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巨石公园 · 3D 混凝土打印的儿童景观空间

BOULDER PARK: A 3D CONCRETE-PRINTED PLAYGROUND

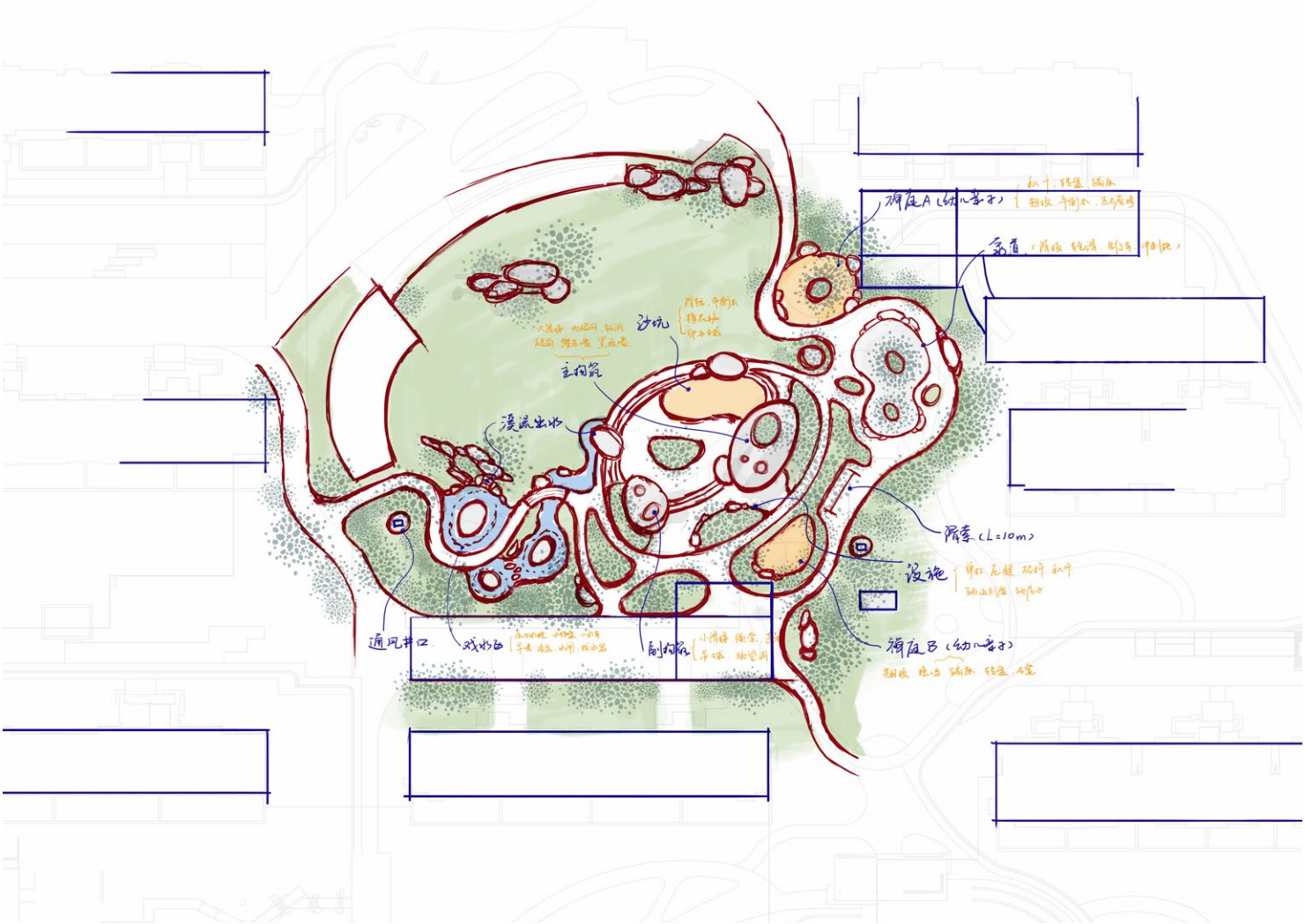
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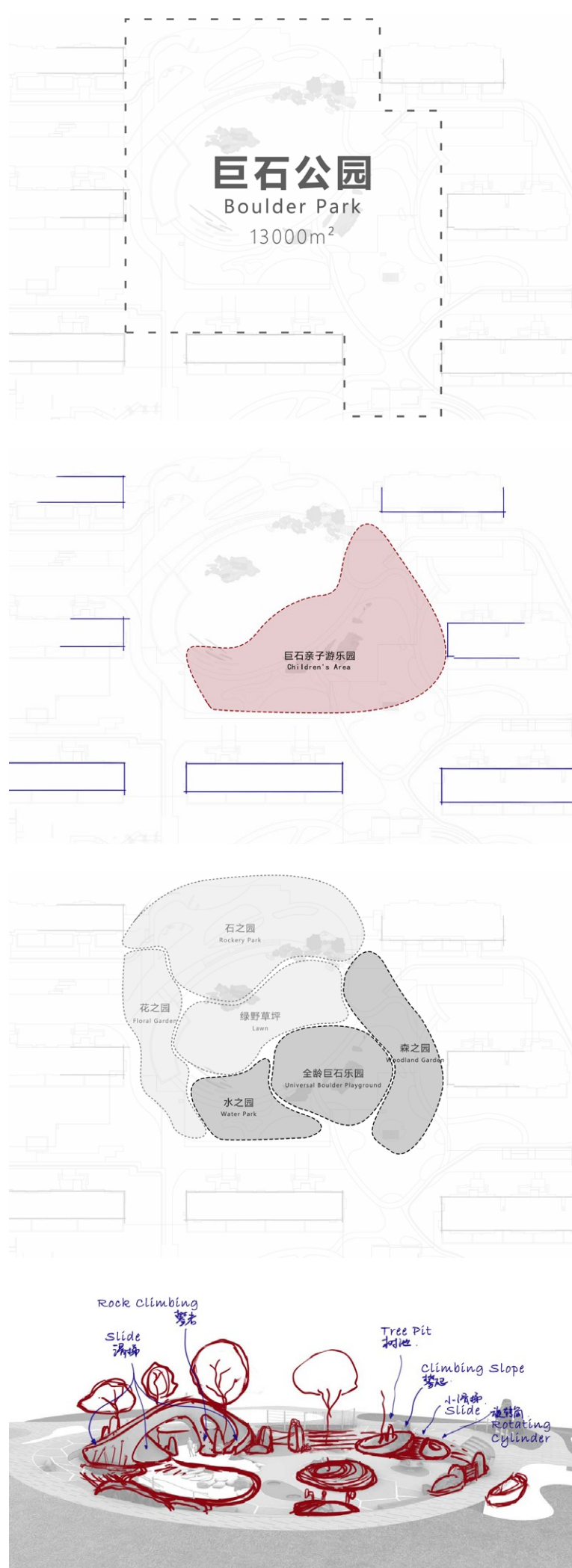
巨石公园 • 3D 混凝土打印的儿童景观空间

