

Dominique Perrault Architect

A RETRACTABLE ROOF ON SUZANNE LENGLEN TENNIS COURT

THE FRENCH TENNIS FEDERATION - PARIS



WINNING PROJECT

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THE PLEATING OF THE COURT SUZANNE LENGLEN

THE «FRENCH OPEN» SITE

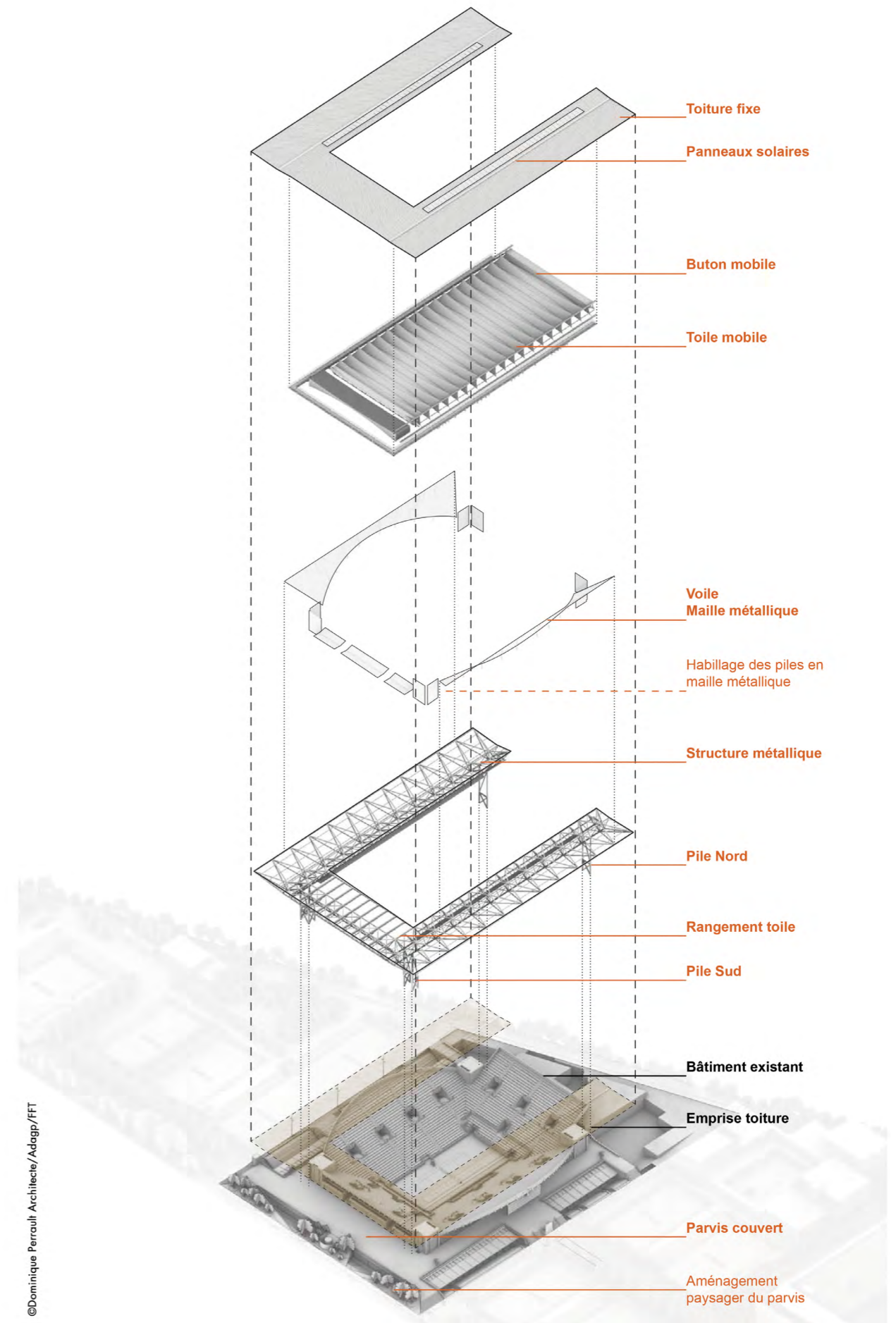
The Roland Garros tournament site is located in the heart of the Ile-de-France metropolis, between dense city and nature, among the Bois de Boulogne, Paris and Boulogne-Billancourt. The new roofing on the Suzanne Lenglen court aims to fit into this context with precision. It is not only a question of building a retractable roof, but also of proposing a large-scale architectural ensemble whose silhouette interact with the existing building as well as with its surrounding environment.

