Large Print

# Renzo Piano

## The Art of Making Buildings

# The Gabrielle Jungels-Winkler Galleries

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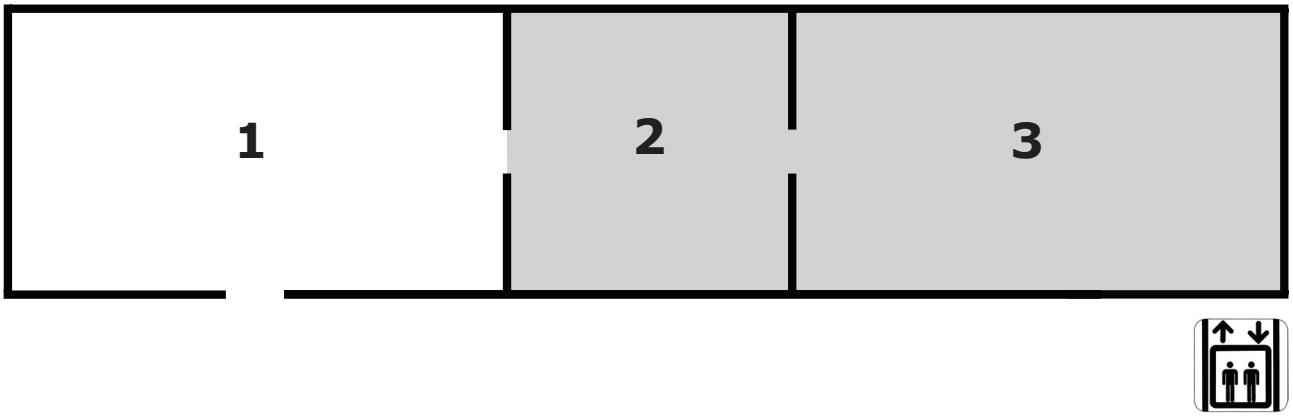
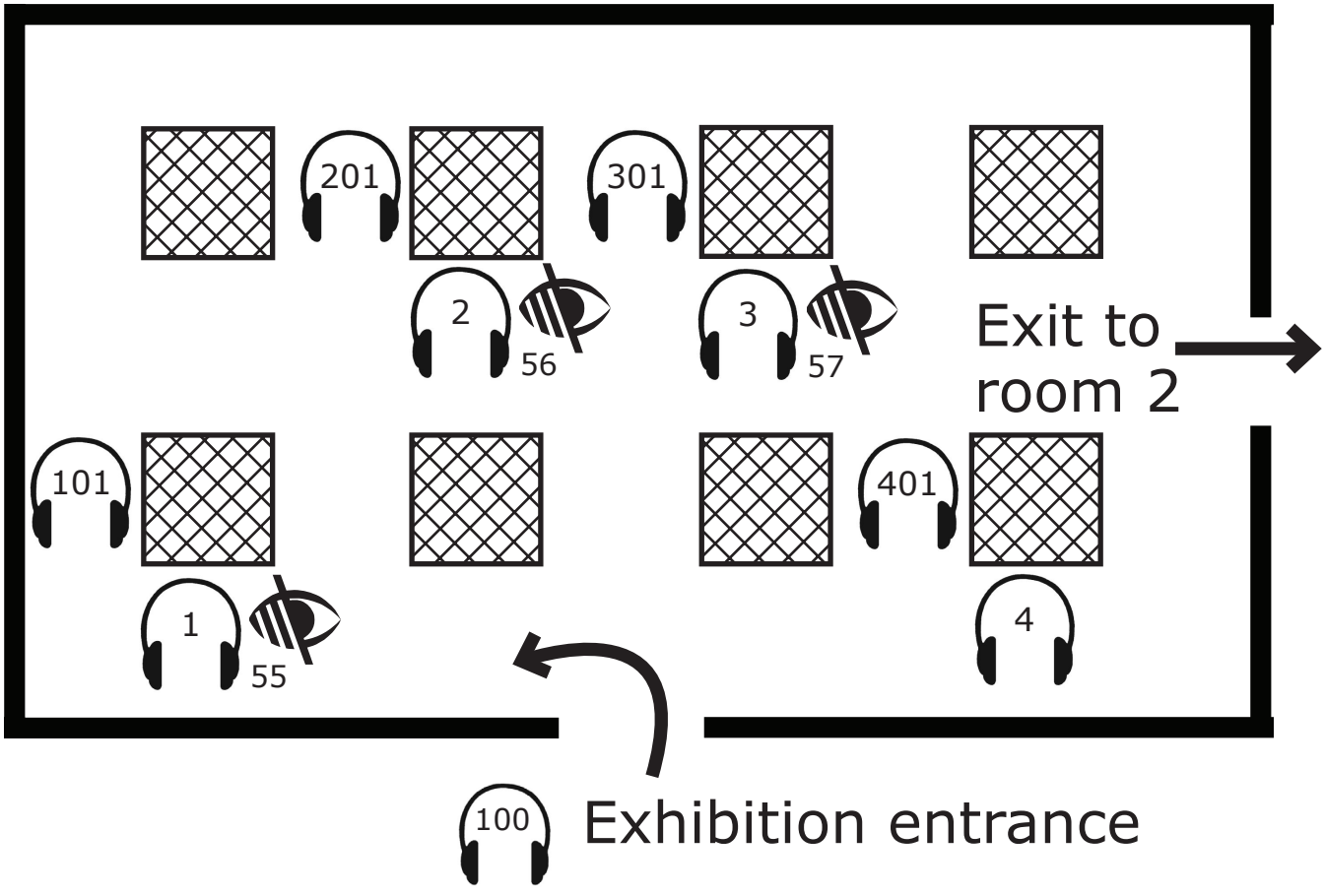
**Renzo Piano: The Art of Making Buildings**

Royal Academy of Arts
The Gabrielle Jungels-Winkler Galleries
15th September 2018 to 20th January 2019

# You are in room 1




=tables

# Multimedia tour room 1

Main commentary

Descriptive commentary

100 Introduction to the exhibition.

1 55 Centre Georges Pompidou. General Presentation model.

101 Centre Georges Pompidou. East elevation and air-conditioning system study model.

2 56 Kansai International Airport Terminal. Bas-relief model.

201 Kansai International Airport Terminal. Model of sculpture.

3 57 California Academy of Sciences. Concept model.

301 California Academy of Sciences. Diagram - sustainable strategies.

4 Jean-Marie Tjibaou Cultural Centre. Competition drawing.

401 Jean-Marie Tjibaou Cultural Centre. Model of final design.

# Contents

# Introduction


Renzo Piano is an architect whose work is infused with a human and poetic sensibility, anchored in the practical concerns of function and construction. He is driven by a genuine curiosity and desire for adventure that underlies the spirit of his architecture.

Piano was born in 1937 on the outskirts of Genoa, on the north Italian Mediterranean coast. Coming from a family of builders, he has a complete command of the construction process, designing, as he says, “piece by piece”.

Tellingly, his practice of more than 150 architects, set up in 1981 and now with offices in Genoa, Paris and New York, is called the Renzo Piano Building Workshop (RPBW).

Each of Piano’s projects is born from a deep consideration of how structural components can be brought together to build the vision he holds in his head, conveyed to others through sketches made in his distinctive green felt pen.

Ideas are developed by making models and then always tested in detail through full-scale prototypes. Engineers are involved early in the design process, working with Piano to ensure a unity of form, aesthetic, function and execution.

This exhibition presents sixteen of Piano’s projects from across the globe. These range from early works — before the career-changing Centre Georges Pompidou in Paris (1971—77) — to schemes currently on site. RPBW’s buildings can appear radical and surprising, while at the same time feeling intrinsically appropriate, drawing cues for their design from their physical and social contexts.

(continued over)

Adeptly responding to both the urban and the human through carefully crafted details, they all demonstrate Piano’s ongoing fascination with lightness, humanising technology, elegance of construction and the creation of truly civic buildings.

# Early Works
## 1964–71

Renzo Piano’s pre-Centre Pompidou work was marked by radical experimentation with lightweight structures, supported by his father and older brother, both builders.

These projects explored prefabrication and modular construction using materials and techniques at the frontiers of technology, underpinned by an interest in the craft of building.

Piano worked for architect and designer Franco Albini while studying at Milan Polytechnic following a brief period at the Faculty of Architecture in Florence.

Albini’s painstaking experiments with materials and how they are brought together were an important influence on the methods that have remained at the heart of Piano’s practice.

(continued over)

Other significant figures included French designer, architect and engineer Jean Prouvé, who headed the Centre Pompidou jury; British-based Polish engineer Zygmunt Stanislaw Makowski, a pioneer in space-frame development; and architect and product designer Marco Zanuso, with whom as a teaching assistant, he co-wrote a book on material technology.

Post-graduation, counter to the theoretical culture dominant in Italy at the time, Piano's interests in construction led to experiments with prefabricated and light-weight structures using unconventional materials.

There were also important contacts with others working in the same fields in London and elsewhere in Europe, and in the USA — an unusually international outlook for an Italian architect at that time. These early adventures formed the basis from which everything else evolved.

The democratic concerns found in much of RPBW's work were also germinating in the radical social politics of the time and would be crystallised by the relationship with Richard Rogers after they won the Centre Pompidou competition in 1971.

Professionally, everything changed for Renzo Piano at this point. However, the themes of his pre-Pompidou projects re-emerge in the approach of RPBW — researched, tested, refined and returned to again and again over a period of almost five decades.

# Early Works

Extended caption 1 (table)

Early experiments challenged the distinction between structure and skin.

(continued over)

They included expandable buildings that were easily assembled and disassembled, such as a tunnel vault made of galvanised-iron sheets to house a woodworking shop and a light-weight reinforced-polyester tunnel vault made up of prefabricated sections.

Shell structures included a moulded skin for a building at the Milan Triennale.

A workshop for the family construction business used tensile structures, while space-frames — lightweight gridded truss structures used to span large areas — and inflatables featured in a series of small projects.

Nothing was wasted — these technologies would be re-visited, adapted and transformed in RPBW’s projects over the following decades.

# Early Works

Extended caption 2 (table)

The 1950s and 1960s were years of unusual architectural adventure in Britain, with schools such as the Architectural Association (AA) and thinkers such as Cedric Price, Reyner Banham and the Archigram group developing new and transformative agendas. London became a magnet for young architects from other parts of Europe, among them Renzo Piano.

The AA held an exhibition of his work in 1969 that caught the attention of Monica Pidgeon, editor of 'Architectural Design', who put Piano in a category of architects such as Mies van der Rohe and Pier Luigi Nervi, "who found complete absorption in the manipulation and developments of pure structural systems in relation to human requirements for shelter, comfort and functionally useable space".

