging the ice.

Carbon fibre, a material now commonly used in sailboats and in the automotive industry, may well be used in architecture in some form in the future. Carbon fibre has the advantage of being tougher than steel while being considerably lighter.

Glass fibre Reinforced Concrete, GRC, can be used to realise demanding shapes with the aid of parametric digital modelling and the related moulding technology.

Smaller dimensions or greater spans can be achieved with the use of structural fibre concrete.

I have had the honour of receiving the "Concrete Structure of the Year" award four times in my home country and once in Germany. I first received this award for my first major public building, the Lahti City Theatre, in 1983. At that time, I was fascinated with the possibilities offered by concrete as an architectural material, and this theatre building is built entirely of fairface concrete. In 2003, I received the German Concrete Architecture Prize for a concert hall that I designed inside a gothic red brick cathedral, again using fairface concrete surfaces. My commitment to this material stemmed from the fact that I regarded it to be comparable to natural materials, to be moulded by an architect like a sculptor, or in the same way that Antoni Gaudi shaped natural stone.

No material has been entirely banned in the pursuit of sustainable development, as materials have been listed in order of preference.

The increasing use of wood could perhaps be identified as a megatrend, as escological considerations drive architecture to seek new forms of expression. In some countries, the capability to build even high-rise wood buildings has been boosted by research and the revision of fire safety legislation. Unfortunately, a devastating fire that ravaged a historic wood village in Norway at the time of writing may have a negative impact on the immediate future of wood building. Construction of new buildings, however, is guided by modern town planning, developing materials and updated safety regulations.

It is clear that in the future, material selection will increasingly be guided by how well it supports the goals of sustainable development. One example is green wall with vertical planting covering the whole facade.

Pekka Salminen, Professor, Architect SAFA

PES-Architects

ARTPOWER

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Future Editions

If you would like to contribute to the next edition of Artpower, please email us your details to: artpower@artpower.com.cn

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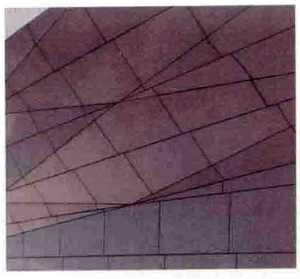
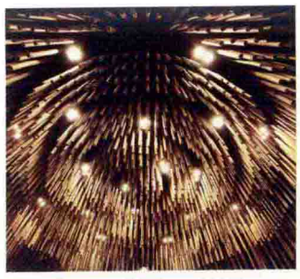


Taiyuan Museum of Art



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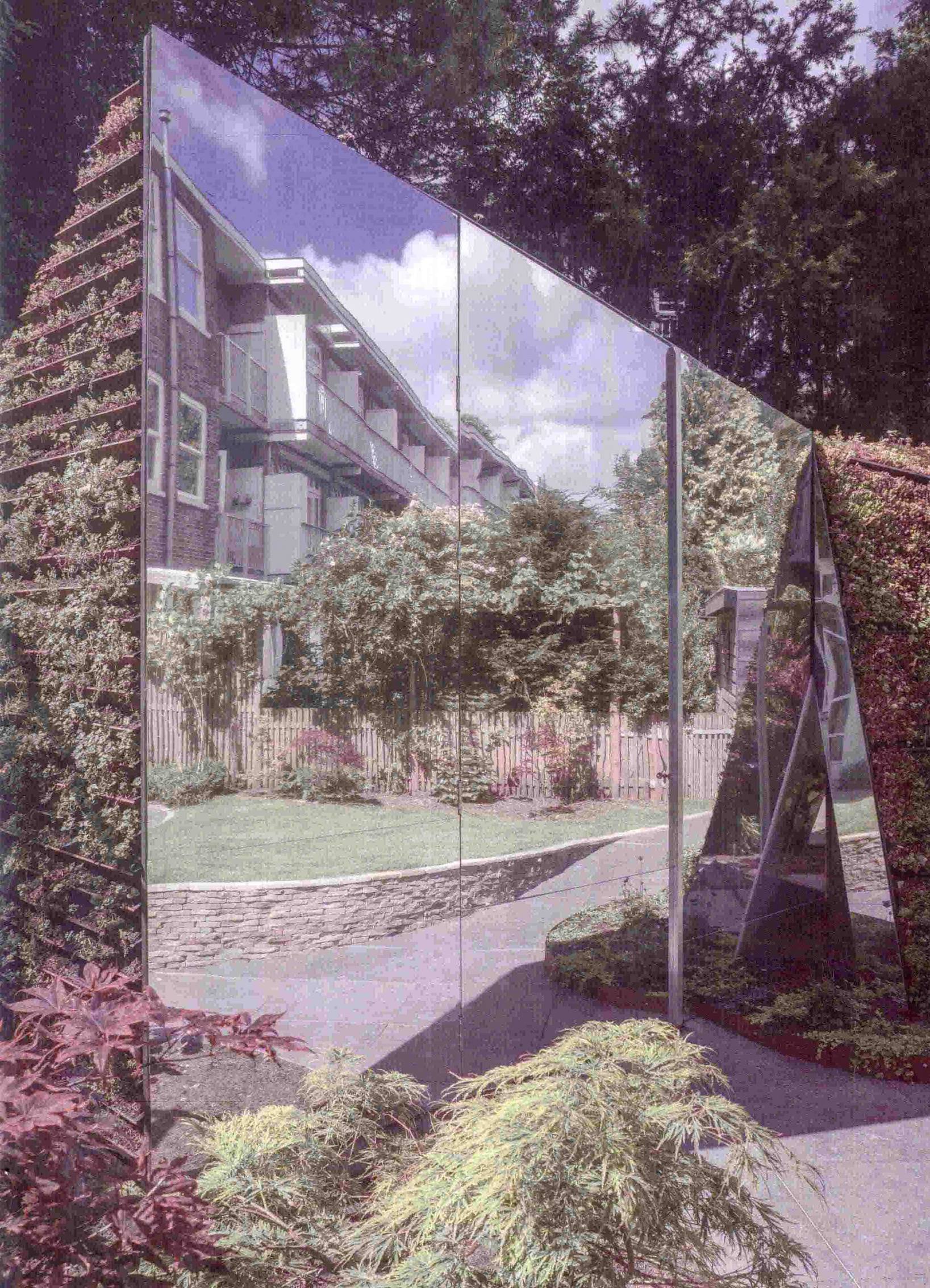