To the North, the project opens up towards the peaks of the Bois de Boulogne, while to the South the relationship is more urban. The Suzanne Lenglen court forms the main facade of the Roland Garros site, from the Boulevard d'Auteuil. Finally, in the immediate

surrounding area of the Normandy highway and ring road, the large roof is consistent with the scale of this important infrastructure node.

Without being the center court of the French Open site, the Suzanne Lenglen court is an active venue during the Grand Chelem period. It is indeed located in the central walking axis. Each spectator is thus led to move towards its side facades.

The project thus represents an opportunity to improve the quality of the existing public spaces, in particular the forecourt to the south of the court. Once the court is covered, the square forms a sheltered place ready to be activated and animated during sports events.



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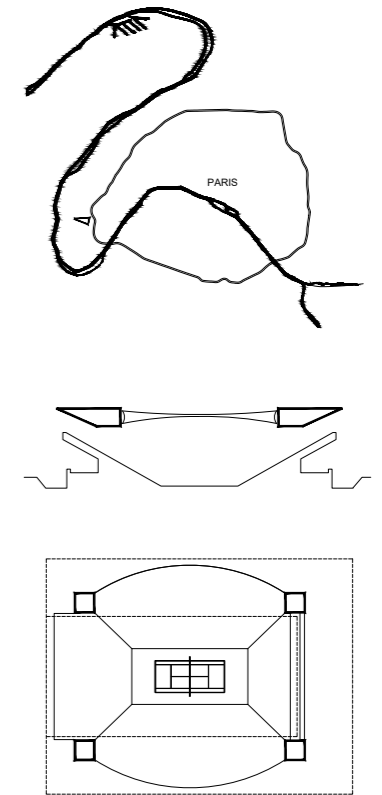
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COVERING THE COURT SUZANNE LENGLEN

The project design consists of a set of technical solutions adapted to specific challenges. The main function of the roof is to shelter the Suzanne Lenglen court and all public seating from the rain. It is also about protecting from the wind and controlling the shadows cast by the roof on the court so as not to disturb the players.

The proposed roof is overhanging the existing stands, with a sufficient overlap. It includes a mobile part, made of canvas, and a fixed part that provides support for the mobile roof and integrates all the necessary equipment for its folding and unfolding.