(continued over)

It was also the beginning of an enduring friendship with Richard Rogers and the two went into partnership, with Su Rogers: “Three partners could be unemployed as easily as two”, as Rogers said.

# Early Works

(Wall captions - clockwise in order of hang)

## Mobile Structure for Sulphur Extraction, Pomezia, near Rome, Italy

Longitudinal section of a reinforced-polyester tunnel vault made up of prefabricated sections that can be dismantled and moved along as extraction progresses across the site

1966, scale 1:50

Fondazione Renzo Piano

# Studio-workshop, Erzelli, near Genoa, Italy

Perspective drawn by Renzo Piano showing the prefabricated steel structure for the floor and roof of a studio he built for himself alongside one he designed for the family construction business

1968

Fondazione Renzo Piano

# Centre Georges Pompidou

## Paris, France, 1971–77


Time hasn’t lessened the impact of the Centre Pompidou, a controversial building when it opened and still a brilliantly shocking structure to come across on the edge of the historic, tight-knit streets of the Marais.

But despite the clamour that greeted the building in 1977, its urban presence and the public space it gave to the city were quickly and enduringly embraced by both Parisians and visitors alike.

The competition-winning entry by the then unknown and very young architects Renzo

Piano, Richard Rogers and Gianfranco Franchini, working with internationally renowned engineering group Ove Arup & Partners, was a set of bold ideas that generated a revolutionary design.

The essential concept as defined in the competition submission was a cross between an information-orientated, computerised Times Square and the British Museum, with the emphasis on two-way participation between people and activities. The structure to make this happen would be transparent, open, modular and extremely adaptable.

Projection screens would animate the façade, interacting with the crowds on the piazza. And the idea of pushing the circulation and mechanical services to the edge of the building was fundamental, making possible the unprecedentedly huge column-free expanses of the interior.

(continued over)

The way the building worked was to be completely visible, in terms of both its structure and of its services — colour coded in what still seems an act of joyful provocation. This comes together as a kit of parts, all in steel, with a simple hierarchy.

Immensely long lattice beams spanning the full width of the building are connected to columns outside the envelope by die-cast rocker beams (gerberettes), an innovative use of an old manufacturing technique.

The glass and steel curtain wall is hung inside the perimeter columns but the gerberette structure overhangs at each end to provide space and support for services on the east façade and for circulation (escalators, walkways and stairs) on the west, the latter providing the movement lost when the screens originally proposed were rejected.

# Centre Georges Pompidou

## Extended caption 1 (table)

Putting up a completely new type of building on a large but constricted city-centre site over a very short time — with major elements still being designed as construction went on — meant a new kind of team had to be created.

As soon as the public competition was won, a joint office was set up in Paris bringing together architects, structural and systems engineers and the management contractor.

This was vital as design development continued over a period of five years while construction went on, and French contract law was changed to make the architects responsible for every aspect of the building.

(continued over)

The support of Robert Bordaz, head of the client body, was vital, pushing the project through with minimal compromise.

## Centre Georges Pompidou

### Extended caption 2 (table)

The six-storey, thirteen-bay primary structure is a permanent welded steel grid that forms a matrix into which everything else can be inserted and from which components could be moved or even removed.

The principal structural support is provided by hollow spun-steel columns, each connected to six cast-steel rocker beams (gerberettes), one on each level.

These, in turn, are connected to the 48-metre-long lattice beams that support the reinforced-concrete floors. The further

end of each gerberette is linked to a slender tension column. Stability of the assembly is helped by diagonal bracing on the long façades.

Cladding is hung from the floor above and set back from the structural edge of the building to make space for services or for people to move up and along it — most dramatically on the iconic escalators that provide views of the city (and were initially free for anyone to ride) — as well as to maintain the sense of transparency.

## Centre Georges Pompidou

### Extended caption 3 (table)

In a move that defied the usual practice of hiding services, pipes and ducts were celebrated on the outside of the structure on rue du Renard, the busiest of the roads around the site.

(continued over)

Because they were to be so visible, the complex assemblies of components were physically modelled as carefully as any other major building element.

All were colour coded in a way that has no real practical purpose: white for ventilation; blue for air conditioning; green for water; yellow for power; and red for people moving — lifts and escalators, visible under the massive escalator crossing the west front. Yet this radical strategy made a powerful statement about the way the services of a cultural building of this scale function like a machine.

**(Wall captions - clockwise in order of hang)**

# Centre Georges Pompidou, Paris, France

Section drawn by Alan Stanton showing the clarity and simplicity of the structure, with the floor plates supported by very deep 48-metre-long lattice beams.

Circulation and services are separated out to become features on the exterior, leaving the interior free for a multitude of uses

1972, scale 1:50
Fondazione Renzo Piano /
Rogers Stirk Harbour + Partners

# Centre Georges Pompidou, Paris, France

Escalator and support structures drawn by Shunji Ishida while the building was under construction. The various components of the secondary structure are visibly bolted together in contrast to the mass of the welded primary structure of trusses and gerberettes from which they hang

1974, scale 1:10

Fondazione Renzo Piano /

Rogers Stirk Harbour + Partners

# Centre Georges Pompidou, Paris, France

Gianni Berengo Gardin Crowds gather to watch a performer in the piazza

1977

# The Menil Collection

## Houston, USA, 1982–86

The commission for a museum to house the Menil art collection, Renzo Piano's first major project after the Centre Pompidou a decade earlier, proved a formative experience.

The design developed through a long relationship with an exceptional client, during which Dominique de Menil formulated the characteristics of her ideal museum: formal but not monumental; a spacious interior within a modest exterior in harmony with its surroundings; and most importantly, naturally lit exhibition spaces.

(continued over)

The changing intensity of the sunlight outside would be an integral part of the viewing experience, made possible as the collection would be rotated, with works only displayed for short periods.

The Menil Collection is essentially a single-storey pavilion in a park, scaled to have a civic presence at the centre of a museum village while respecting the orthogonal grid of suburban Houston. Gallery spaces are accessed off a 150-metre central circulation zone, ‘The Promenade’, which extends to the left and right from the entrance.

The ‘Treasure House’, a second storey that runs the length of the south side of the building, provides storage for the majority of the collection not on show, hermetically sealed and kept in the dark. The building reflects the neighbourhood’s domestic vernacular in its height, bays and weatherboard skin while alluding to the

dignity of classical precedent through its shady colonnades, as appropriate in Texas as in the Aegean.

The entire exhibition space has a platform roof, extended to cover the external circulation spaces. Visible from below are 291 ‘leaves’, long curved ferro-cement louvres with a subtly reflective surface that provides a dramatic ceiling landscape.

Apart from the beauty of their rhythm, form and finish, these have three functions: to block direct sunlight and reflect diffuse light within the galleries; to trap hot air as part of the ventilation strategy; and to help to control radiant heat.

They are integrated with ductile iron trusses and hung from a structure also made of ductile iron — another unusual building material, chosen because it can be easily cast in organic forms.

(continued over)

This supports an almost flat coated-glass roof that filters out a large proportion of the sun’s heat and harmful ultra-violet light.

# The Menil Collection, Houston, USA

## Extended caption 1 (table)

The prototyping and refinement through testing that are at the heart of RPBW’s work were first extensively used in developing the roof of the Menil Collection.

After creating a series of models at different scales, a full-size mock-up of a gallery room was built on site to assess the appearance of the interiors and the light levels achieved, leading to changes to the roof glazing and the spacing between the ferro-cement leaves. The leaves themselves were

modelled at full size by Windboats Marine (boat-builders based in Norfolk, UK) because their manufacture — using a sprayed-cement technique with ferro-cement moulds — was an innovation without precedent.

## The Menil Collection, Houston, USA

### Extended caption 2 (table)

Bringing natural light into the gallery spaces, a requirement at the heart of the brief, has become an ongoing endeavour in RPBW museum projects.

At the Menil Collection the task was to exclude all direct sunlight and to limit diffused light to between 200 and 1,000 lux when it might exceed 80,000 lux outdoors, while still allowing the continuous variations caused by time or weather to be experienced inside.

(continued over)

RPBW embarked on extensive testing, first with elaborate physical simulations and then with computer modelling based on weather data collected over several years, to confirm that the proposed solution provided effective shading from direct sunlight. This was reconfirmed with a full-scale mock-up.

**(Wall captions - clockwise in order of hang)**

## The Menil Collection, Houston, USA

Typical section through the gallery showing sunlight reflected from the ferro-cement leaves and the strategy for bringing air

into the galleries from under the floor. Created during design development by Shunji Ishida, the drawing includes (from left to right) Paul Winkler, Walter Hopps (the first director of the Menil Collection), Dominique de Menil and Renzo Piano

1981, scale 1”:1’ 0”

Fondazione Renzo Piano

# The Menil Collection, Houston, USA

Section cut through the centre of the building looking east, showing the recessed entrance lobby and the offices in the ‘Treasure House’ above, with the overhanging roof structure providing shade around the exterior

1981, scale 1/4”:1’ 0”

Fondazione Renzo Piano

# Kansai International Airport Terminal

## Osaka, Japan, 1988–94


Handling approximately 50,000 passengers a day, at 1.7 kilometres, Kansai International Airport Terminal is one of the longest buildings in the world and a major feat of architecture and engineering.

Often compared to a glider in plan, with the main building as fuselage and the departures and arrivals gates the elongated wings, it is a light and flexible mega-structure occupying a manmade island in Osaka Bay.

Plan and section are based on making a passenger’s route through the airport as logical and self-evident as possible. Travellers from the mainland arrive into a vast atrium running the full length of the north side of the main terminal.

This provides views through the arrivals and departure halls to the aircraft at their gates, making the layout of the airport immediately comprehensible, while the shape of the roof also indicates the direction of travel.

The beautiful double curve of the air-side building’s roof has a practical rationale, giving the control tower unobstructed views of all gates and runways.

The 1 million-cubic-metre volume of the interior is undivided and column-free and the façade looking out to the aircraft stands is entirely glazed, continuing the theme of legibility initiated in the atrium.

(continued over)

The continuous glazing is supported by a steel lattice-shell structure held by tension cables that maintains the slender, wing-like appearance.

More than 82,000 stainless-steel panels cover the roof, their uniform size and shape derived through a programme of computer modelling. Such techniques — at the forefront of architectural and engineering technology at the time — made it possible for the architects to use curved natural forms with a precision and complexity that had previously been unachievable.

# Kansai International Airport Terminal, Osaka, Japan

## Extended caption 1 (table)

International and domestic terminals are arranged over different levels of the main building, connected by the ‘Canyon’, an atrium that is 25 metres wide and 30 metres high.

From here, travellers can see the functions of the terminal set out in the layers of the building before them.

The runway side of the main building is considerably higher than the entrance side. In combination with the direction of the airflow through the structure, this has the effect of channelling passengers towards the boarding lounges, while the asymmetric design makes it easy to orient oneself without complex signage.

