

MASONRY MATERIAL AND STRUCTURE

砌体材料与结构 II

主 编 张大力 副主编 王盼青

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主 编	张大力
副 主 编	王盼青
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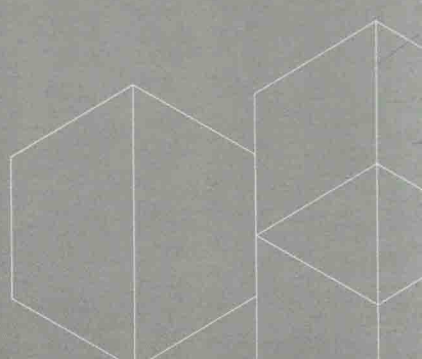
Preface



Masonry structure is widely used in the world. It is closely connected with its advantages -- easy to obtain locally, good fire resistance, chemical stability and atmospheric stability. It is better than the reinforced concrete structure. It can save cement and steel, cost lower, shorter construction period and so on.

This book selects more than 30 latest masonry structure building works worldwide. The architectural style is novel, not only to meet the building function, but also reflects the new requirements of high strength lightweight, sustainability, high shock resistance etc.. These projects locate all over the world, respectively from the climate, terrain and cultural differences, which show the diversity of masonry structure and art. We can study and show the construction from the book. A comprehensive analysis of the latest development trends of masonry materials and structures comes in the book, which matches with high quality case real photos, also the original building design and structure design data with comprehensive, including layout, building vertical plane and profile, and the details of the structure figure. It can be the reference information for architects and structural designers.

In the writing process, we obtained the support of many architectural design firms, architectural designers and structural designers, thanks!

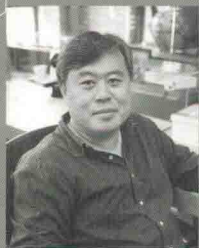
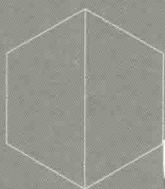


前言

砌体结构在世界范围内得以广泛应用，是与它的优点密不可分的——便于就地取材，耐火性、化学稳定性和大气稳定性均较好，比钢筋混凝土结构节约水泥和钢材，造价低，施工周期短等等。

本书在全球范围内选录了 30 多个最新的砌体结构建筑作品。这些建筑造型新颖，不仅满足了建筑的功能，还体现了高强轻质、可持续性、高抗震性等新要求。这些项目案例遍布世界各地，分别从气候、地形及文化差异等方面，展现了砌体结构的多样性和艺术性。本书通过对这些建筑的研究和展示，全面分析了砌体材料与结构的最新发展趋势，除了配以高质量的案例实景照片以外，还辅以原始建筑设计和结构设计的全面性资料，包括建筑的平面图、立面及剖面图，以及结构细节图，为建筑设计师和结构设计师提供了值得借鉴的信息资料。

本书在编写的过程中，得到了众多建筑设计事务所和建筑设计师、结构设计师的大力支持，在此表示感谢！



张大力

1987 年毕业于清华大学建筑系，获学士学位；1990 年硕士毕业于天津大学建筑系，获硕士学位，高级建筑师。现任天津华汇工程建筑设计有限公司总经理，副总建筑师、天津勘察设计协会副理事长、天津城建大学客座教授、研究生导师。曾主持参与了 200 余项大中型建筑工程项目设计，并获得多项天津市优秀勘察设计一等奖、全国优秀工程勘察设计一等奖等奖项；还参与了全国许多地方的多项消防性能化设计评审工作。

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Dartmouth College Black Family 274

Visual Arts Center

达特茅斯学院黑人视觉艺术中心

High Strength Light Weight Materials

The first trend in the application of masonry material is the development of strong, light and efficient materials. The application of strong and light hollowed blocks can lighten walls, improve productivity, contribute to more balanced stress, and increase seismic resistance. Developing highly strong and adhesive mortar can effectively promote the intensity and seismic resistance of masonry.