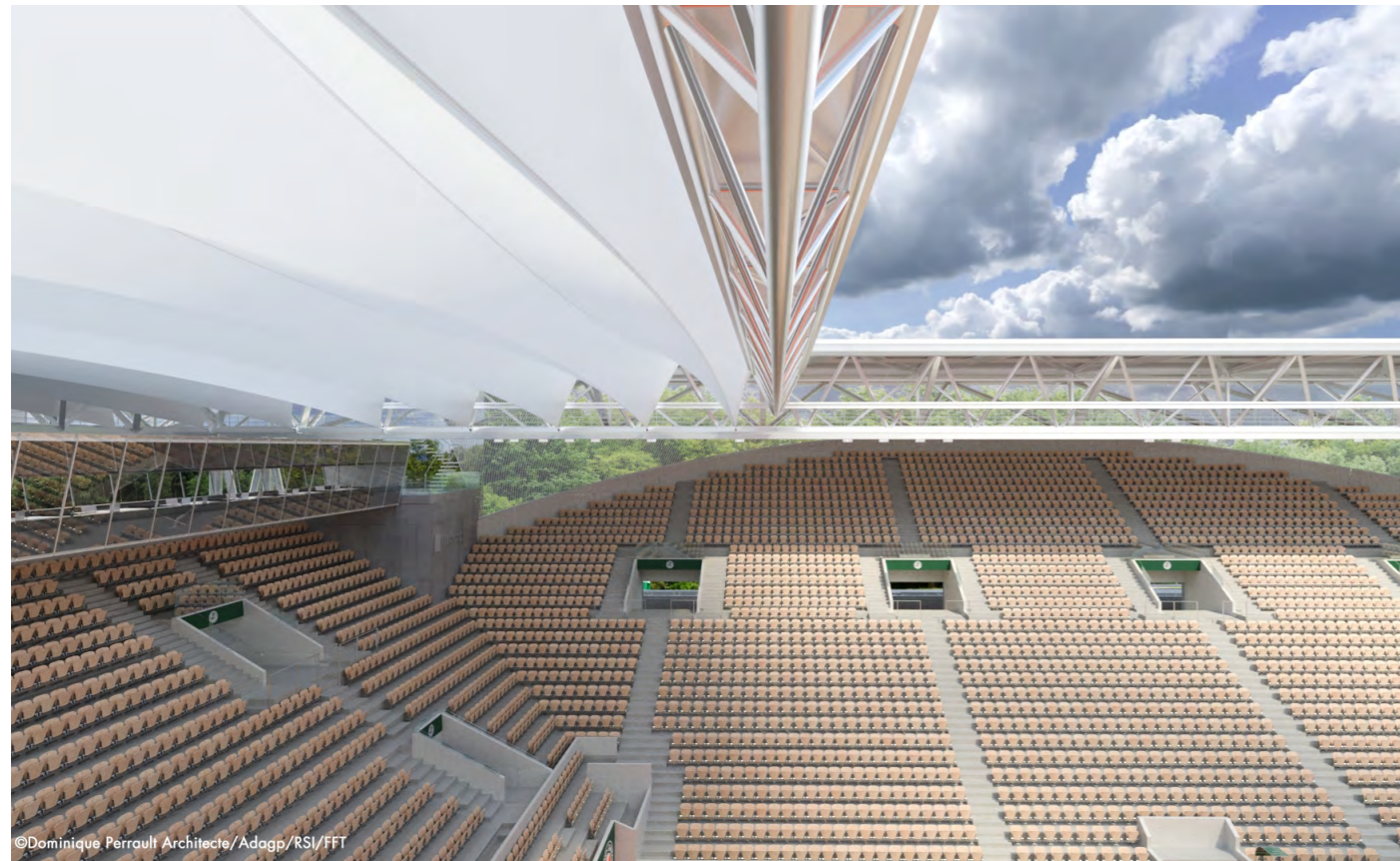
The project is intended to be pure and without artifice, resulting from the structural efforts implemented.

A FLOATING ROOF

The structure is pure, minimal and fully apparent, and proceeds by a fine assembly of steel elements on a concrete structure. By creating a dialogue between a

new flat horizontal surface and the existing curves of the side stands, the project enhances the geometry of the Suzanne Lenglen Court. The new cover of the Suzanne Lenglen Court seems to levitate over the court. His relationship to the existing building helps preserve its architectural integrity.

The U-shape of the fixed part of the roof covers the stands on three sides (West, East and South) and completely opens the view to the North and the Bois de Boulogne when the movable roof is folded. The two East and West arms of the U, with a span of 87 meters, integrate the rails and locking mechanisms of the movable roof, while the South section forms a storage box for the folded roof and integrates the winch and the motor for the activation of the unfolding mechanism, thanks to a moving button.