# Kansai International Airport Terminal, Osaka, Japan

## Extended caption 2 (table)

The undulating roof profile of the main building was derived from a study of the airflows inside it, with its cross-section formed from a series of arcs with differing radii.

The form of the air-side building was generated from the toroid geometry found throughout the natural world in phenomena such as magnetic fields and convection currents, and was first used by RPBW in the Bercy Shopping Centre a few years earlier.

An arc derived from a torus (a doughnut-like form) with a radius of 16.4 kilometres — tilted at 68.2° to the horizon — defines a double-curved shape that is high in the centre and low at either end.

# Kansai International Airport Terminal, Osaka, Japan

## Extended caption 3 (table)

The roof of the main building is supported by eighteen welded tubular-steel lattice beams that span almost 83 metres, with sloping steel columns and cross-bracing secondary beams across their top.

Its form developed from studies of structural and ventilation requirements undertaken with Peter Rice and Tom Barker of Ove Arup. It was decided that the air could simply be blown across the space, from the rear of the building towards the runway side, and the predicted trajectory of this airflow was what determined the roof’s form.

This avoids enclosed air-distribution ducts suspended from the ceiling, leaving the vast structure exposed.

(continued over)

Blade-like deflectors beneath the roof guide the airflow and reflect the light coming in through skylights.

Commissioned to respond to and reveal the air currents, mobile sculptures created by Susumu Shingu fixed to the ceiling are in continuous movement.

**(Wall captions - clockwise in order of hang)**

## Kansai International Airport Terminal, Osaka, Japan

The ‘glider’, suspended above, a geometric study in wood of the form of the 1.7-kilometre-long terminal

2000, scale 1:200
Daimler Art Collection, Stuttgart/Berlin

# Kansai International Airport Terminal, Osaka, Japan

Early RPBW computer drawing of the plan and elevation from the air-side, showing the main terminal building at the centre and the curve of the immensely long toroid wing accommodating the gates, all of which are visible from the control tower

1991, scale 1:500

# California Academy of Sciences

## San Francisco, USA, 2000–08


The California Academy of Sciences is itself like a living organism. Form, layout, materials and systems all operate together in support of the institution’s mission, and all were developed through a closely collaborative process involving architects, engineers and scientists.

Founded in 1853, the Academy is a world leader in research, preservation and

education, seeking to understand life on earth and how we can best sustain it. In the past, its scientists would spend the summer months on a schooner, the Academy, collecting plants and animals to be displayed on-board during winter.

The institution maintains this strong link between research and its public presentation by housing both functions within a single location, an idea championed by RPBW.

The new building replaces (and in some cases preserves and protects) a group of eleven 20th-century structures damaged in the 1989 Loma Prieta earthquake.

While it retains the same site and orientation as the originals, everything else is radically different.

(continued over)

All of the Academy’s functions — research, conservation, education, museum, aquarium and planetarium — are protected by a Living Roof covered with some 1.7 million indigenous plants, almost like a piece of Golden Gate Park raised ten metres above ground.

Under this roof, whose undulations form a series of domes and are an essential part of the structure’s natural ventilation system, a central courtyard covered by a concave glass canopy acts as a pivotal centre.

Sustainability — a moral imperative for both the Academy and the design team, and strongly supported by the people of San Francisco — is at the heart of the project.

Materials, recycling strategies, the positioning of spaces to exploit natural lighting and ventilation, water usage and

rainwater recovery, and energy production with photovoltaics all determined the form of the project from early sketches to final design. The museum obtained LEED Platinum certification, the highest level awarded.

# California Academy of Sciences, San Francisco, USA

## Extended caption 1 (table)

Renzo Piano’s first sketched idea for the Academy building was of the planted, undulating roof, which he described as “Like a piece of the park flying”.

Subsequently, RPBW worked with the Academy to develop the principles on which the design would be based, summarised in a report presented to the client.

(continued over)

As studies continued, the team realised that by puncturing the roof, winds from the Pacific could be used to suck air through the building, providing ventilation and cooling.

Over the next five years, architects, engineers, scientists and researchers worked together to develop the overall form and detailed structure of the building. Computer modelling was used to investigate the building's environmental behaviour and responsiveness to external conditions.

# California Academy of Sciences, San Francisco, USA

## Extended caption 2 (table)

The multi-tasking Living Roof offers an environment in which the optimum

conditions for native plants, insects and birds can be explored and presented.

Undulating to resemble a natural landscape, its roles include insulating and cooling, reducing noise, capturing storm water, generating power from 60,000 photovoltaic cells wrapped around its perimeter, and controlling sunlight and glare.

The planting uses specially developed biodegradable coconut-fibre trays, an innovation that is now replacing plastic in green roofs worldwide.

Three structures from the pre-earthquake institution — the African Hall, North American Hall and Steinhart Aquarium — are sheltered by the roof, along with the planetarium and rainforest exhibitions under its two largest domes.

**(Wall captions - clockwise in order of hang)**

# California Academy of Sciences, San Francisco, USA

Section through the central courtyard and two biospheres showing the environmental strategy. Drawing by Shunji Ishida, sketched over by Renzo Piano during a design meeting

2002, scale 1/4”:1’ 0”

RPBW

# California Academy of Sciences, San Francisco, USA

North elevation with the main entrance and façade of the original building to the left and the elevator to the Living Roof terrace visible on the right

2008, scale 3⁄32”:1’ 0”



# California Academy of Sciences, San Francisco, USA

East–west section through the planetarium, central courtyard and rainforest biosphere with the Living Roof and openable skylights

2008, scale 3⁄32”:1’ 0”

# The New York Times Building

## New York, USA, 2000–07

Many of the concerns that find expression in The New York Times Building — visible structure, extreme transparency, public space at street level and a form that both acknowledges and transforms its context — are explored in other RPBW projects.

But this scheme — designed shortly before the attack on the World Trade Center and built in its aftermath — can also be seen as an emphatic realisation of Renzo Piano’s belief that transparency is a more reliable source of security than opacity.

Buildings with large areas of glass have to solve problems of solar gain — amplified in

very tall structures — as well as issues of privacy that become particularly acute when very low-iron, extremely clear glass is used, as here.

The solution to both was a double-skin curtain wall with an outer layer of ceramic rods attached to a delicate steel framework.

Starting at second-floor level, this outer layer plays several roles: as a sun screen to limit both glare and solar gain, increasing the building's energy efficiency; as a device for controlling views into and out of the office floors; and, vitally for Piano, as a subtle reflector of the sky.

Occupying half a Manhattan block in an architecturally undistinguished part of town, The New York Times Building is a sophisticated rectangular tower, 52 storeys high including a four-storey podium.

(continued over)

The tower’s corners are deeply cut away to give a cruciform plan, reducing its perceived bulk, revealing the structure, flooding interiors with light and providing views out.

Double-height spaces at the corners between some floors encourage movement and interaction. Housing the newsroom, editorial offices and the TimesCenter auditorium, the podium extends beyond the tower base to wrap the site, enclosing a garden at its centre.

This is a building always seen in relation to its neighbours and rarely in its entirety. From a distance, its restrained form has simple elegance. Close up, the exposed structure and giant logo over the entrance provide drama and a different kind of visual pleasure.

# The New York Times Building, New York, USA

## Extended caption 1 (table)

The tower’s façades are extended six storeys beyond the building’s frame. This has the effect of dematerialising the apex of the structure in a way that echoes The Shard in London, designed at the same time.

The strategy also hides the roof-mounted mechanical services. Façades respond to changing light and weather: an outer skin of 175,000 off-white ceramic rods and the low-iron glazing reflect Manhattan’s skies and the surrounding buildings, and computer-driven blinds control the amount of daylight entering the interior.

At the external corners, the ceramic screening is pulled back or pushed out beyond the glazing it shelters, revealing the interdependent layers of the building’s skin

# The New York Times Building, New York, USA

## Extended caption 2 (table)

In the aftermath of the attacks of 9/11, Renzo Piano maintained the importance of openness as an essential component of civilised life.

At The New York Times Building, the idea of permeability is most dramatically realised at night — illuminated interiors blaze out over the street and strip lighting forms a giant abstract work of art.

The street-level lobby is completely public, even providing a shortcut between 40th and 41st Streets. Dividing the banks of elevators rather than concentrating them in the centre makes possible long views through the lobby to the garden at the heart of the plot. This peaceful space, planted with birch trees and grasses, also

provides a backdrop to the 378-seat auditorium on the ground floor.

**(Wall captions - clockwise in order of hang)**

## The New York Times Building, New York, USA

Lower portion of the west elevation on Eighth Avenue showing the different densities of the screen of ceramic rods, with ‘The New York Times’ logo, made up of 1,000 pieces of aluminium, clamped to it

2005, scale 3/16”:1’ 0”

# The New York Times Building, New York, USA

West elevation facing Eighth Avenue showing the ceramic-rod screen stopping 2.28 metres short of the corners to reveal the façade structure behind

2003, scale 1/24”:1’ 0”



# The New York Times Building, New York, USA

South elevation showing the podium extending to the east and the tower above, with stairs in some of the set-backs to the west

2003, scale 1/24”:1’ 0”

# Jean-Marie Tjibaou Cultural Centre

## Nouméa, New Caledonia, 1991–98


Rising up from the narrow Tina Peninsula, 8 kilometres to the north of the New Caledonian capital of Nouméa, is a line of ten tall pavilions with a ribbon of low building sheltering behind them.

Encased in dramatic timber façades, these structures and the surrounding landscape make up the Jean-Marie Tjibaou Cultural Centre.

(continued over)

Named in honour of a leader of the Kanak independence movement who was assassinated in 1989, the centre celebrates Kanak culture, with exhibition spaces, studios for music, dance, painting and sculpture, facilities for researchers and conferences, a 400-seat theatre, a multi-media library and a café.

The whole complex is filled with the sounds of birds and the sea and the deep notes of the wind as it meets the façades.

Drawing on research by French anthropologist Alban Bensa — who became a consultant for the project — RPBW's work here is rooted in Kanak building traditions but develops them using the materials and structural sophistication of contemporary architecture and engineering.

Adapting Kanak custom, three clusters of circular 'cases' or pavilions, set among a complex of covered trails, outdoor rooms

and gardens, rise up from the gently curving ridge. Sharing a common structural form, the pavilions — grouped in three ‘villages’ — range in height from 20 to 28 metres.

The density of their curved, slatted façades decreases towards the apex in what has become an RPBW architectural trope. Steeply pitched corrugated-aluminium brise-soleil set at a lower level cover the main internal areas.

As the area is earthquake-prone, lightweight construction was vital. And with termites another natural hazard, iroko — one of the few timbers the insects are unable to consume — was used throughout, along with aluminium, steel and glass.