“在一万三千平的社区公园，我们将代表永恒与守望的自然材料——巨石，作为园林的核心设计要素，并与活动体验功能自然地结合在一起。譬如匍匐在沙坑上的巨石，可以改造为攀登、歇靠的游戏装置；浅溪里的石头，可以成为戏水装置的一部分。而巨大的岩穴探险空间，则由时代发展日趋成熟的 3D 打印混凝土技术来创造性地实现。”

BOULDER PARK: A 3D CONCRETE-PRINTED PLAYGROUND

"In the 13,000-square-meter community park, we use the natural material of large boulders — representing eternity— as the core design element of the garden, naturally integrating with the functional and experiential activities. For example, boulders lying over a sandpit can be transformed into climbing and resting play structures; stones in the shallow creek can become part of the water play installation. And the massive rock cave adventure space is creatively realized by the increasingly advanced 3D-printed concrete technology."





1. 设计背景

巨石公园，坐落在山东济南万科雪山城云湾园内，社区中心区域，占地约1.3万平米，是集儿童玩耍、浅溪戏水、亲子陪伴、自然休闲于一体的综合性社区公园。依据风格特质和功能需要，总体划分为全龄巨石乐园、水之园、森之园、石之园、花之园。其中，喜随主持设计的儿童活动部分，包括有全龄巨石乐园、水之园、森之园三部分。

1. DESIGN BACKGROUND

Boulder Park, located in the Yunwan Garden of Vanke Snow Mountain City in Ji'nan, Shandong, covers an area of approximately 13,000 square meters in the central area of the community. It serves as a comprehensive community park that combines children's playground, shallow stream water activities, parent-child interaction, and leisure. According to the style characteristics and functionality, the park is generally divided into several areas: the All-Age Boulder Playground, Water Garden, Forest Garden, Stone Garden, and Flower Garden. Among them, the children's activity part, which is designed by XISUI Design, includes the All-Age Boulder Playground, Water Garden, and Forest Garden.