The constructive system of the steel structure is mainly based on the bolted assembly. Laterally, a mesh fabric, fixed at the top to the longitudinal beams and at the bottom to the existing concrete stands, encloses the bleachers. Made of stainless steel, the mesh offers resilience and simplicity to the project. It emphasizes the curve of the stands and protects the highest bleachers from weather changes, while allowing light to pass through.

THE PLEATING OF THE MOBILE ROOFING

In haute couture, pleating refers to the art of folding a piece of fabric. For a fashion piece, this technique offers with style and elegance a great liberty of movement. The mobile cover of the Suzanne Lenglen court, thought as a pleated fabric, unfolds with delicacy and lightness in a solid frame. The relationship between the rigid steel structure and the flexibility of the mobile canvas helps to shape the identity of the project, combining mechanical precision and design finesse. The mobile roof, like a membrane, is made up of

a succession of 21 modules of stretched V-shaped canvas, continuously fixed between cables, for a total surface area of around 4800m². Each module is approximately 5 meters wide and 44 meters long. When the roof is deployed, the cables are tensioned to take up rain and wind loads. A mobile girder on the north side of the mobile roofing is provided for its drive during the unfolding and folding operation. The movement is done horizontally, by deployment of the fold along rails, from South to North. As soon as the positioning of the cover is triggered, a show begins.

The proposed fabric is a PTFE fiber fabric, SEFAR® Architecture TENARA® 4T40HFT. It is a 100% fluoropolymer fabric with a high-tenacity PTFE yarn skeleton. Costing more than a classic polyester/PVC canvas, this material was nevertheless chosen for its particularly adapted technical qualities: high light transmission, low maintenance, robustness under repeated folding and unfolding movements, preservation of its mechanical qualities in cold weather, and a much longer life span than conventional fabrics. Associated with the chromatic palette of the Suzanne

Lenglen court, which mixes the red tones of the clay court, the shades of green of the displays and the clear variations of the raw concrete of the bleachers, the project aims for a soft neutrality through a metallic grey tint vibrating according to the light and the light changes. Suzanne Lenglen symbolized the freedom and elegance associated with athletic performance. This design study wished to retranscribe through an architecture, both precise and delicate, the temperament of this avant-garde woman who, almost a century ago, marked the tennis history.



le coffre et la toiture repliée



la toile tendue, le buton mobile et la poutre mobile



DESIGN TEAM

The project is the result of a collective work, mobilizing many recognized expertises. To design the retractable roofing of the Suzanne Lenglen court, the team combined a builder, an architect and an engineering department, respectively the Renaudat and TESS companies, and architect Dominique Perrault, accompanied by co-contractors to cover the entire field of necessary skills.

Renaudat ensures the realistic anchoring of the proposal, close to the construction site and the realization, while the combined expertise of Dominique Perrault and TESS will allow the optimal exploitation of the site's possibilities.