RPBW’s characteristic exploration of legible structure takes on an additional significance in this context, where traditional building techniques are equally apparent and comprehensible.

# Jean-Marie Tjibaou Cultural Centre, Nouméa, New Caledonia

## Extended caption 1 (table)

The buildings of the Cultural Centre are reached by a footpath through a landscape of dense vegetation using plants, trees and flowers that are typical of New Caledonia.

Tall Norfolk pines have been introduced to the north of the site, deflecting wind away from the ground-level terraces and other open public areas — one of several planting strategies that create micro-climates.

The footpath itself, the ‘Kanak alley’, is rich with metaphorical significance. It traces a meandering journey from birth to death, incorporating ancestral life and the primeval forest to arrive at a space planted with flora introduced from elsewhere in the region, symbolising the aspiration to welcome people to live peacefully together.

# Jean-Marie Tjibaou Cultural Centre, Nouméa, New Caledonia

## Extended caption 2 (table)

As construction options were limited by the remote location, much of the structure was prefabricated as a kit of parts in France and brought to the site for assembly.

The walls of the pavilions are made up of two concentric rings that create a double skin. The exterior ring is formed of curved slats and the interior one of vertical columns, both made of laminated iroko wood, a resilient material that is almost maintenance-free.

Horizontal and diagonal steel bracing and connections link the two rings. The roof is another double-skin structure, this time made of aluminium sheeting, contained within the walls.

(continued over)

The pavilions are linked by a ribbon of buildings providing support functions, their walls and promenades shaded by the extended roof.

## Jean-Marie Tjibaou Cultural Centre, Nouméa, New Caledonia

### Extended caption 3 (table)

The pavilions’ spectacular façades are part of an efficient passive ventilation system, necessary in this humid semi-tropical climate. The double outer walls allow air to circulate freely between the two layers of slatted wood.

Apertures in the exterior shell are designed to exploit the prevailing winds, using the stack effect (in which warm air rises and is replaced by colder air) to circulate cool air

around the building. The system is regulated by adjustable louvres, open when the wind is light and closing as its velocity increases.

Air currents passing through the slatted façades also give the pavilions a characteristic acoustic reverberation, inspired by the sound of wind passing through the woven plant fibres of traditional Kanak construction.

**(Wall captions - clockwise in order of hang)**

## Jean-Marie Tjibaou Cultural Centre, Nouméa, New Caledonia

Section through one of the pavilions in the first ‘village’ cluster housing an exhibition of artefacts focusing on Kanak identity.

(continued over)

The pavilions are linked by a connecting spine from which stem low buildings housing further exhibition spaces, an auditorium and ancillary spaces that connect into the landscape

1993, scale 1:50



## Jean-Marie Tjibaou Cultural Centre, Nouméa, New Caledonia


Competition drawing with elevations, sections and a ground-level plan demonstrating how the clusters of pavilions — many more here than were finally built — sit within a landscape that represents a rich metaphorical journey

1991, scale 1:200

# IBM Travelling Pavilion

## 1983–86

The personal-computing revolution was just beginning when IBM commissioned a structure to house a travelling exhibition about the future of technology.

The resulting pavilion embodies a vision of progress that is closely connected to nature. It also exemplifies RPBW's drive to combine craftsmanship with innovative technology in structures that are understood by their users and that inspire through a sensitive and sensual combination of materials and form.

Being temporary, the project provided opportunities to revisit earlier experimentation with shape and structure, materials and the methods by which these were brought together.

(continued over)

In the course of two years, the pavilion — demountable and transportable — visited twenty European cities in fourteen countries, its radical modernity juxtaposed with historic landmarks and nature to stimulating effect.

Three principal materials were used: laminated wood for the arches and other structural members, polycarbonate for the moulded pyramids forming structure and glazing, and cast-aluminium for the junctions.

The factors that generated the building — a form that would combine nature and technology, a desire for transparency, lightness and ease of assembly/disassembly — were clearly legible to visitors. The materials and the rhythmic repetition of the 34 arches combined to produce a sensuously beautiful environment for the exhibition and an exhibit in itself.

Sited in parks or city squares (and on one occasion on a raft on a river), the pavilion

took advantage of the shade from mature trees to control sunlight; when this was insufficient, two shading systems were deployed.

A freestanding system extracted the considerable heat then generated by computers, as well as by visitors and solar gain. Air-conditioning and cabling were incorporated in the structural depth of the suspended timber floor, and warm air blown across the polycarbonate pyramids in cold weather prevented condensation.

# IBM Travelling Pavilion

## Extended caption 1 (table)

The pavilion’s development started with ideas drawn from natural structures such as leaves, which in turn inspired details of joints and conjunctions of materials. These ideas were developed through discussion, sketches and mock-ups.

(continued over)

Joints were prototyped in wood to get the organic shape before being made in aluminium. As part of the testing process, a single full-size arch was mocked up on a beach in Genoa.

The pavilion – 48 metres long and 12 metres wide – was made up of 34 uniform wooden arches with cast-aluminium joints and a covering of identical moulded-polycarbonate pyramids, used both as glazing and as part of the structural web.

The three materials – each in itself familiar – were brought together by new ultra-strong adhesives, a technology encountered by Piano and Arup engineer Peter Rice when working on experimental plastic-bodied cars for Fiat two years earlier.

# IBM Travelling Pavilion

## Extended caption 2 (table)

After prototyping by RPBW, the design was developed with engineers from Arup. The joints were modified to simplify construction and to accommodate the different rates of expansion and contraction of the three materials — polycarbonate, wood and metal — as temperatures fluctuate.

Semi-cylindrical arches were changed to half arches, less cumbersome to handle, and stackable on a convoy of eighteen specially designed trucks; two of these stayed on site with the mainframe computer and technical plant.

All of the components were designed for easy assembly, using simple push-fit connections. It took seven workers two weeks to assemble the pavilion in each location. The two halves of each arch were assembled on the ground and then jacked into position before being pinned together.

# IBM Travelling Pavilion

## Extended caption 3 (table)

Two pavilions were constructed so the exhibition could be shown in more than one city simultaneously, with local architects involved in selecting and assessing potential sites.

The transparency of the structures meant shading was crucial, and trials were undertaken to determine the potential impact of glare and solar gain at each location. Pavilions were often juxtaposed with historic buildings such as the Castel Sant’Angelo in Rome.

In the UK, Alan Stanton (who had worked with Piano and Rogers on the Centre Pompidou) initially conducted a feasibility study for Jubilee Gardens on London’s South Bank; however, the site finally chosen was beside the Natural History

Museum in South Kensington. Chris Wilkinson was responsible for the pavilion's appearances in York and London.

**(Wall captions - clockwise in order of hang)**

## IBM Travelling Pavilion

Longitudinal section showing the arrangement of the exhibits, with characters including, from left to right: Isaac Newton, Gianni Berengo Gardin, Renzo Piano, Shunji Ishida, Albert Einstein, Leonardo da Vinci, Noriaki Okabe, Alan Stanton and other members of the RPBW and IBM teams.

(continued over)

Drawing by Shunji Ishida on multiple sheets amalgamated

1982, scale 1:40



# IBM Travelling Pavilion

Drawing by Shunji Ishida, showing from left to right: elevation of a single arch; section showing the internal structure; cross-section through half an arch and the raised floor; above, detailed list of all the materials used

1983, scale 1:10

Fondazione Renzo Piano

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# Renzo Piano

## The Art of Making Buildings

# The Gabrielle Jungels-Winkler Galleries

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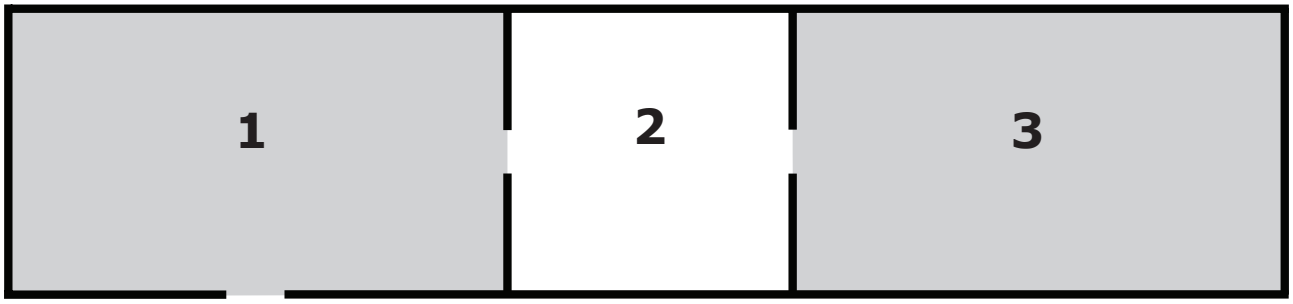
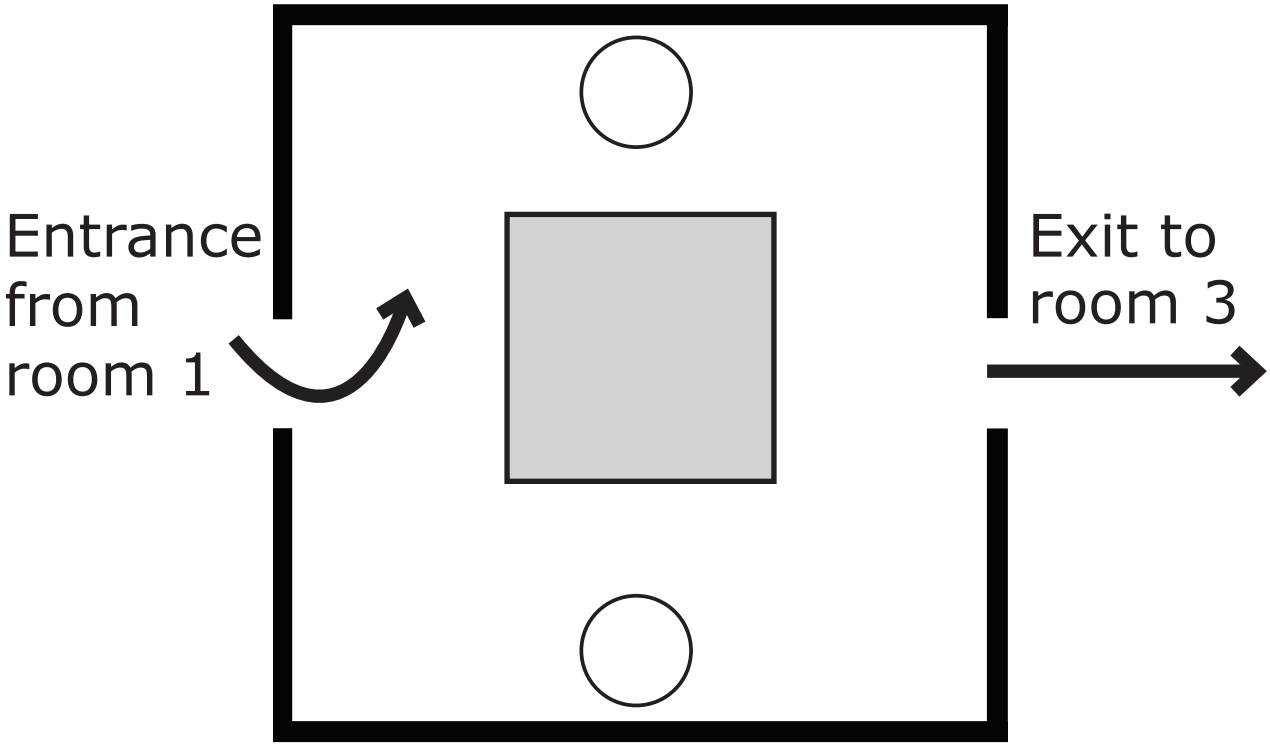
**Renzo Piano: The Art of Making Buildings**