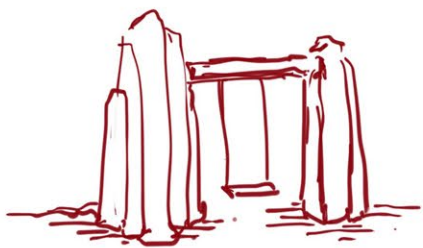


2. 全龄巨石乐园与森之园

参与体验方面，全龄巨石乐园及森之园，将秋千、滑梯、滑竿、蹦床、摇马、跷跷板、转盘、钻筒、传声筒、攀爬绳等多种百玩不厌的儿童活动功能，融入自然巨石与混凝土洞穴所营造的景观场地，帮助孩子们乐此不疲地感受户外时光的同时，锻炼了上下肢的身体力量，促进了大脑对于自然认知、平衡等发育的需要。

2. ALL-AGE BOULDER PLAYGROUND & FOREST GARDEN

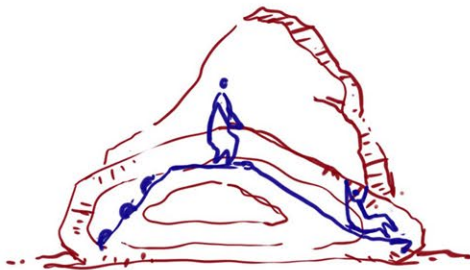
In terms of interactive experiences, the All-Age Boulder Playground and Forest Garden incorporate a variety of children's activity facilities such as swings, slides, seesaws, trampolines, rocking horses, merry-go-rounds, climbing tunnels, speaking tubes, climbing ropes, and more. These facilities are seamlessly integrated into the natural landscape formed by large stones and concrete caves, providing children with endless enjoyment while also helping them build physical strength in their limbs. Additionally, these activities promote the development of their brain's ability to recognize nature, balance, and other essential skills.