高强轻质材料

01

砌体材料运用的趋势之一，是发展高强、轻质、高性能的材料。运用高强、轻质的空心块体，能使墙体之重减轻，生产效率提高，保温性能良好，且受力更加合理，抗震性能也得到提高。发展高强度、高粘结胶合力的砂浆，能有效地提高砌体的强度和抗震性能。



Scale-ing House

标尺楼

Design Concept

"The great view and the light" These two concepts should be compatible for a good house. However, Pangyo, the collective housing area, is composed only of functional logic to accommodate as many houses as it can. It has a closed view being next to other buildings in the south, while facing the north from which Cheonggyesan is seen. Therefore, this project had its functional limitation that the houses couldn't get the beautiful view in the north if the important rooms were arranged in the south for the natural sunlight. The project began with this incompatible situation which had to be resolved.



Front Elevation 前立面图



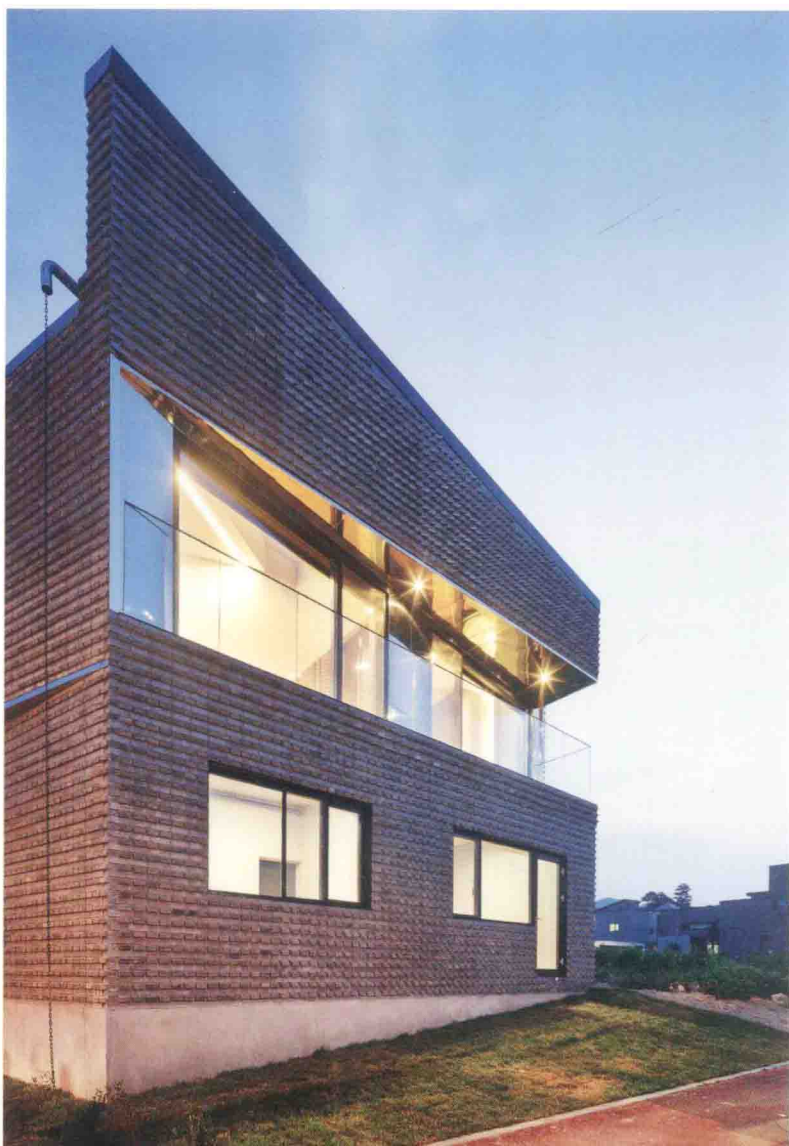
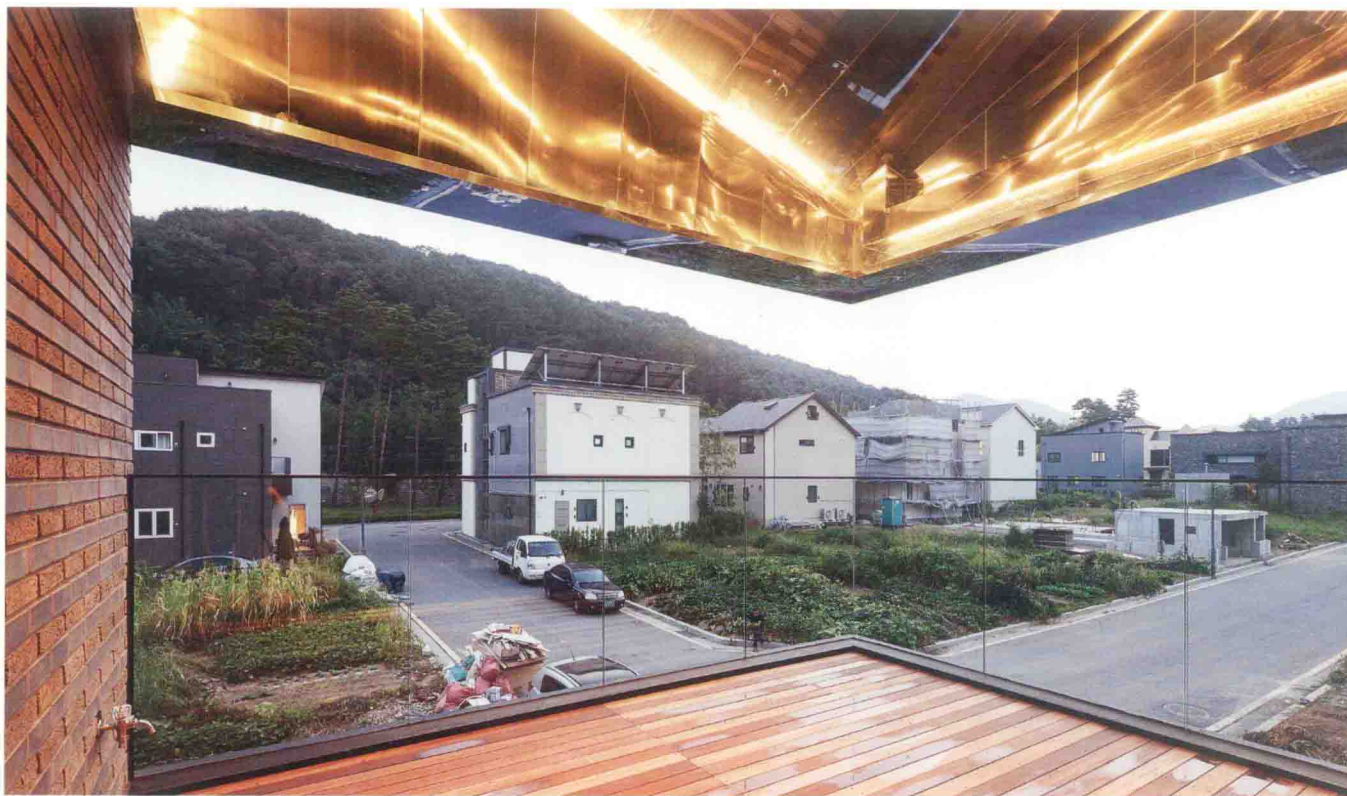
Architect JOHO Architecture Designer Jeonghoon LEE Photographs Namgoong, Sun Location Unjung-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Site Area 127.98 m² Building Area 213.69 m²