Royal Academy of Arts
The Gabrielle Jungels-Winkler Galleries
15th September 2018 to 20th January 2019

# You are in room 2




# Contents

# Photographs

Gianni Berengo Gardin Berengo Gardin (b. 1930) has been photographing the work and activities of Renzo Piano since the mid-1970s



# Film

Thomas Riedelsheimer
Duration: 16 minutes 46 seconds
2018



ßA film by Thomas Riedelsheimer

# The Island at the Royal Academy

Created by Renzo Piano and the Building Workshop, this model brings together 102 Renzo Piano and RPBW buildings, from Piano's first studio to several projects still in progress 2018, scale 1:1000
RPBW

(Detailed map including list of projects available in the gallery).

**(Photographs - clockwise in order of hang)**

## Otranto, Apulia, 1979

Renzo Piano launching a camera-carrying helium balloon to survey the area before constructing the Laboratorio di Quartiere (Neighbourhood Workshop) to research ways of restoring Otranto's historic centre.

This formed part of a UNESCO-supported experiment to assess the feasibility of renovating historic town centres without displacing residents, who are instead engaged in the regeneration work

# Otranto, Apulia, 1979

Curious children in the mobile unit that formed part of the Urban Regeneration Workshop to research the feasibility of involving and employing local people in the restoration of historic town centres

# Osaka, 1991

Construction workers warming up to music at the start of a day’s work on the main terminal building of Kansai International Airport

# Ovada, Piedmont, 13 September 1987

Renzo Piano’s fiftieth birthday party. Left to right: Renzo Piano, Shunji Ishida, Sugako Ishida, Richard Rogers

# Porto di Scarlino, near Grosseto, Tuscany, 2007

Renzo Piano sailing ‘Kirribilli MAS60’, a boat he designed himself

# Bologna, 1982

Renzo Piano at his ‘Pezzo per Pezzo’ exhibition at the Fiera di Bologna. The VSS (Vettura Sperimentale a Sottosistemi) car chassis — a rigid steel frame designed for an experimental plastic-bodied car — was commissioned by Fiat and designed by Piano with engineer Peter Rice

# Turin, 1983

The Alexander Calder retrospective exhibition designed by RPBW for the Palazzo a Vela: the exhibition design focused on light, space and how to locate the works within the vast interior of the reinforced-concrete structure

# Genoa, 1992

A construction worker under the membrane roof of the Piazza delle Feste, created on the site of a former wharf in the Porto Antico as part of the exhibition ‘Genoa ’92 – Colombo ’92’, celebrating the 500th anniversary of Christopher Columbus reaching America.

RPBW worked across the whole of the former port, restoring 90 per cent of existing buildings to revive a largely derelict part of the city with walkways, public piazzas, shops, restaurants and museums.

The area, with new links to the waterfront, was given back to the city after the exhibition

# Genoa, 1982

The first 1:1 prototype arch for the IBM Travelling Pavilion — designed to house an itinerant exhibition on the future of computing and telecommunications — is tested on the beach

# Osaka, 1993

Main terminal building of Kansai International Airport under construction. The airport occupies a manmade island in Osaka Bay

# Osaka, 1993

Construction workers building the glazed wall at one end of the main terminal of Kansai International Airport

# Turin, date unknown

Construction workers during the 20-year-long project to convert Fiat’s redundant Lingotto car factory into a multi-purpose centre with spaces for an auditorium, exhibition and conference facilities, two hotels, offices and retail

# Venice, 1984

A temporary concert hall consisting of a large resonant box that would house a stage, an orchestra spread across three tiers of galleries and an audience of 400 in the central pit below, erected in the unused church of San Lorenzo for the ‘Prometeo’

# Milan, 1984

Claudio Abbado conducting the orchestra on the ‘passerelle’ during a rehearsal of Luigi Nono’s ‘Prometeo’. RPBW’s design for a temporary concert hall for the work was transferred from the Venetian church where it premiered to the disused Ansaldo factory in Milan. The orchestra was spread over three tiers of galleries with the audience seated at the centre

# Genoa, 1987

Renzo Piano in fancy dress sailing a boat he created from a dismantled wardrobe, produced for an RPBW-organised race for staff and friends. All the boats in the ‘$100 Columbus Cup’ had to be made for less than $100

# Paris, 1978

Noriaki Okabe, a partner at RPBW, playing the piano in a performance space in IRCAM, the institute for the development of electronic and avant-garde music that forms part of the Centre Georges Pompidou complex.

This was the first of many collaborations with musicians: as in the Parco della Musica Auditorium in Rome a quarter of a century later, the panels forming the walls can be adjusted to control the acoustics

Large Print

# Renzo Piano

## The Art of Making Buildings

# The Gabrielle Jungels-Winkler Galleries

# Room 3

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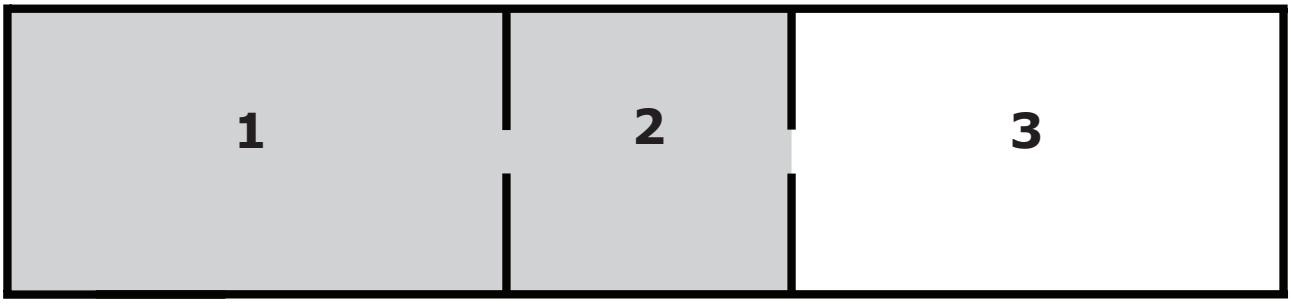


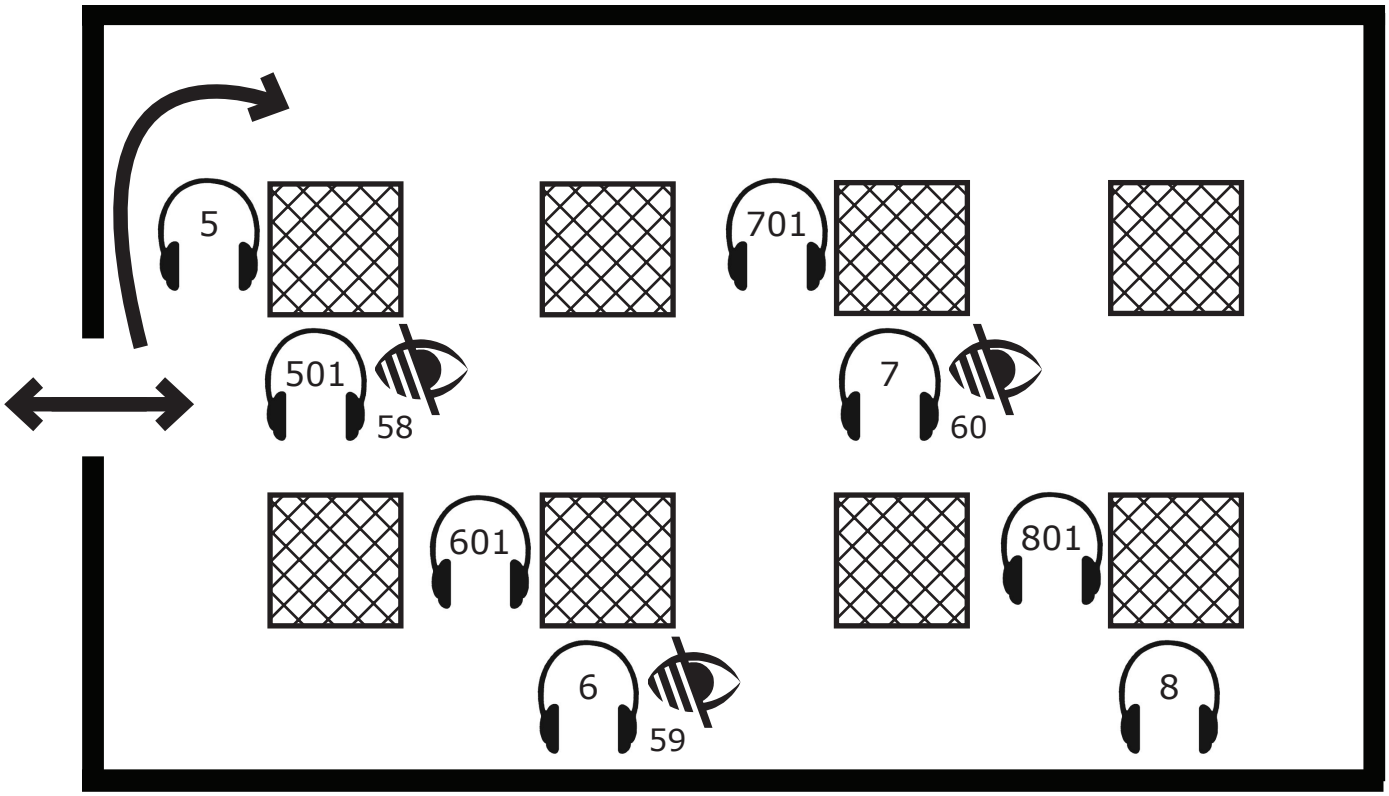


=tables

=entrance from room 2 and exit from exhibition

# Multimedia tour room 3

Main commentary

Descriptive commentary

5 Parco della Musica Auditorium. Concept model.

501 58 Parco della Musica Auditorium. Interior of concert hall, photos and model.

