

加州科学院

California Academy of Sciences

客户 California Academy of Sciences

建筑设计 Renzo Piano Building Workshop Stantec Architecture (San Francisco)

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可持续设计

新设计的目标——“探索、解释、保护自然世界”使加州科学院成为可持续设计策略应用的理想工程。除了高效的取暖与空调系统，建筑材料的选择、旧有材料的重新利用与组合方式等组成了整体可持续解决方案。

建筑选址与日照和通风有关，屋顶回收雨水以及建筑能耗自供给等均被整合到建筑设计之中。可持续也是展览设计、展览理念以及日常工作的一部分。基于对功能的阐释，公众将看到并分享到许多可持续设计的原理。

新建筑保留与原有建筑相同的位置和朝向。原有建筑围绕中心广场组织功能区，在新设计中也保留了原有的三个古老建筑元素，作为与历史沟通的桥梁表达对历史的缅怀，分别是：非洲厅、北美厅（加利福尼亚）和斯坦哈特水族馆入口。两个球状展厅——天文馆穹顶与雨林生物圈在中心广场附近，与重建的斯坦哈特水族馆入口一起，反映了建筑所代表的性质：空间、土地与海洋。这三个标志将屋顶“抬升”，创造出波浪状的屋顶景观。

新建屋顶高度与原有大厅的屋顶高度相同，风格统一。屋面种植了本地的抗旱植物，这些绿色屋顶延伸出围墙，形成了一个玻璃雨篷，为建筑遮阳挡雨，并在玻璃之中安装了超过55 000块的太阳能光电板为建筑提供能源。在这个有机屋顶的中心，玻璃



Sustainable Design

The mission statement of the Academy, “To Explore, Explain and Protect the Natural World”, (combined with the mild San Francisco climate) made this project ideal to incorporate sustainable design strategies.

Not only energy efficient heating and cooling, but also a more holistic approach was agreed to, involving a serious effort in the choice of materials, recycling of the materials of the old Academy and the way in which they are put together.

The location of spaces in relation to daylight and ventilation, the efficient use of water and the run-off from the roof, as well as the generation of energy are integral to the building design.



Sustainability is also part of the exhibition design, the exhibition philosophy, and its day-to-day operation. As a functioning demonstration the public will be able to see and understand many of the principles of sustainable design. The new building retains the former location and orientation, and like the original Academy, all functions are organized around central Piazza, or courtyard.

Three historic elements of the previous Academy have been maintained in some fashion, as a memory and a link to the past: African Hall, North American (California) Hall and the entrance to the Steinhart Aquarium.

Two spherical exhibits, the Planetarium Dome and the Rainforest Biosphere, are located adjacent to the Piazza. Together with the reconstructed entrance of the Steinhart Aquarium, these elements represent the Academy: Space, Earth and Ocean.

These 3 icons ‘push’ the roof up, and thus create the undulating roofscape.

This roof, floating at the same height as the roof of the original halls, formally unifies the institute. It is landscaped with native plant species which are drought resistant and do not require irrigation once established.

The green roof extends beyond the perimeter walls and becomes a glass canopy providing shade, protection from the rain and generates energy through more than 55,000 photo voltaic cells in the glass.