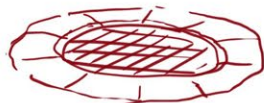
巨石秋千
Boulder Swing



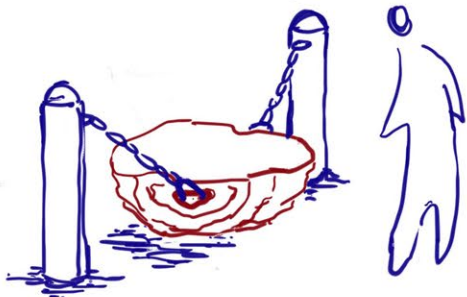
巨石翘板
Boulder Seesaw



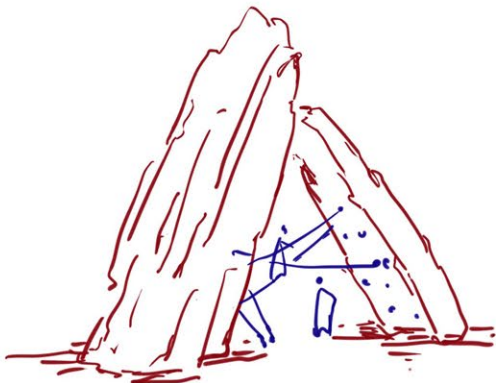
滚石滑梯
Rolling Stone Slide



石井蹦床
Stone Well Trampoline



悬石座椅
Suspended Stone Seat



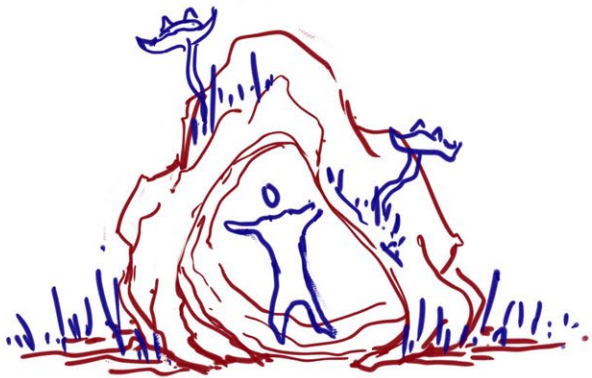
勇者峡谷
Brave Canyon



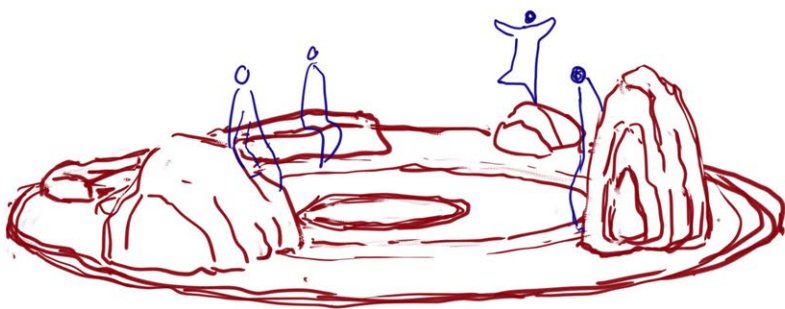
乱石平衡木
Rough Stone Balance Beam



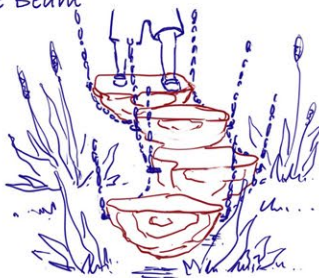
平衡木 / 梅花桩
Balance Beam / Stepping Logs



置石钻洞
Boulder Tunnel



禅庭转盘
Zen Courtyard Roundabout

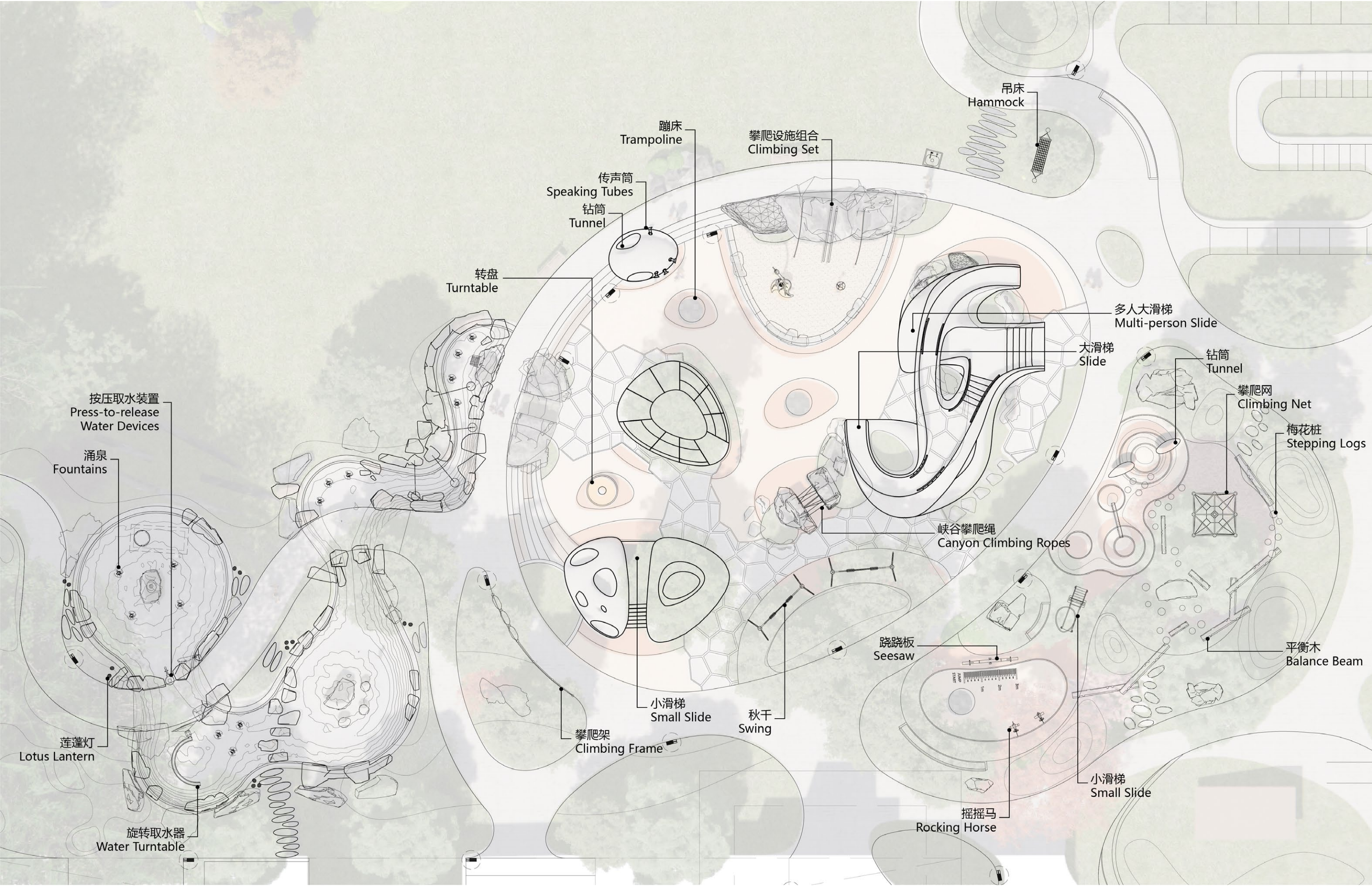


悬石吊桥
Suspended Stone Swing Bridge



岩壁彩绘墙+黑板
Rock Wall Mural · Blackboard





平面图
Plan

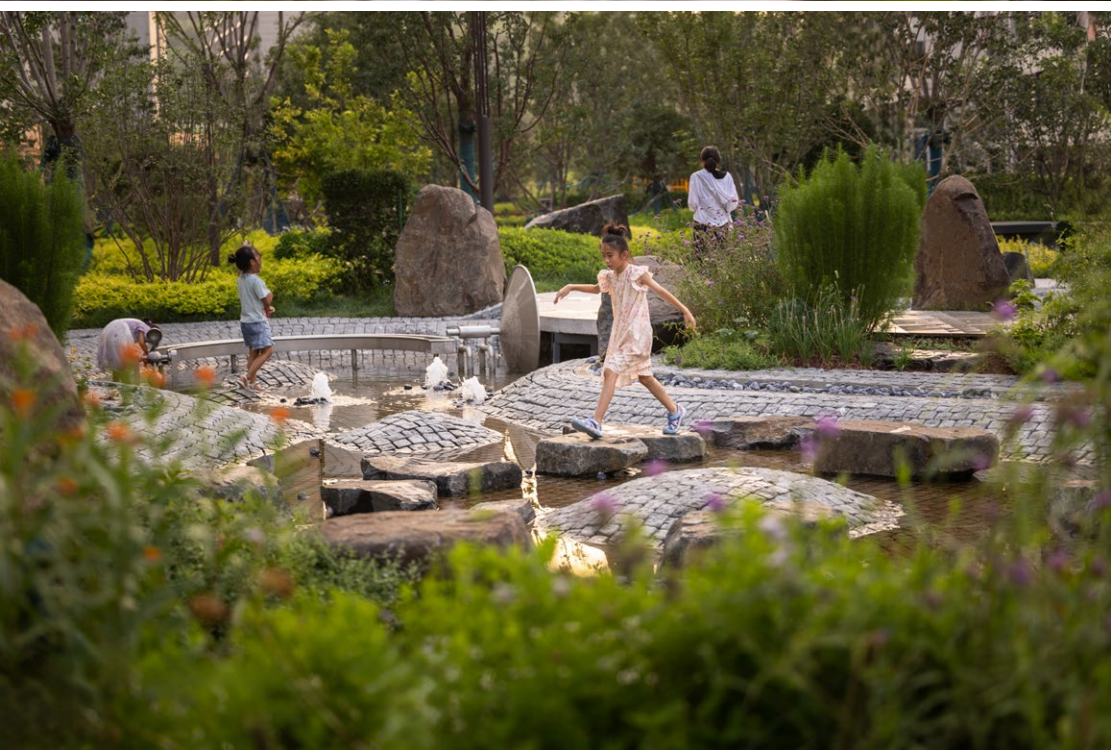


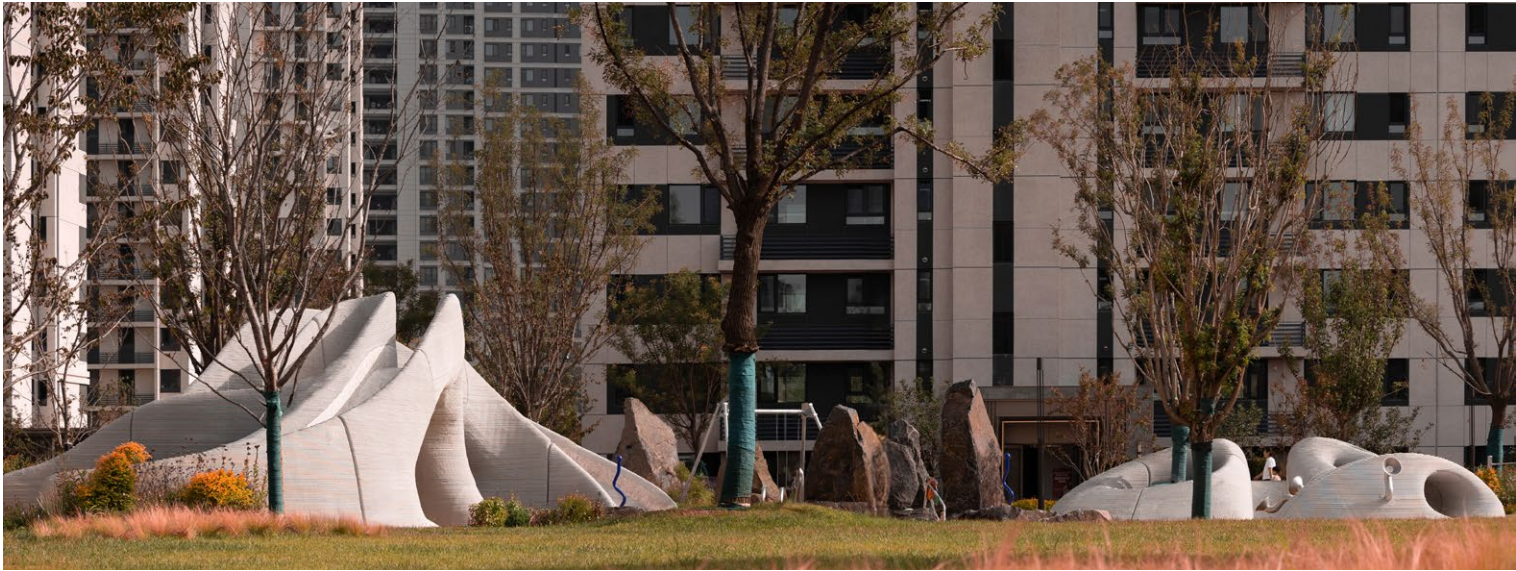
3. 水之园

水之园以潺潺浅溪为笔，轻轻勾勒出一处与自然融汇的趣味户外戏水乐园。涌泉、跳泉等元素为孩子们提供了丰富的戏水体验。孩子们可以在这里感知水的温柔力量、体验与自然平等共处，激发探险欲望与好奇心。互动装置如水转盘、取水器和按压取水装置等，让孩子们在玩耍的同时，不仅享受水的乐趣，也在探索中获得成就感。

3. WATER GARDEN