希尔咖斯卡诺建筑办公室

Selgascano Architecture Office

What is being sought with this studio is quite simple: work under the trees. To do so, we need a roof that is as transparent as possible. Also, at the same time, we need to isolate the desk zone from direct sunlight.

Hence the transparent northern part is covered with a bent sheet of 20 m^2 colourless plexiglass on the north side. The south side, where the desks are, has to be closed in much more, but not completely, so there is double sheet of fibreglass and polyester in its natural colour on the south side, with translucent insulation in the middle. All three form a 110 mm thick sandwich.

In the former case, the outward view is clear and transparent. The views in the latter case are translucent, somewhat marred by the cantilevered metal structure left inside the sandwich, with the shadow of the trees projecting onto it gently.

Half burying the whole thing, to provide horizontal views of the allotment where the arm is installed, comes before all of that, but it's OK to do it afterwards as well. Everything placed below ground level is in concrete with wood formwork, wooden planks that are also used for paving, firmly bolted, and painted in two colours with two-component paint with an epoxy base.

And to finish off, we have given it a sightly less... slightly more... wet touch: on rainy days, that rain, when it rains, the raindrops on the plastic, when they hit, sometimes more, sometimes less, sometimes a lot... sometimes a sound...

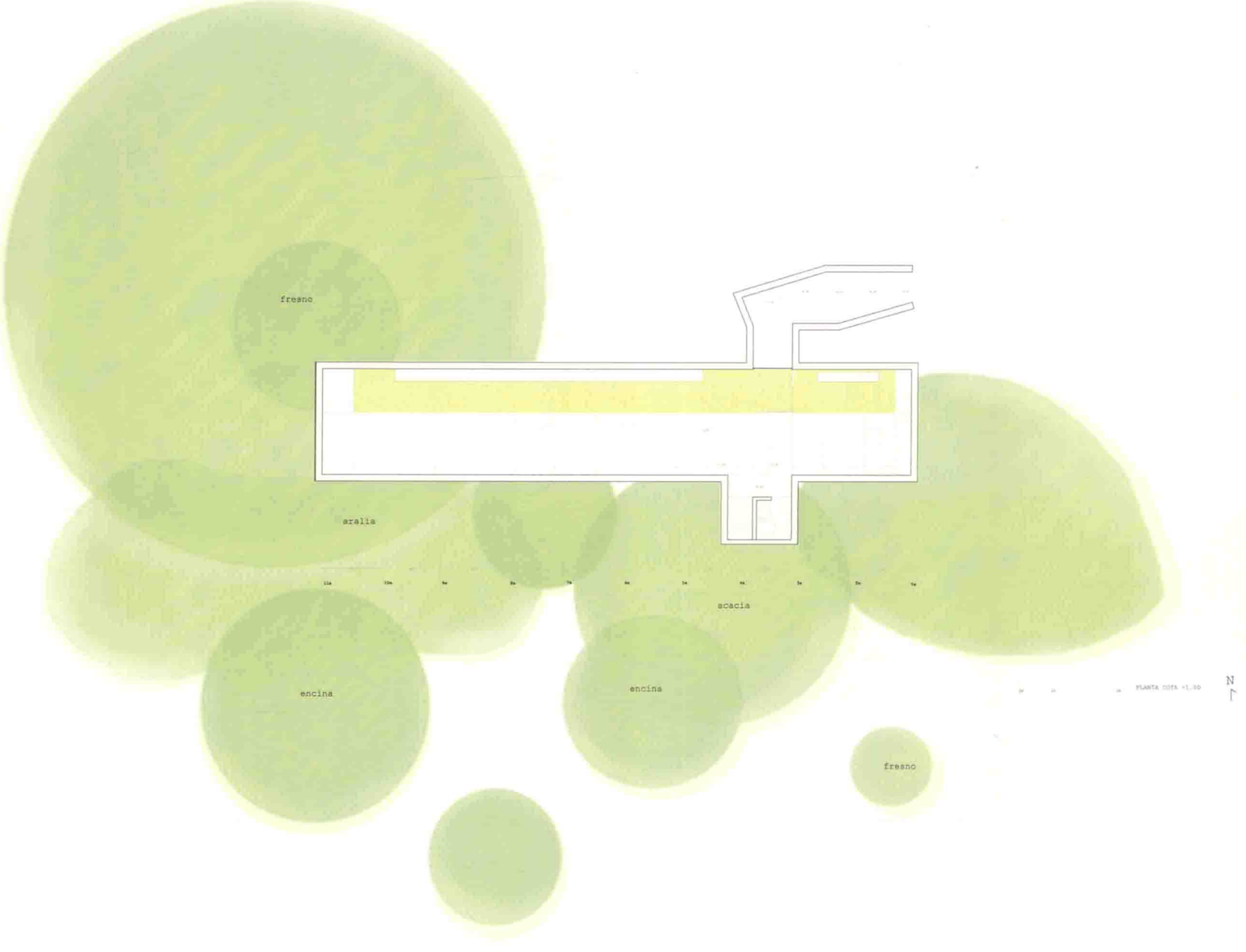
这个工作室所追求的很简单：在树下工作。为了实现这个目标，我们需要一个尽可能透明的屋顶，同时，还要将办公区跟阳光隔离，避免阳光直射。