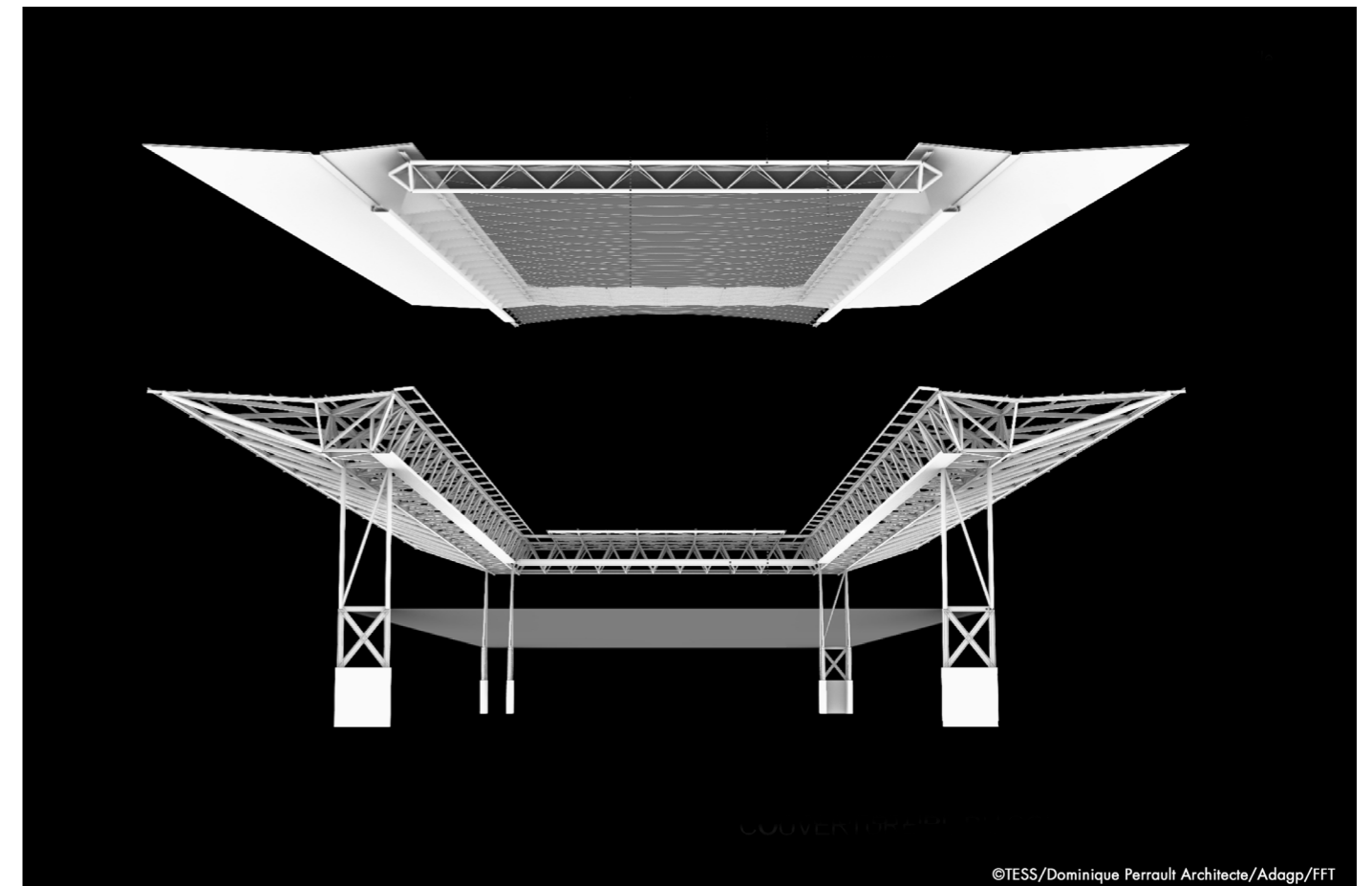
From an organizational point of view, Renaudat Centre Construction is the representative of the operation and ensures its management with the French Tennis Federation (FFT) and the Société de Livraison des Ouvrages Olympiques (Solideo).

- **Renaudat Centre Constructions** is the mandatory of the team. Specialized in the construction of complex

works and structures, Renaudat has participated, among others, in the construction of the Léo Lagrange sports complex in Toulon and the Zenith of Saint Etienne. Renaudat acts as a representative, steel carpenter and coordinator of the construction team.

- **Dominique Perrault** acts as an architect. He is the architect of the Velodrome and the Olympic Swimming Pool in Berlin, the Olympic Tennis Stadium in Madrid and the Grand Palais des Sports in Rouen. He works as an architect but also as a design coordinator, in order to propose a coherent and architecturally ambitious project.

- **T/E/S/S** it is a structural engineering office. TESS participated in the Louis Vuitton foundation and in the mobile sail of the Seine musicale, and specializes in the creation of bold and realistic structures. TESS brings to the group an expertise and a guarantee of quality in the technical aspects.