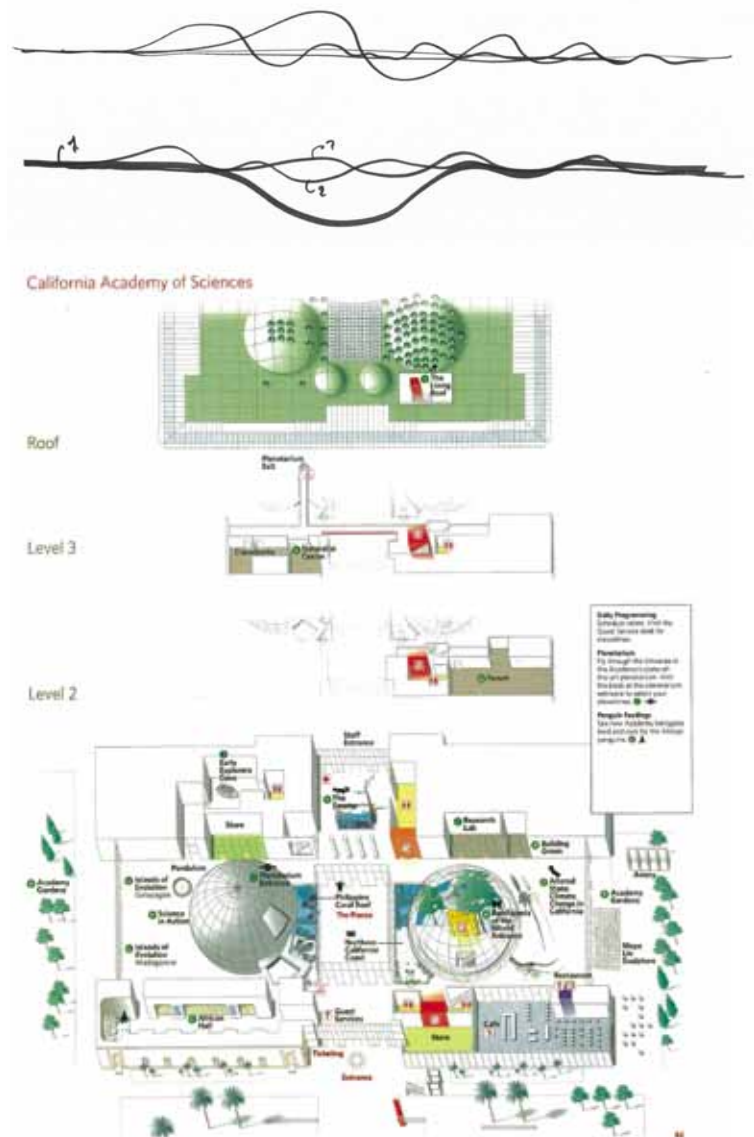
In the center of the Living Roof a glazed skylight covers a piazza. Much smaller skylights distributed over the surface of the roof, allow natural light into the exhibit space and can be automatically be opened for the natural ventilation of the space below.

The Research activities and the storage of scientific specimens (a collection of 18 million specimen in jars and special containers) will be concentrated on the 5 floors facing south to the park. Additionally the exhibit halls and the public entrance, will be oriented to the other wind directions on the ground level. In the basement, below this floor, a large aquarium has been located together with back house functions of the museum and the life support system for the tanks.

The Piazza

The piazza is the focal point of the new institute and is covered partly with a glass roof, its structure recalling a spider web, while the center is open to the sky. The two main aquarium tanks are positioned adjacent to this space and connect the groundfloor with the aquarium in the basement.

During opening hours the piazza will be used as a lunch and break-out





天窗覆盖中心广场。许多小块的天窗散布在屋顶表面，将天然光引入展厅空间。同时，天窗能自动开启加快自然通风。

研究活动与科学样品的存贮（在特制容器中有超过1 800万的样品）将集中在朝南的五层中。此外，展厅与公共入口避开冬季主导风向。在地下室，大型水族馆的设置加强了博物馆房间的功能性并为贮存提供生命支持系统。

中心广场

广场成了新建筑的焦点，部分被玻璃屋顶覆盖，中心裸露，让人不禁联想起蜘蛛网。两个水族箱毗邻广场而建，将地下室的水族馆与一层地面相连。

在开放时间，中心广场将被用于餐饮与休憩空间；而在夜晚，又可当作音乐厅、晚宴与聚会功能使用。玻璃天窗下先进的伸缩面料屏幕加强了活动空间的舒适性。阳光与雨水幕，加之改善声学条件的特殊幕布都是帮助调节空间微气候的重要元素。

展厅

展览的概念设计与建筑设计是同时开始的，建筑首层的展台空间高34英尺，通过立面与屋顶有效利用了天然采光与自然通风（玻璃幕墙与波浪状屋顶都有可操作的通风口，白天可以有效向外散发室内热空气）。因有玻璃罩篷的保护，建筑围护结构外也设置了展台，并一直延续到研究所坐落的花园之中。

在地下室空间成功实现了水展厅布置，没有了光线的干扰，参观者能更加清晰地观察水箱里的展品。由于毗邻中心广场，大量自然光线能够穿透水体进入下层的水展厅。

水箱环境需要严格控制，因此紧挨生命支持系统空间。非洲

space, in the evening for concerts, diners and parties. A sophisticated system of retractable fabric screens under the glass skylight assures the comfort level in this event space.

Sun and rain screens, as well as special screens to improve the acoustics, are important features that help to control the microclimate in the space.

Exhibit Spaces

The exhibit design in concept was developed parallel with the building design resulting in a large, flat, 34 feet high flexible exhibit space on the ground level which benefits from the natural light and ventilation through the facades and the roof. (the space is ventilated by means of operable vents in the glazed facades and openings at the large undulations of the roof, where warmer air is allowed to escape during the day)

This exhibit space continues outside of the building envelope, and is first protected by the glass canopy and then continuing in the park in which the Academy is situated.