6 59 The Shard, London. Model.

601 The Shard, London. Facade glazing, photograph.

7 60 Stavros Niarchos Foundation Cultural Centre. Model.

701 Stavros Niarchos Foundation Cultural Centre. Roof representation model.

8 Emergency Children's Surgery Centre. Bas-relief and sketches.

801 Emergency Children's Surgery Centre. Mock up of wall, photograph.

# Contents

**Wall caption:** (orange model suspended above)

# Kansai International Airport Terminal, Osaka, Japan

Model, suspended above, of one of the principal trusses of the main terminal building – nicknamed the ‘dinosaur’ – which make possible the largely column-free spaces beneath. Made up of curves of different radii, the form indicates the direction of passenger travel from arrival at the terminal towards the gates

1999, scale 1:20

Daimler Art Collection, Stuttgart/Berlin

**Wall caption:** (photograph on end wall)

# Stavros Niarchos Foundation Cultural Centre, Athens, Greece

Yiorgis Yerolymbos Crowds gather to watch a performer in the Agora during the opening

2016



Photo: Yiorgis Yerolymbos

# Parco della Musica Auditorium

## Rome, Italy, 1994–2002


Creating a cultural centre of national significance for the outskirts rather than the centre of a capital city is in itself an extraordinary project.

In the case of the Parco della Musica Auditorium — the subject of an invited international competition — the aspiration was also to provide a new civic focus for the somewhat rundown suburb of Quartiere Flaminio in the north of Rome.

Given depth by Renzo Piano's long-standing relationships with musicians such as Pierre Boulez and Luigi Nono, RPBW has created numerous buildings for making and experiencing music.

This accumulated knowledge is embodied in the Parco della Musica, a complex of three venues with an additional open-air amphitheatre.

The site also provides homes for the Accademia Nazionale di Santa Cecilia (an institution for music education, scholarship and performance with a Museum of Musical Instruments) and the Fondazione Cinema per Roma (an organisation for the promotion of cinema) as well as an archaeological museum, shops and a restaurant.

The dramatically shaped halls — the 2,800-seat Sala Santa Cecilia, the 1,200-seat Sala Sinopli and the 750-seat Sala Petrassi — are arranged symmetrically on three sides of a 3,000-seat amphitheatre.

(continued over)

An ancient form reimagined for a contemporary context, this is open to the public at all times as a variation on one of RPBW’s favourite tropes — the piazza.

The great double-curved roofs of the halls, clad in oxidised lead like the domes of Rome’s baroque churches and with their pairs of overlapping plates irresistibly suggesting the wing cases of a giant beetle, acknowledge the forms of nearby sports stadia and recall the curves of upturned mandolins.

Despite the weight implied by the use of lead, these sculptural buildings appear to float, with their refined brick walls set back under the eaves.

The halls are connected at their bases by a continuous lobby with back-of-house and other services. Subterranean strata provide rehearsal spaces, recording studios, car parking and views of the remains of the Roman villa discovered on the site.

# Parco della Musica Auditorium, Rome, Italy

## Extended caption 1 (table)

Bringing life to a fractured part of Rome’s suburban fabric, the Parco della Musica plays an urbanistic as well as a cultural role.

The Quartiere Flaminio is also home to sports stadia dating from the 1960 Olympics — Pier Luigi Nervi’s Palazzetto dello Sport and Stadio Flaminio — and the new complex takes advantage of the transport infrastructure already in place as well as responding to the topography of the area with its park and wooded hills.

Oxidised lead, red brick and travertine recall the traditional materials used in central Rome. The amphitheatre and the incorporation of a Roman villa unearthed when work started on the site explicitly acknowledge the place’s classical heritage.

# Parco della Musica Auditorium, Rome, Italy

## Extended caption 2 (table)

RPBW’s decision to make each of the three auditoria an independent structure meant their acoustic isolation from one another was relatively simple; however, the strategy also required a substitute for the buffering usually provided by ancillary spaces to be devised.

This led to the development of an air chamber between the laminated-wood structural beams and the outer lead skin. The acoustic behavior of each of the halls was investigated through computer simulations and the exhaustive use of large-scale models, with final modifications done on site.

The two smaller auditoria have many adjustable elements, including their ceilings and walls — and even the floor of the versatile Sala Petrassi — allowing them

to be tuned for different types of performance. All three are lined in American cherry, which has particularly valuable sonic properties.

**(Wall captions - clockwise in order of hang)**

## Parco della Musica Auditorium, Rome, Italy

Elevation of the complex viewed from the north showing the auditoriums grouped on the plinth and the street frontage with colonnade; sections through the 2,800-seat Sala Santa Cecilia, the 1,200-seat Sala Sinopoli and the 750-seat Sala Petrassi

2002, scale 1:500

# Parco della Musica Auditorium, Rome, Italy

Detail of section of the Sala Santa Cecilia, showing the layered roof structure with its sculpted underside and baffles for controlling the hall’s acoustic characteristics.

Created for the competition by Shunji Ishida, the drawing shows people involved in the project playing in the orchestra, including Piano’s close friend musician Claudio Abbado conducting, Milly Rossato Piano on second violin, Ishida himself on third violin, Renzo Piano on cello, musician and friend Luciano Berio on trumpet, along with other RPBW architects

1994, scale 1:25

RPBW

# Parco della Musica Auditorium, Rome, Italy

Detail of section of the Sala Petrassi showing the stairs rising into the space between the orthogonal walls of the auditorium and the curved outer skin

1996, scale 1:20



# Parco della Musica Auditorium, Rome, Italy

Detail of section of the Sala Petrassi showing the timber structure that holds the outer skin away from the inner structure

1996, scale 1:20

# The Whitney Museum of American Art

## New York, USA, 2007–15

With its sculptural form levered up from the ground, RPBW's Whitney is an alien, disruptive and energising object.

But at the same time it is a building that acknowledges its context, both in its scale and in the way its massing and the cladding of its different façades address this area of Lower Manhattan and the Hudson River to the west.

Founded by sculptor Gertrude Vanderbilt Whitney in Greenwich Village in 1931, the Whitney moved in 1966 to a Marcel

Breuer-designed building on Madison Avenue at West 75th Street. RPBW's original commission in 2003 was to extend this space, but three years later a radical decision was taken to create a new building on a site in the formerly industrial Meatpacking District.

The site is at the southern end of another great agent of urban renewal, the High Line that reuses a disused elevated railway as a linear park.

As with many RPBW projects, the social responsibility of the architect has driven a desire to make spaces for the public as well as for the client.

So the Whitney's new home not only reunites its collections and functions within a single building, but also gives the city a new piazza and a new way of looking at itself from the gallery terraces.

(continued over)

A massive sheltering overhang on Gansevoort Street leads to the open piazza — containing a gallery space, restaurant and reception facilities — that provides a new civic space at the centre of the site.

The mass of the building above is divided by a central service spine, with exhibition spaces to the south and administration and workshops to the north.

More than 18,000 square metres of galleries are set out from the fifth to the eighth levels, with expanses of full-height glazing offering views across the Hudson and over Manhattan.

To the east — away from the river — galleries open out to a series of terraces that provide more space for art. The building also has a performance space — a first for the Whitney — and all galleries have sprung floors to make dance and movement possible throughout.

# The Whitney Museum of American Art

## Extended caption 1 (table)

A building designed from the inside out, with a public plaza at its core, the new Whitney focuses and revitalises not only the institution but its post-industrial urban context.

The lofty open space at street level extends deeply beneath the mass of the building, which is supported only on delicate columns that pick up the rhythm of the High Line immediately to the east.

The sense of openness is completed by the sheer glazing of the reception area.

The great volume of the space makes it welcoming and inclusive, and also responds to the scale of the High Line.

(continued over)

This is a building that is open in plan and section, spilling out onto terraces on all the exhibition floors and extending a gallery of American art to take in views over the Hudson River and the city itself.

## The Whitney Museum of American Art

### Extended caption 2 (table)

The language of the Whitney’s external form, with its jagged edges and projecting steel balconies and stairs, engages with the Meatpacking District’s industrial and dockland past and breaks down the mass of the museum to integrate it with the built texture of the area.

The building’s skin is the product of prolonged research and development with a manufacturer selected early in the process. Grey-blue steel panels alternate with

longitudinal windows to the north and regular openings to the south and west. The vertical panels have the effect of wrapping the building, expressing its massing rather than its floor levels; responding to changing climatic conditions and reflecting both the waters of the Hudson and the city's lights.

**(Wall captions - clockwise in order of hang)**

## The Whitney Museum of American Art, New York, USA

Bas-relief section cutting through the public piazza and lobby at ground level with the offices and theatre facing the Hudson above, topped by four levels of galleries

2010, scale 3/32":1' 0"
RPBW

# The Whitney Museum of American Art, New York, USA

Bas-relief south elevation showing the sculpted form and its relationship to the Hudson River on the left and the High Line park on the right, which is co-opted almost as part of the building.

Public terraces step up the building, while the lower volume is sliced as a gesture of invitation to enter. This early façade cladding arrangement expresses the floors within

2010, scale 3⁄32”:1’ 0”
RPBW

# The Whitney Museum of American Art, New York, USA

Elevation of the south wall facing onto the entrance terrace extending from the High Line park, before it was decided to clad the building with metal panels

2011, scale 3⁄8”:1’ 0”

# Stavros Niarchos Foundation Cultural Centre

## Athens, Greece, 2008–16


Between the Athenian suburb of Kallithea and the ancient port of Phaleron, the National Library of Greece and the Greek National Opera have been given new homes beneath an expansive sloping park, creating a building as landform.

In the centre of a bowl between mountains and water, the earth has been lifted up to a peak of 32 metres, with views across the

sea and back towards Athens.

A project at a monumental scale, the 175,000-square-metre site forms the Stavros Niarchos Foundation Cultural Centre. The ambition represented by this privately funded project provides Athens with a 21st-century cultural landmark.

The Centre alludes to monuments of the past, but uses a form, materials and structure that are entirely contemporary.

As well as providing homes for two national cultural institutions, it restores the capital’s connection with the sea, revitalises peripheral neighbourhoods, creates new meeting places and provides a sustainable symbol for the future of Athens and Greece.

A vast canopy flies over the highest point of the landform, its load supported on just 30 slender steel columns.

(continued over)

Shaded by this canopy is a wide and open platform with an entirely glass-walled reading room and exhibition space the ‘Lighthouse’ at its centre. Views out across the Bay of Phaleron and back over the park are contained and framed by the soaring roof.

Opera house and library are both sheltered under the slope of the park, which forms their green roof. A public space — the Agora — connects the two and marks the entrance at ground level. With space for 2 million volumes, the National Library also houses a business incubator, a recording studio and facilities for children.