- **Ramery Batiment** is a civil engineering company and has carried out numerous construction and public works projects.

- **ELEMENTS Ingénieries** will leverage its expertise in environmental issues and building life cycle analysis.

- **Calcul-Meca**, specialized in mechanisms, will ensure the proper functioning of the mobile cover, thanks to its experience in the calculations of the mobile sail of the Cité Musicale or the conception of the mobile roof of the swimming pool of the Aqua'Rel in Lons de Saunier.

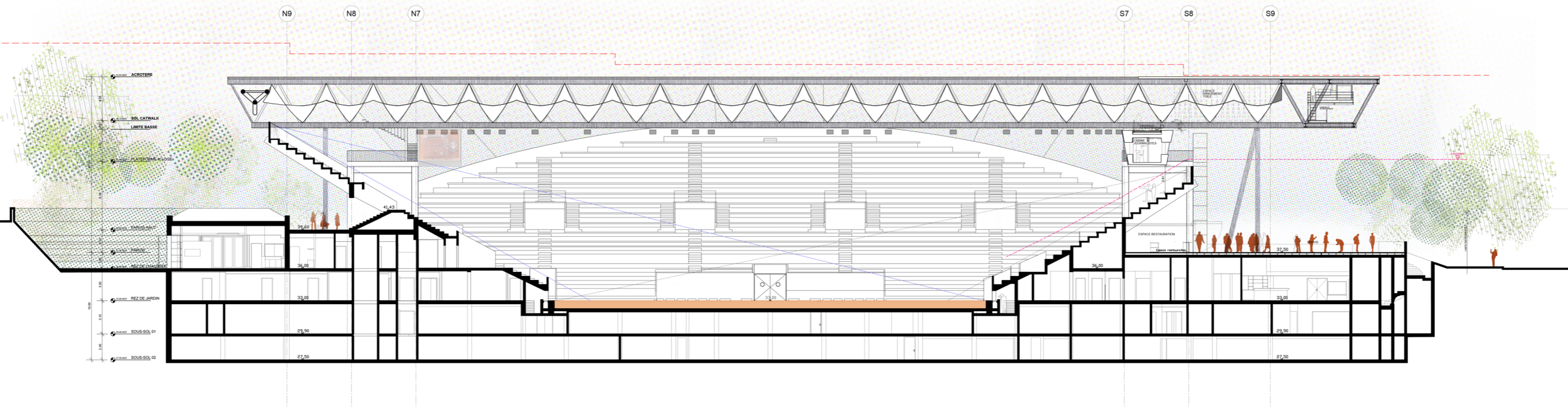
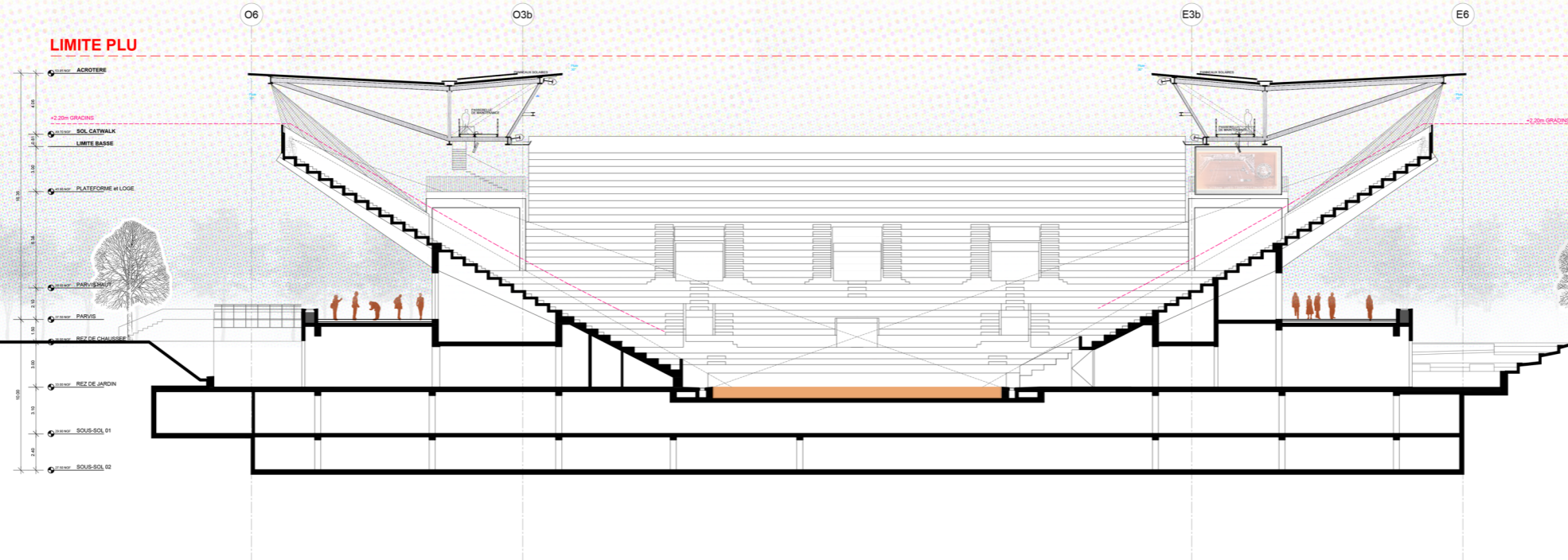
- **Taiyo** Construction company specializing in membranes and canvases, Taiyo has participated in the installation of the Toyota Stadium in Toyota City and the Arthur Ashe Stadium in Flushing.