建筑设计 JOHO 建筑事务所 设计师 李助 摄影师 南官宣 项目地点 韩国京畿道城南市盆唐区吴郡洞
占地面积 127.98 m² 建筑面积 213.69 m²

设计概念

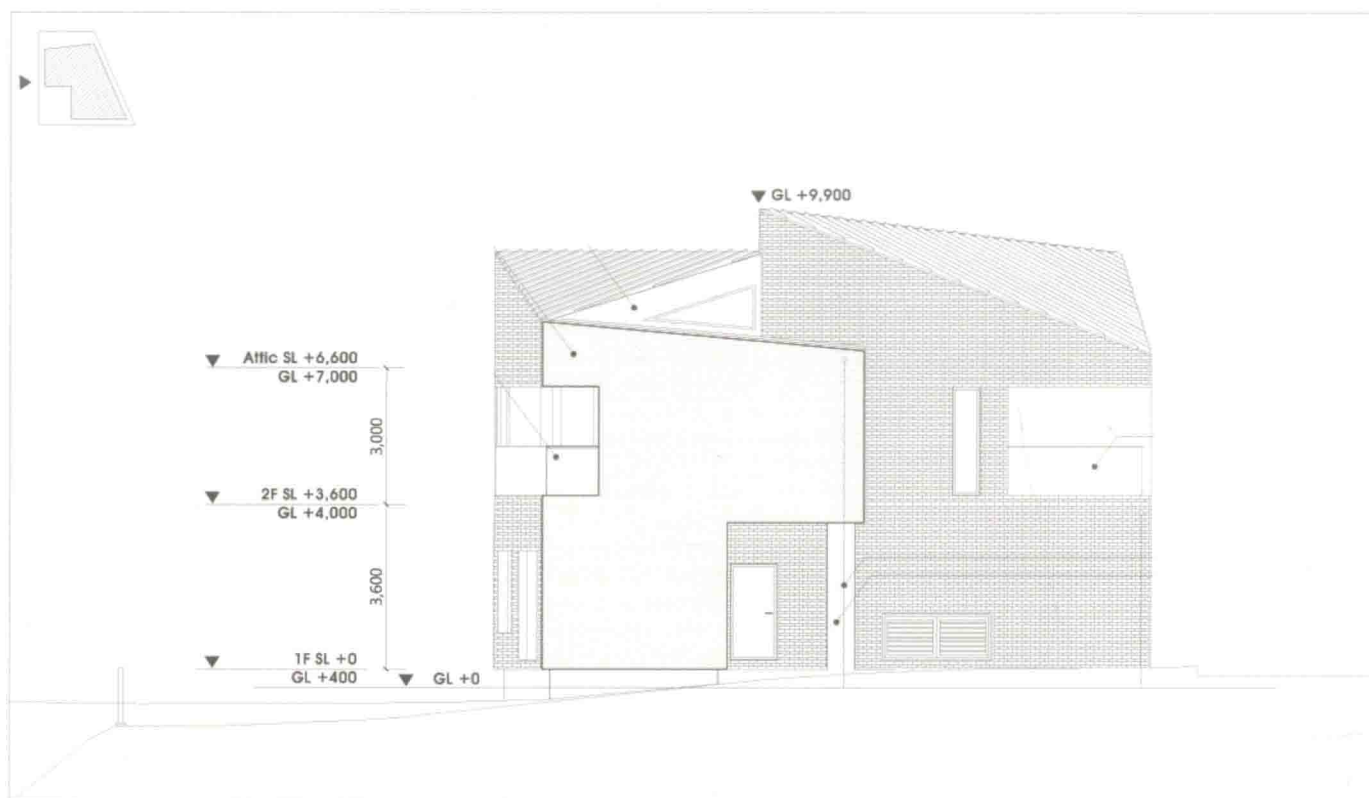
一座好的建筑应该符合“极佳视野”和“采光”这两个条件。然而，在住宅密集区，唯一的条件就是能满足最基本的功能。这栋建筑南侧紧挨着旁边的密集建筑群，没有一个很好的视野，北侧则面朝清溪川。因此，若将重要的房间设在南侧，就看不到北侧美丽的溪景，但若设在北侧，就得不到南侧的自然光，这成了摆在建筑师面前的首要难题。