The National Opera contains a 450-seat flexible space for experimental work and a magnificent 1,400-seat hall based on the traditional Italian horse-shoe-shaped opera house, plus rehearsal rooms and production areas.

# Stavros Niarchos Foundation Cultural Centre, Athens, Greece

## Extended caption 1 (table)

Designed with New York landscape architect Deborah Nevins & Associates, the 17-hectare park is one of the largest green areas in Athens, providing a habitat for more than 1,500 trees and 200,000 shrubs.

Originally ramping up towards central Athens, the orientation was reversed, so the slope climbs towards the sea and looks back at the city.

A network of footpaths paved with crushed-clay tiles links with the streets of the surrounding suburbs and gradients have been managed to make the entire site accessible.

Another major topographical feature is a 400 metre-long canal that runs along one side. It both softens the edge of the landform and creates a dramatic access route alongside it.

(continued over)

Functionally, the canal cools the atmosphere and soaks up exceptionally heavy rainfall.

## Stavros Niarchos Foundation Cultural Centre, Athens, Greece

### Extended caption 2 (table)

Soaring 17 metres above the roof of the opera house at the peak of the park’s manmade hill, the 10,000-square-metre canopy gives Athens a new landmark.

Made up of two thin shells with a wing-like section, it is a ferro-cement masterpiece, without parallel in size and complexity.

The technique uses cement plastered over layers of steel mesh, making it possible to create large smooth surfaces. The underside of the canopy produces a gentle reflection of the harsh sunlight. A shock-

absorbing system located within the depth of the roof means the entire structure can flex to accommodate thermal expansion, strong winds and even earthquakes. The canopy also generates electricity from more than 5,500 photo-voltaic panels.

**(Wall captions - clockwise in order of hang)**

## Stavros Niarchos Foundation Cultural Centre, Athens, Greece

Section cut through the opera house and library beneath the sloping park, with the canopy soaring above. To the left is the opera auditorium with a sculpture by Susumu Shingu hanging from the centre and the fly tower visible above.

(continued over)

A glass passage providing dramatic views back towards Athens links the top of the raised platform to the ground-floor entrance and the Agora at the heart of the scheme. To the right is the library with the book stack at its centre

2015, scale 1:200



# Stavros Niarchos Foundation Cultural Centre, Athens, Greece

Elevation of the Cultural Centre from the canal side, showing the slope of the manmade park with the opera house and library sheltering underneath and the canopy soaring above.

The slope is jacketed by stabilised earth walls that give it mass at its base. Drawing

by project architect Giorgio Bianchi with an overlay of the vertical circulation between the Agora at ground level and the public space beneath the canopy

2010, scale 1:400
RPBW

# Stavros Niarchos Foundation Cultural Centre, Athens, Greece

Elevation drawn by project architect Giorgio Bianchi showing the landform with the slope rising to accommodate the library and opera house on the right, and the canopy above

2010, scale 1:400
RPBW

# Academy Museum of Motion Pictures

## Los Angeles, USA, 2012–present

A new landmark on Los Angeles' Miracle Mile — a stretch of Wilshire Boulevard that is home to the Los Angeles County Museum of Art (LACMA) and several other major institutions — the Academy Museum of Motion Pictures is due to open in 2019.

Combining the May Company's streamline moderne department store with a new spacecraft-like spherical structure to its north, the spectacular complex on the edge of the LACMA campus will accommodate two film theatres, 50,000 square feet of

gallery and project space, an education studio, a restaurant, café and shop.

The two elements of the project engage in a dialogue of contrasts — between weight and weightlessness, opacity and transparency, shadow and light.

Appropriately, the sphere is a cinematic manifestation of RPBW's desire to provide openness and public space, embodied in what could be seen as a somewhat retro vision of the future, given sophistication and glamour by the precision of its detailing.

A new public piazza leads towards and under the sphere, which is raised from the ground on just four massive concrete columns (earthquake-resisting structures): this route to one of the complex's main entrances is a completely open space, impressively roofed by the raked floor of the 1,000-seat theatre.

(continued over)

Above the theatre, looking out towards the Hollywood Hills, is an expansive terrace covered by a dramatic domed glass roof — coated and shaded to temper the Southern California sun — on a lightweight frame.

The May Company building (renamed the Saban Building), originally built in 1939, has had later additions removed and its interior stripped back.

Three glass bridges cross from it to the various levels of the sphere and exposed steel ‘Pachinko’ stairs (nicknamed after a Japanese pinball variant) climb its north side to the theatre and terrace, bringing the project alive with movement in a characteristic RPBW strategy.

# Academy Museum of Motion Pictures, Los Angeles, USA

## Extended caption 1 (table)

The moderne, round-cornered rectangle of the former department store provides a home for the museum’s galleries, education studio and public spaces.

In contrast, the new element started as a set of five ‘bubbles’ before being refined to a single, pure sphere — a non-architectural object landing in Los Angeles.

The sphere became less pure and more blob-like over the course of many iterations before resuming its Platonic perfection.

This was then manipulated and carved out underneath to articulate the raked form of the theatre within, an architectural move that also generated the drama of the museum’s entrance.

# Academy Museum of Motion Pictures, Los Angeles, USA

## Extended caption 2 (table)

Dynamic contrast is embodied in the sphere itself. Light pours into the terrace through a spectacular open-ended, glazed roof modelled as a perfect section of a sphere. Nothing gets in the way of the views out — the form embodies the idea of being outward-looking.

The glazing wraps down past the terrace floor to encase the top part of the concrete panels that enclose the theatre space.

People are pulled from the piazza towards the entrance by the sphere’s cantilevered arc, proceeding through to the Saban Building or up into the sphere itself via the ‘Pachinko’ stairs, where their movement is presented to the world outside like that of actors on a giant cinema screen.

**(Wall captions - clockwise in order of hang)**

# Academy Museum of Motion Pictures, Los Angeles, USA

Bas-relief elevation with the streamline moderne façade of the refurbished Saban Building to the right, connected by bridges to the Sphere Building with its curved glass roof wrapping the terrace

2015, scale 1⁄8”:1’ 0”
RPBW

# Academy Museum of Motion Pictures, Los Angeles, USA

West elevation of the final scheme showing the cutaway under the Sphere Building that provides a welcoming entrance to the south, with the curved glass roof wrapping the terrace more completely than in earlier designs

2016, scale 1⁄8”:1’ 0”

# Emergency Children's Surgery Centre

## Entebbe, Uganda, 2013–present


Built for Emergency, a medical NGO operating in Africa, the Middle East and central Asia, this new medical centre is being established to provide free treatment for children in need of surgery from across Africa.

The complex, which is currently under construction, is designed to exude a sense of security and enclosure as well as openness and hope.

(continued over)

Unusually for RPBW, the buildings are low-tech in appearance, with rammed-earth walls rising from the ground and hovering roofs covered in photovoltaic panels held up by a simple steel structure. It is a very modest, pared-back architecture, balancing resourcefulness with aspiration.

The site, 35 kilometres from the Ugandan capital, Kampala, follows the natural slope of the ground down to the shores of Lake Victoria.

Three long buildings are arranged in parallel across the site, with a fourth closing the east side of the courtyard garden that is the focus of the plan.

The entrance and welcome area is in the smallest of the buildings, a single-storey structure that also contains facilities for initial medical assessment.

The other buildings each have two storeys — a ground floor and basement. The south

wing houses surgeries, a pharmacy and the clinical departments.

The north wing contains the wards, recreation rooms and areas where children can play together at ground level, with classrooms to train medical personnel, offices and a canteen in its basement.

The fourth square building accommodates the intensive-care unit and operating theatres.

RPBW’s first project in Africa originated with a request from Emergency’s founder, Gino Strada, a friend of Renzo Piano.

The project has entailed adapting the practice’s established methodologies to build a vital facility with limited means, using local resources of materials and labour.

# Emergency Children’s Surgery Centre, Entebbe, Uganda

## Extended caption 1 (table)

The complex has four principal parts organised around a central courtyard garden in which a large tree offers shade. Corridors and wards look out over this garden, and footpaths connecting the different parts of the centre run through it.

An additional guest house provides accommodation for the families of children who are being treated. The roofs, raised above and pushed out beyond the buildings, provide shade to the built masses and to the outdoor walkways.

The complex sits on terraces that step down the site and direct views towards Lake Victoria. A series of rammed-earth and red-glazed ceramic walls provide security and unify all the project’s components.

# Emergency Children’s Surgery Centre, Entebbe, Uganda

## Extended caption 2 (table)

Early proposals for the roof envisaged a steel structure with the architectonic sophistication typical of RPBW.

However, a gift of steel from an Italian supplier led to a much simpler solution: the structural members were supplied as round sections and the architects devised a pairing system for columns and beams that provides architectural definition.

The steel-truss roof appears to float above the walls and open paths around the complex. It supports 3,500 square metres of photovoltaic panels, providing the hospital with power during the day.

# Emergency Children’s Surgery Centre, Entebbe, Uganda

## Extended caption 3 (table)

Rammed-earth or pisé constructions can be found throughout the world, but this ancient technique has attracted fresh interest because of its cheapness and its environmental virtues (local materials, low embedded energy, high thermal inertia, recyclable).

Drawbacks include its lack of strength and — without careful detailing — its lack of resistance to rain. The basic method involves pressing a mix of clay, sand, gravel and water into moulds. At the Emergency Centre, where rammed earth is used for load-bearing walls, the mix includes chemical binders to reinforce the structure and increase resistance to moisture.

Initially pigments were added to create different hues and subsequently clay from

several nearby quarries was tested with the idea of varying the colours. In the end all the clay, with its subtle shades of red, was excavated directly from the site.

**(Wall captions - clockwise in order of hang)**

## Emergency Children’s Surgery Centre, Entebbe, Uganda

South elevation of the building housing the wards with a section through the operating-theatre building showing the photovoltaic roof extending beyond the elevations and the central tree-shaded courtyard

2018, scale 1:100

# Emergency Children’s Surgery Centre, Entebbe, Uganda

West elevation showing the way the buildings follow the contours of the land, going from a single storey at the entrance on the right to two storeys for the wards, administration and education spaces to the left

2018, scale 1:100

# Emergency Children’s Surgery Centre, Entebbe, Uganda

Bas-relief cross-section through the wards, administration and education spaces, central courtyard garden and diagnostic facilities; created before the roof design was simplified to use donated steel supplied in round sections

2015, scale 1:100

RPBW

# Centro Botín

## Santander, Spain, 2010–17

A landmark cultural centre in a park, the Centro Botín revives a lost aspect of Santander's historic identity by reconnecting its old urban centre with the sea. Cantilevered above the boundary between land and water, the building's form suggests something maritime.

Jutting external stairs and walkways connect its two lobes, putting three levels of public space at the literal centre of the project. This spilt form also embodies the dual functions of the Fundación Botín, with art displayed in the west block and cultural activities and education programmes housed in the east.