- **Jean-Paul Lamoureux** is a consulting engineer in acoustics. He collaborates with Dominique Perrault

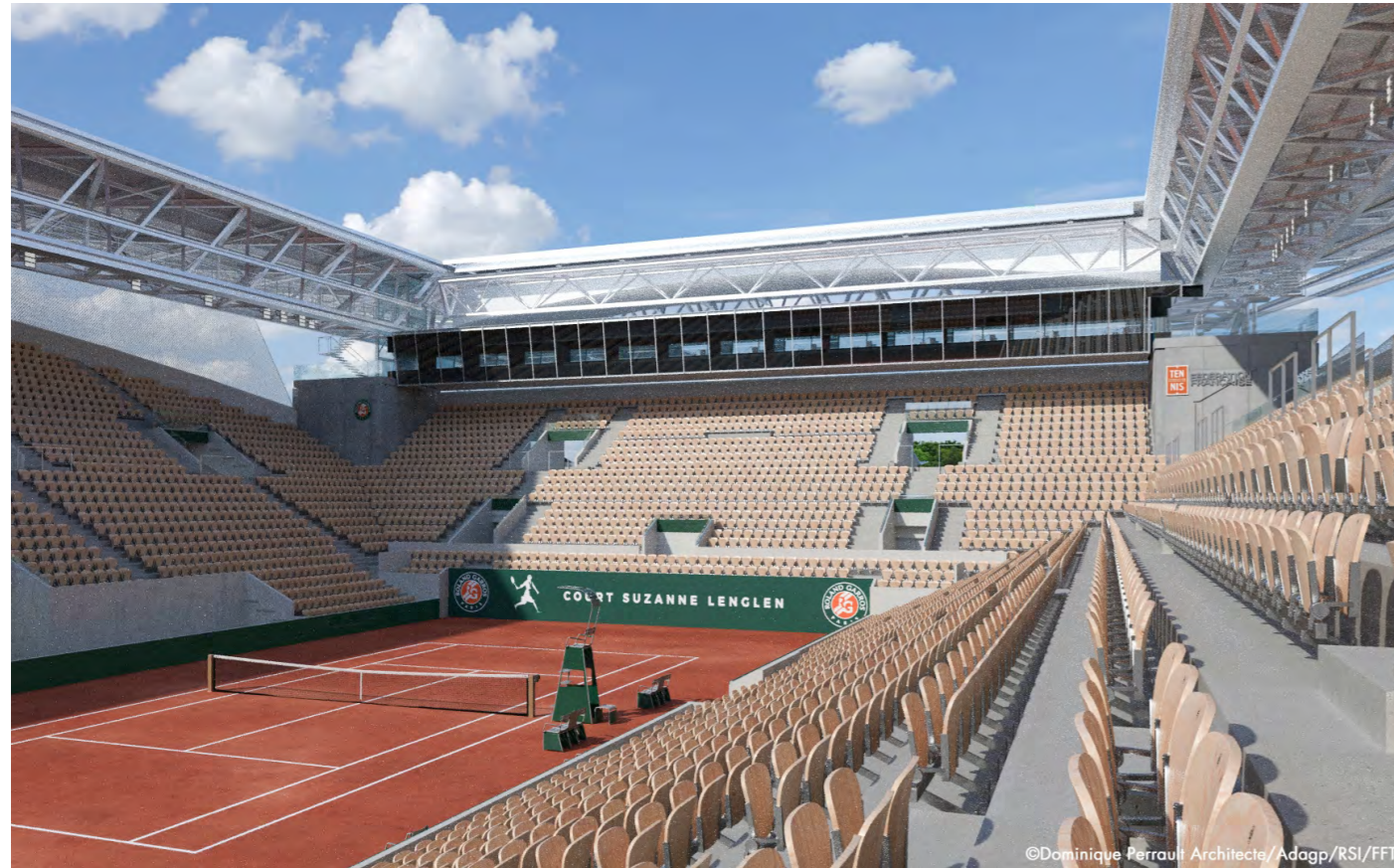
and has a multitude of common references such as the Berlin Olympic Velodrome and Swimming Pool and the Madrid Olympic Tennis Stadium.