The Water Garden uses the gently flowing stream as a brush to softly outline a playful outdoor water park that blends with nature. Elements such as spring fountains and jumping jets provide children with a rich water play experience. Here, children can feel the gentle power of water, experience harmony with nature, and ignite their sense of adventure and curiosity. Interactive installations, such as the water turntable, water pump, and pressure-activated water dispensers, allow children to enjoy the fun of water while also gaining a sense of achievement through exploration.





创新技术应用：3D 混凝土打印技术

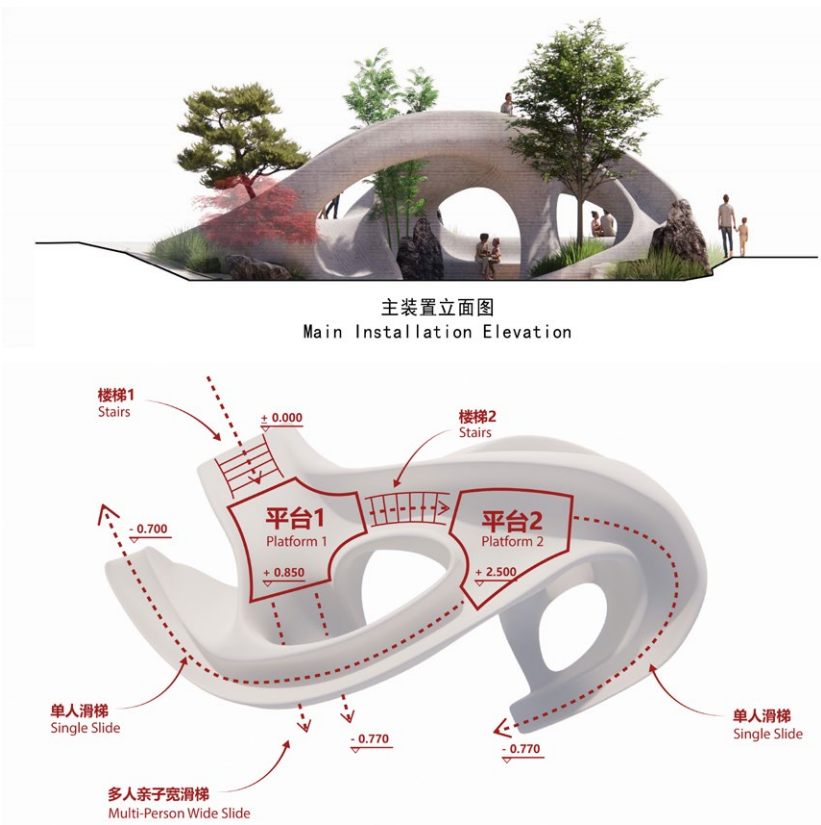
INNOVATIVE TECHNOLOGY APPLICATION:
3D CONCRETE PRINTING

4. 核心装置

公园的核心装置采用国际前沿的 3D 混凝土打印技术，基于数字模型逐层堆积材料，形成实体结构。该技术通过计算机控制的机械臂精确挤出液态或半固态混凝土，随后快速固化，逐层构建直至完成整个结构。其核心在于数字化设计与材料科学的紧密结合，赋予了现实空间设计建造领域前所未有的自由度和复杂度。这种工艺独特的层积岩纹理，与自然巨石、洞穴的质感相融合。同时其异形曲面一体成型的优点，提高了空间的精度，与体验的流畅性。

4. MAIN INSTALLATION

The most eye-catching interactive installations on the site are created using cutting-edge construction technology—3D concrete printing. This advanced manufacturing method, based on digital models, forms solid structures by layering materials. The process uses computer-controlled robotic arms to precisely extrude liquid or semi-solid concrete, which then rapidly solidify, building up layer by layer until the entire structure is complete. The essence lies in the tight combining of digital design and material science, giving designers unprecedented freedom in the field of spatial design and construction. This process produces unique layered rock textures that blends harmoniously with the tactile impression of natural boulders and caves. Moreover, its advantage of forming complex free-form curved structures in once enhances both the spatial accuracy and user experience.