The site is the newly extended Jardines de Pereda (a collaboration with landscape designer Fernando Caruncho), created on an area previously consigned to car parking and cut off from the city by a major road.

This has been rerouted through a 200-metre-long tunnel under the park, effectively doubling the size of the public space, which now includes an outdoor amphitheatre and a plaza.

In characteristic RPBW style, the building is lifted above ground on slender columns, creating an open public space underneath and allowing unobstructed views from the park to the sea.

Ground-level walkways are echoed above by terraces, bridges and viewing platforms in a dramatic relationship with the Bay of Santander below.

(continued over)

The moulded forms of the two lobes and their skin — covered with 280,000 ceramic discs that shimmer in the Atlantic coastal light — give a sense of continuity as well as an ambiguity that makes the building's size hard to read. Looking up at the double curve and sparkling skin of the underside is an unexpected delight.

Both end walls have full-height glazing, bringing the exterior inside and filling the galleries with light. Views back over the old city of Santander and out to the harbour and distant mountains forge links between city, park, cultural centre and sea.

# Centro Botín, Santander, Spain

## Extended caption 1 (table)

The façades facing back towards the city are cut away to enclose an entrance

piazza. Conceived initially as a gesture to bridge the highway that ran through the site, a complex of walkways and stairs (nicknamed ‘Pachinko’ after a Japanese pinball variant) zigzags between the two parts of the building.

These take visitors from the public space at ground level, past the main entrances from the first-floor platform, to a viewing deck on the roof of the eastern block.

Opening up spectacular views over the bay, the building’s outdoor space has become a destination in its own right.

People moving up, under, through and on top of the building animate it and connect it to the activity of the new plaza to the north, where a number of routes from the city across the park meet.

# Centro Botín, Santander, Spain

## Extended caption 2 (table)

The roof, the almost continuous west and east sides and even the underside of the building, are covered in 280,000 round ceramic tiles with a mother-of-pearl finish.

Hand-sized, curved in profile and mounted all over the skin, they subvert the perception of scale. Light bouncing off the sea and the bright orange flooring of the restaurant and bookshop shimmers on the tiles under the building, while above, their surface glistens in both sunshine and rain.

Like the form of the building itself, these tiles suggest something marine — fish scales perhaps — without resorting to imitation.

# Centro Botín, Santander, Spain

## Extended caption 3 (table)

Controlling natural light to provide optimum conditions for the display of art has been a preoccupation of RPBW since the design of the Menil Collection in Houston in the early 1980s. Many approaches have been implemented in the more than 30 art galleries RPBW have designed.

In Centro Botín, the upper-floor exhibition space is lit from above, with sunlight and solar gain controlled by three layers. Over a complex support structure, the outermost layer is made up of fritted glass slats that screen the gallery from direct sunlight.

Under this, double glazing seals the space while a third layer of sensor-controlled aluminium louvres modulates light and can even darken the interior.

**(Wall captions - clockwise in order of hang)**

## Centro Botín, Santander, Spain

Section showing the two elevated lobes of the building with the top-lit galleries to the left, education and administration spaces to the right, and external circulation (‘Pachinko’) between

2014, scale 1:100



## Centro Botín, Santander, Spain

East elevation of the gallery building showing the circulation on the ground plane climbing upwards between the two lobes

2014, scale 1:100

# The Shard

## London, UK, 2000–12


Very tall, very delicate and with a refined, dynamic skin that both reflects the changing skies of London and reveals life within, The Shard is unlike most of London’s new generation of skyscrapers, both outside and in.

The Shard anticipates the ways the city is changing, responding to and enabling emerging patterns of working and living in increasingly dense neighbourhoods at transport nodes.

Stacking up retail, offices, restaurants, a hotel and luxury apartments, it employs a strategy that is rarely found in London.

(continued over)

The complexity of the programme is amplified by the difficulties of a tight site above and next to railway tracks.

The novel idea of constructing a mixed-used tall building on the south bank of the Thames had architectural implications. Piano’s immediate response was to suggest a tapering tower that conceptually would vanish into the sky and in practical terms would provide the large floor plates needed for modern offices at the bottom, narrowing progressively for restaurants and a hotel in the middle, and still more for apartments above.

The lattice-like apex and the eight sloping façades, reflecting the changing sky, disguise the mass of the building.

Structurally, The Shard is an unconventional combination of concrete and steel, chosen for speed and efficiency of construction. Concrete is used for the

massive core at the centre of the plan, in the five basement levels and from levels 41 to 69, with steel from the ground up to level 40 and again from level 70 to the top. Engineering and construction on a very tight site were equally innovative.

‘Top-down’ construction meant that the first 23 storeys of the core and much of the structure around it could be built before the underlying basement had been fully excavated — the first time this method had been attempted for a very tall structure.

# The Shard, London, UK

## Extended caption 1 (table)

Enthusiastically backed by Southwark Council, planning permission was granted in 2002 but revoked by Deputy Prime Minster John Prescott, largely because of fears for the sightlines to St Paul’s Cathedral and the Tower of London. However, in 2003, the resulting Public Inquiry came out in favour of the project.

What was a run-down part of the city now includes two other RPBW projects for the Sellar Property Group: Shard Place, a residential tower with public space below, and The News Building, an office building incorporating the rebuilt London Bridge Bus Station.

As the transport links have now been completed, public spaces associated with all three RPBW buildings are being appropriated by the people using the area.

# The Shard, London, UK

## Extended caption 2 (table)

Complexity is a feature of every aspect of The Shard: putting up a large building on a constricted inner-city site; dealing with numerous service tunnels and the immovable foundations of a previous building; a programme that entailed starting construction above ground before the below-ground excavations were complete; calculating the geometry of some 11,000 glass panels to make up the apparently simple skin.

In addition, mixing uses in a tall building — a concept at the heart of original developer Irvine Sellars' vision — gives rise to complications created by the demands of different tenures, including separate entrances, servicing and circulation.

(continued over)

Vertical circulation must offer independent, fast access for all the different uses — offices, hotel, flats, the public and fire escapes. In response, The Shard has ten escalators and 32 lifts, including thirteen double-deck lifts in which two stacked lift cars occupy the same hoistway.

## The Shard, London, UK

### Extended caption 3 (table)

The external appearance of the tower is determined by its eight angled glass façades with their exceptionally transparent, low-iron glass.

The result of a collaborative design development with the manufacturers, they fragment the building’s mass, disguise its scale and reflect light in dynamic and constantly changing ways. But the

complexity of the façades — with an inner double-glazed layer and single-layer external glazing — has an essential practicality, with the gap between the layers accessible from inside the structure and automatic blinds in this void responding to solar gain and adding a further dynamic element to the tower.

Vertical gaps between the façades themselves contribute further to breaking down the apparent mass and provide natural ventilation to the three winter gardens on every floor of offices.

**(Wall captions - clockwise in order of hang)**

# The Shard, London, UK

Bas-relief section looking east, produced at concept-development stage when the building was to be 400 metres tall and embodied the idea of a fractured tower of glass.

It was envisaged that public space would be provided around the base and on two terraces at great height

2000, scale 1:500
RPBW

# The Shard, London, UK

Bas-relief conceptual reference panel produced for the Public Inquiry to convey the ideas embodied in the tower’s design

2001, scale 1:500
RPBW

# The Shard, London, UK

Detail of section of a typical façade showing the two panes of glass held apart by cast-aluminum brackets with blinds between

2006, scale 1:5
© RPBW

# Jérôme Seydoux Pathé Foundation

## Paris, France, 2006–14

The view from the street does no more than hint at the radical nature of this urban infill project. Behind a narrow masonry façade at 73 avenue des Gobelins — a local landmark still decorated with bas-reliefs by the young Auguste Rodin — an opaque grey volume with a dramatically organic form curves up.

Only glimpsed during the day, at night it radiates a soft glow. This is the new headquarters of the Fondation Jerôme Seydoux-Pathé, an organisation dedicated to conserving the history of the Pathé film

company and to promoting cinematography. Housing the Pathé archives and offices, the building also includes an underground screening room, a research centre and exhibition spaces.

Immediately behind the street façade is the public lobby, a triple-height greenhouse-like atrium with a view right to the back of the site. Connected to this by a metal circulation core with a series of bridges is the second element in the programme — the ‘creature’.

Its sinuous shape — without precedent in Paris — exploits the limitations of the awkward trapezoidal site while keeping its distance from its neighbours.

Complex joints connect it to the adjacent buildings at just four points and it stops short of the back of the plot to make space for a new garden planted with birch trees.

(continued over)

Exhibition and screening spaces occupy the lower levels of the five-storey structure, with archives on two floors at its heart. But the most extraordinary interior is the double-height office space under the roof.

Covered by a sequence of parabolic laminated-larch arches — an exuberant display of structure — it is flooded with subtly filtered natural light from the roof’s double-curved glass shell while the neighbouring buildings are seen as if through a veil.

The roof wraps the space so there is no ceiling and almost no wall, creating an uplifting place of work and a celebration of light.

# Jérôme Seydoux Pathé Foundation, Paris, France

## Extended caption 1 (table)

Narrow at its street front, with medium-rise apartment buildings lining both sides, the site widens and bends as it extends back. Early studies proposed a rectilinear form, which morphed in stages into the organic curves of the final design.

The height and bulk of the new structure are at their greatest near the centre of the site: at the sides and back it dips to give light and air to neighbouring apartments.

The footprint, arrived at through extensive computer and physical modelling, surrenders some of the potential built area to increase the green space — benefitting both client and neighbours and making possible a dramatic view of the tail of the structure.

# Jérôme Seydoux Pathé Foundation, Paris, France

## Extended caption 2 (table)

The visible surface of the building is a technologically advanced double skin of aluminium and glass, solid in some parts and transparent in others.

The primary structure of this shell is made up of 32 laminated wood arches, with a secondary steel structure supporting the double-curved insulated glass panels.

Outside the glass skin is a further layer made up of some 7,400 curved and perforated aluminium scales.

Parametric modelling was used to plan the distribution of the scales over the complex form of the façade, to calculate the size and density of the perforations, and even to control the machine production of the aluminium components.

**(Wall captions - clockwise in order of hang)**

# Jérôme Seydoux Pathé Foundation, Paris, France

Longitudinal and cross-sections showing the functional programme including the mezzanine office floor under the roof; west and east elevations showing the organic form of the shell falling away to the sides and back to give light to neighbouring buildings

2010, scale 1:100

# Jérôme Seydoux Pathé Foundation, Paris, France

Bas-relief section through the office floors at the top of the building showing the double-height space and the parabolic wood arches that define the internal volume

2009, scale 1:20

RPBW

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Thank you.
Molly Bretton, Access Officer


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