The Master Room and Living Room were allocated in north to capture the beautiful scenery. In this case, the plan design has a weakness that the natural lights do not come into the rooms. To solve the problem, it was designed to have a difference of height, with the roof divided into four parts, so that the light could come into the rooms. The height of the roof was different, so the lights came in from various angles from the east, south, and the west. It became possible to feel the seasonal changes inside the building thanks to the natural lights coming from the windows. This is the optical space organization that can overcome the physical weakness of the north side and get the maximal sun lights. Moreover, the automatic upper windows discharged the heat inside to outside in summer, making the cross ventilation possible with the windows and doors in the south and north. This project design was based on the natural convection current to make an eco-friendly and heat-effective space.

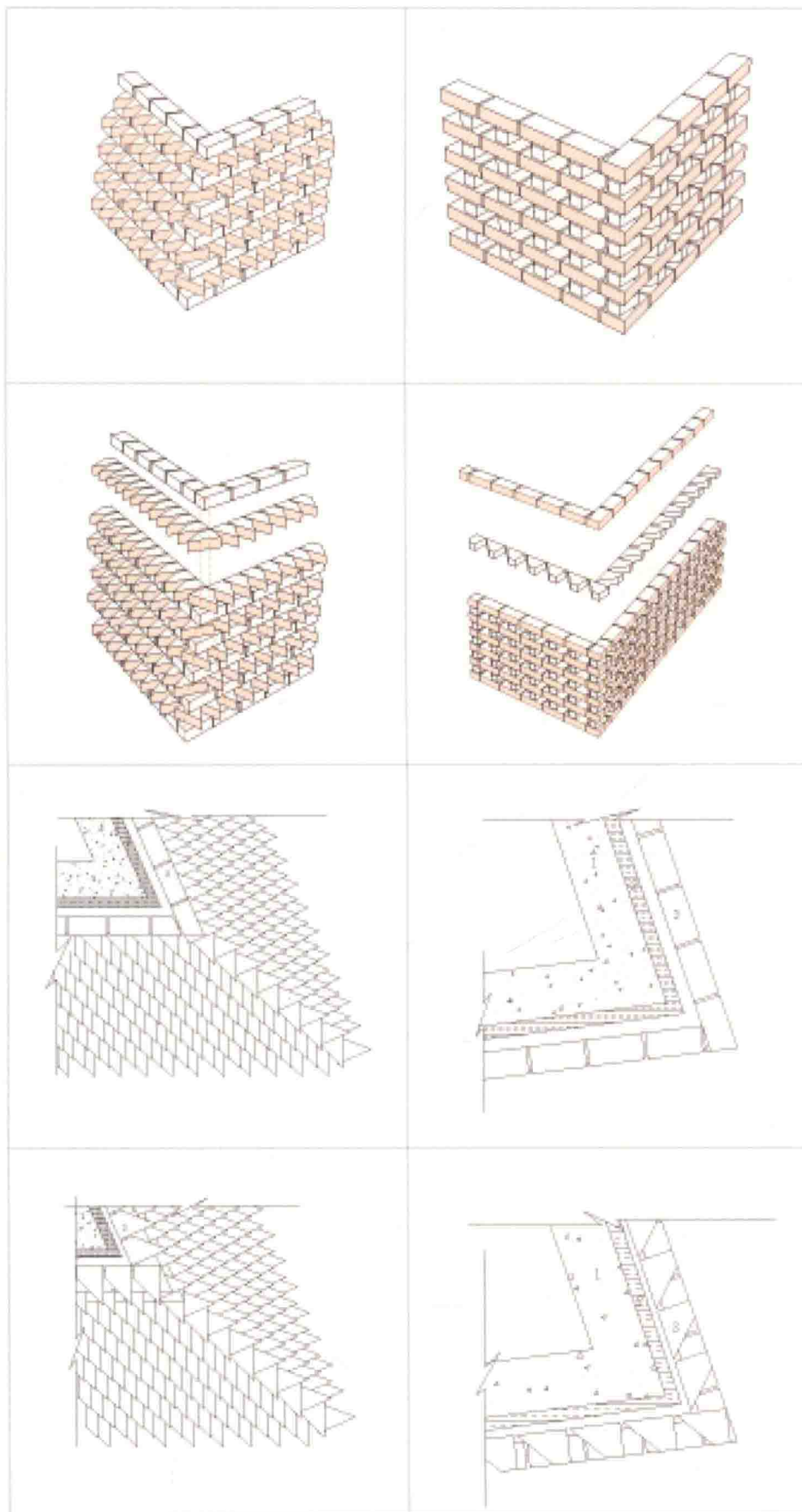
建筑师将主卧和客厅设在北侧，可以眺望美景。但遗憾的是，房间照不到自然光。为弥补这一遗憾，建筑师将屋顶从高到低分成四部分，这样光线便可以从东、南、西三个不同角度的天窗照入，足不出户便能感受到四季冷暖。建筑师通过运用光学原理，最大限度地引入光照，巧妙地解决了北侧的光照难题。此外，夏季时，屋顶天窗可以将室内的热流自动排出，实现南北门窗对流通风，形成一个环保和高效热能的空间。