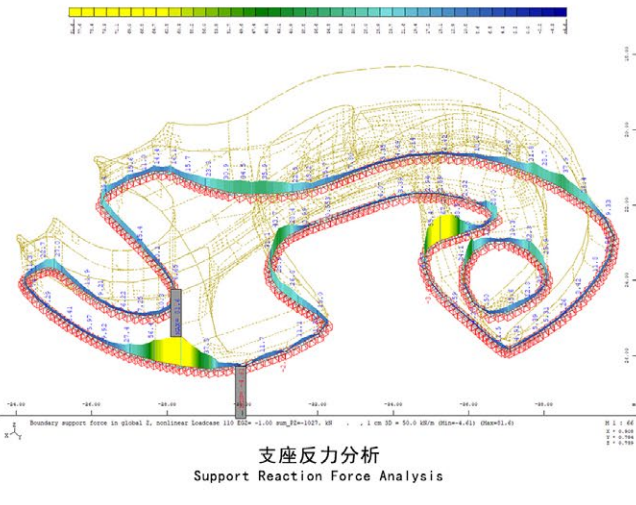
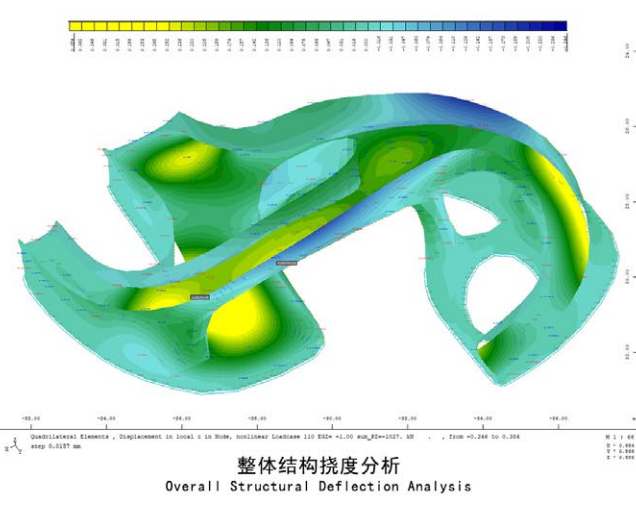
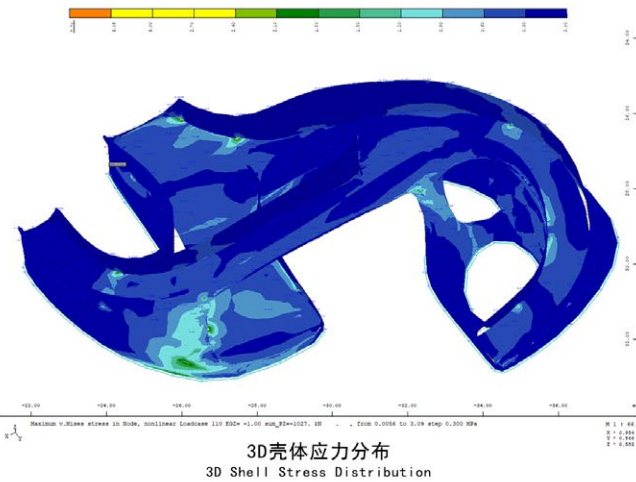


• 3D 混凝土打印一体成型

借助数字控制造型打印技术，复杂异形曲面得以一体化成型。不仅显著提升了造型的精确度与体验流畅性，避免了传统工艺中难以避免的误差，也降低了对人工技艺的依赖，展现了技术与艺术的紧密融合。

3D CONCRETE PRINTING MONOLITHIC MOLDING

Digitally-controlled 3D printing enables monolithic molding of complex organic shapes. This not only significantly improves shape accuracy, effectively avoiding inevitable errors in conventional craftsmanship, but also reduces reliance on manual skills, showcasing the close fusion of technology and art.





• 层岩峡谷

3D 打印工艺独特的层积岩纹理，与周围的自然置石景观相得益彰，既满足当下使用功能，又不失探秘野趣氛围。孩子们在“巨石”中嬉戏，仿佛穿梭于真正的山峡之间。

同时，从细腻的曲面造型中，自然衍生出的凹凸与坡面，形成了台阶、扶手、滑梯、看护座椅等元素。实现了功能性与装置造型的和谐统一。

LAYERED CANYON

The unique layered rock texture of the 3D printing technique complements the surrounding natural stone landscape, meeting current functional needs while maintaining an atmosphere of exploration and adventure. Children playing among the "boulders" seem to be traversing real canyons.

Meanwhile, the subtle curves of the surface naturally create steps, handrails, slides, and seating elements, harmonizing function with the form of the installation.