A new aquarium exhibit is realized in the basement, taking advantage of the absence of light for better visibility into the tanks. The large open tanks adjacent to the Piazza are connected to the aquarium exhibits, thus allowing natural light to penetrate through the water into the aquarium below.

Because of the need for a highly controlled environment in the tanks they are positioned next to the life support system spaces.

African Hall was restored and continues to display its historic dioramas, while California Hall was replaced by a similar volume which houses the new Auditorium as well as the Academy Restaurant.

Public Entrance

The main entrance on Music Concourse Drive was shifted about 80 feet to the northeast, to center the facility on the site. This new configuration achieves a more compact footprint and in doing so returns one acre of land to the Golden Gate Park.

The elimination of one driveway and landscaping the area between the Concourse bowl and the Academy, the original formal stairs accessing the Academy have been eliminated creating a gentle slope that leads up to the entrance.



厅被重新修复并继续展示其历史悠久的各种模型；而加州厅被改造成同体量的包含会堂与研究所餐厅的功能空间。

公共入口

为了使设施居于场地的中心，音乐大厅车道主入口向东北方向移动了80英尺。新的布局使得建筑占地面积更加紧凑，并且为金门公园节省出1英亩的土地。减少一条车道将其绿化，原有通向研究所的楼梯也被通向入口的缓坡取代。

新的停车库出口加建了玻璃罩篷，与研究所入口相邻。中心车道安排了建筑的另一个入口，因处于研究与行政区一侧而成为工作人员入口，将来也可作为公众入口。

研究、收藏与行政（RC&A）办公楼

RC&A办公楼共5层，其中地上3层，地下2层（紧邻设备用房）。科学图书馆占据上层楼层，研发部（包含部分行政功能）则占据了一至四层的大部分。整个科学检体样品被存贮在研究与行政空间的正立面空间与灵活展台。

材料

为了保持屋顶与墙体的一致性，材料选择也尽量简单统一。颜色的选择也具有偶发性，尽量保持中性的空间。除了重新修复使用的非洲厅采用原有的石灰石，墙体与幕墙主要以浅灰色建筑混凝土材料为主，模板挂孔外露用来固定展品。

地板材料为抛光混凝土，展厅腹板由一系列单独的白色声学板组成，镶嵌在屋顶天花上。玻璃幕墙采用超白玻璃，增加了透明性和室内与公园间的通透性。屋顶为钢混结构，上覆包含储水层的绿植，屋顶外露部分为轻钢结构，镶嵌带太阳能光电板的玻璃板。

（译／李昭君）

The new parking garage under the Music Concourse Drive has a protected exit under the glass canopy, adjacent to the entrance doors of the Academy. A second entrance, from Middle Drive, passes through the Research and Administration block, thus becoming mainly the staff entrance with a possibility to allow public access also here in the future.

The Research, Collection and Administration Building

Only three of the five floors of the RC&A building are above grade. The two lower floors are under the main exhibit floor level, directly adjacent to ‘back of house functions’, such as the aquarium life support, the loading dock, workshops etc.

The scientific library occupies the upper floor and the research departments most of the lower 4 floors, mixed with Administrative functions.

The entire scientific specimen collection is stored between these research and administration spaces at the facade and the flexible exhibit floor.

The Research and Administration facility will be naturally ventilated and naturally illuminated by employing operable windows and automatic sun blinds, which will balance the natural light in the workspaces.

Materials

To emphasize the roof and the building as a whole, the materials used for the new Academy are minimal. The use of color is sporadic, (e.g. only to indicate circulation of visitors), leaving the spaces neutral in color intentionally.

The material palette is “frugal”, not rich, to make the space strong and essential.

Light gray architectural concrete is the main material for the walls and closed facades, apart from the restored the African Hall which features the original limestone. The formwork tie holes have been left visible and are used to fix exhibits.

The floors are polished concrete and the exhibit hall soffit consists of a series of individual white acoustic panels, mounted horizontal under the undulated roof, thus creating a “fish scaled” surface.

The four glazed facades in between the more solid blocks are executed with extra white glass, to enhance their transparency and to improve the visual transition of the interior into the Golden Gate Park.

The roof is a hybrid concrete\steel structure with vegetation on top, including a water “storage” layer. The roof transforms towards the exterior into a light steel structure supporting glass panels with PV cells. **AT**