Left Elevation 左立面图



1F Floor Plan 一层平面图



Analysis of Material and Structure

The brick architecture is produced by each brick as one pixel, it reveals the nature of materials as well as a combined shape. In particular, basalt is different from the general bricks, because people process the gemstone in the shape of a brick. Therefore, basalt brick can keep its essential meaning of basalt gemstone. This project is focusing on contracting the features of basalt including its rough pores and its surface that is different from a fired brick.

The architectural form consists of basalt bricks, general brick, and stainless steel. As well as general brick, about basalt bricks, which are the main material to compose the rough surface, are divided into two parts according to their angles and recomposed on the architectural form. The basalt bricks are allocated horizontally in five parts ranging from 5 degrees to 45 degrees. In addition, it is divided into the embossed and the engraved parts vertically. The 2-parted basalt bricks are recomposed with the general bricks and changes both the vertical and horizontal form with the embossed and engraved parts. The changes are caused from the features of the bricks as the material presents the changes of strata in contrast. The rough pores of the basalt gives us an essential message of the materials inside the recomposed surface. The bricks are revealing their existence by the recomposed forms with the embossing and engraving that changes the angles of the light. The materials are recomposed and the image is re-structured.

材料与结构分析

建筑的主体采用玄武岩砖结构，每块砖如同一个像素，整体构成了一幅非常有质感的画面。与普通烧结砖不同的是，玄武岩砖是由矿石加工而成，保留了玄武岩的天然特性，比如其毛糙的表面更像是贴近自然的纹理。

该建筑由玄武岩砖、普通砖和不锈钢三种材料构成。其中，普通砖和玄武岩砖是构筑外墙的主要材料，根据角度的不同，它们又被重新组合，并分成了两种。玄武岩砖以不同的角度（倾斜 5° 到 45° 不等）水平铺设在 5 个不同的平面上。此外，在垂直面，它又分成浮雕和刻雕两段，与普通砖一起重新组合构筑墙体，根据垂直面和水平面的变化，形成玄武岩砖特有的地层演变般的效果。通过玄武岩表面毛糙的气孔，还可以看出基础墙的材质。建筑师通过浮雕及刻雕砖的设计，改变了光线的传播路径，从而重构了整栋建筑的视觉效果。