因此透明的北部覆盖着 20 m^2 的无色有机玻璃弧形板。南侧，办公桌所在地，要围起来更多但不是全部都围起来，所以南面是双层自然色的玻璃纤维和聚酯，中间是半透明绝缘体，三者形成一个 110mm 厚的夹层。

前者从外面看是清晰透明的，后者是半透明的，稍微被悬臂金属结构损坏，留在夹层，树木的阴影轻轻地投射到夹层里。

将建筑的一半埋在地面下，首先要考虑为扶手区域营造水平视野，不过这一点在日后完善也无妨。地面下的所有东西都是在混凝土和木模版中，厚木板也用于铺砌地面，被栓紧并涂以两种颜色的双组分环氧基涂料。

最后，我们为建筑添上了或多或少的“湿”意：在下雨天，雨滴轻轻击打着塑料表面，那声音，时而清脆，时而微弱，时而响亮，变幻无常。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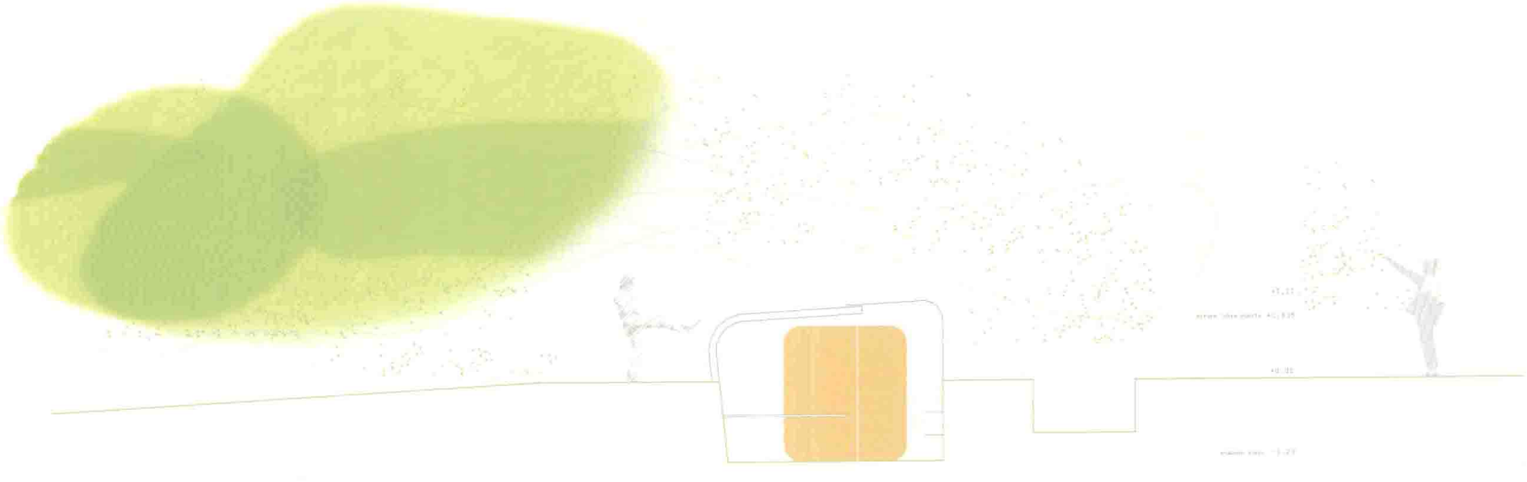

SECCIÓN POR PUERTA METACRILATO