• 安全趣味

儿童游戏场地的安全性与趣味度尤为重要。所有通过 3D 打印创造出的景观装置,边角都被设计得圆润柔顺、无尖锐棱角,避免了儿童在游戏过程中可能发生的磕碰伤害。同时,洞穴场景与滑梯、钻洞、传声筒等活动游戏玩法紧密结合,使得园林环境与儿童活动在形式与功能上达成了奇妙的统一。

SAFETY AND FUN

Safety and enjoyment are paramount in children's play areas. All 3D-printed landscape installations are designed with smooth edges and rounded corners to ensure that there are no sharp or hazardous points that could cause injuries. The cave-like scenes, with slides, tunnels, and speaking tubes, combine the garden environment with children's play activities in terms of form and function.







5. 设计师说

主创设计师胡一昊，说：

“景观构筑物及景观装置，往往体量较小，荷载要求低，功能需求简单清晰。在 3D 打印混凝土技术的应用上，相比于建筑领域，景观项目或许拥有更加丰富的使用场景。

尽管当前 3D 混凝土材料技术，仍面临一系列挑战，诸如受力均匀性不够稳定、配筋手段相对单一等。但巨石公园所采用的 3D 打印材料，其平均强度达到 50MPa，超越了传统的 C40 混凝土强度标准。这一技术指标，已足够满足大部分景观装置及构筑物的结构需求。

在景观项目中，户外耐久性、自然造型的实现能力、施工安装的简便性，以及人力成本的节约，成为首要考虑的因素。而 3D 混凝土打印技术，正是以其在这些方面的显著优势，成为一种较为理想的选择。”

5. DESIGNER SAY

Hu Yihao, lead designer, explains:

“Landscape structures and installations are often small in scale, with low load requirements and simple, clear functional needs. In the application of 3D-printed concrete technology, compared to architecture, landscape projects may have even more diverse usage scenarios.

Although the current 3D concrete materials still face a series of challenges—such as uneven stress distribution and relatively simple reinforcement methods—the 3D printing materials used in Boulder Park have an average strength of 50MPa, surpassing the traditional C40 concrete strength standard. This technical specification is more than sufficient to meet the structural needs of most landscape installations and structures.

In landscape projects, outdoor durability, the ability to achieve organic shapes, ease of construction and installation, and cost savings in labor are the primary considerations. 3D printing technology, with its significant advantages in these aspects, has become an ideal choice for this purpose.”



6. 总结

该公园展现了新技术——3D 打印混凝土——如何在尊重当地文化与环境的同时提升公共空间。通过将 3D 打印混凝土构件与自然元素结合，项目为玩耍、探索和亲近自然提供了场所。该项目体现了 3D 打印混凝土构件与周边环境协调共融，为社区带来功能与美学双重价值。

6. CONCLUSION

The park shows how new technology—3D concrete printing—can enhance public spaces while respecting local culture and the environment. By integrating 3D-printed concrete elements with natural features, it offers a space for play, exploration, and connection with nature. This project exemplifies how 3D-printed concrete elements harmonize with their surroundings, providing both functional and aesthetic value to the community.



项目信息表

项目正式名称：	巨石公园 · 3D 混凝土打印的儿童景观空间
项目地点：	中国山东省济南市历城区将山北街万科雪山城云湾园
开发商：	济南万科
项目面积：	4,000m²（仅儿童设计范围）
设计团队：	喜随设计
主设计师：	胡一昊
项目经理：	彭阳
设计师：	李铖蹊、郑孟子、陈文琪、阮成昕、刘一何、褚天成
结构顾问：	栾庐构造设计事务所
3D 打印施工：	冠力科技
项目领域：	儿童活动空间
预算：	人民币 250 万元
竣工时间：	2024 年 6 月 26 日
摄影师：	胡一昊，喜随设计；周晟，沉璧视觉
视频：	沉璧视觉

DATA SHEET

Official Project Name:	Boulder Park: A 3D Concrete-Printed Playground
Location:	Vanke Snow Mountain City, Jiangshan North Street, Licheng District, Jinan City, Shandong Province, China
Client:	Vanke Jinan
Project Site Area:	4,000m² (children's area only)
Design Team:	XISUI Design
Chief Designer:	Hu Yihao
Project Manager:	Peng Yang
Designers:	Li Chengxi, Zheng Mengzi, Chen Wenqi, Ruan Chengxin, Liu Yihe, Chu Tiancheng
Structural Consultant:	LuAnLu Partner Structure Consulting
3D Printing Construction:	Guanli Intelligent Technology Co., Ltd.
Project Sector:	Children's Activity Space
Budget:	CNY 2.5 million
Project Completion Date:	June 26, 2024
Photographer:	Hu Yihao, XISUI Design; Zhou Sheng, CHENIN Visual
Video:	CHENIN Visual