- **Louis Choulet** enhances the skills of the group with its fluid engineering skills.

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DATA SHEET

RESTRICTED COMPETITION: 1st Prize

- **location :** «French Open» site, Avenue Gordon Benette, 75016 Paris
- **client :** The French Tennis Federation (FFT) + Société de Livraison des Ouvrages Olympiques (Solideo).
- **contractor:** Renaudat Centre Constructions, steel construction, Chateauroux
- **architect :** Perrault Architecture (DPA/Paris)
- **co-contracting companies :**
 - Ramery (structural work), Laigneville
 - Taiyo (canvas), Muehweg
- **co-contracting engineering offices :**
 - structure : T/E/S/S, Paris
 - fluids/CFO-CFA : CHOULET, Clermont-Ferrand
 - mecanism : MECA, Nantes
 - acoustics/lighting : Lamoureux, Paris
 - environment : ELEMENT, Paris
- **subcontracting engineering offices :**
 - Roads and networks: Mozaïc, Caen
 - Economy: AXIO, Paris
 - BIM: Aur Blanc, Lyon
 - Execution project management: Calq, Paris
- **competition :** Delivered phase 01 - December 2019
Delivered phase 02 - April 2020
- **provisionnal delivery:** 2024
- **fixed cover surface :** 5200 m²
- **surface of the retractable cover :** 4800 m²
- **program :**

The project consists of covering the Suzanne Lenglen court in order to:

 - Enable the holding of tennis matches in rainy weather and at night.
 - Enable boxing events to be held during the 2024 Paris Olympic and Paralympic Games.



DOMINIQUE PERRAULT ARCHITECT

Founded in 1981, Dominique Perrault Architecture is an international architecture, urban planning and design studio, based in Paris and Geneva. Praemium Imperiale award laureate, Dominique Perrault gained an international recognition with the French National library (1995). This project marked the starting point of many other commissions abroad, such as The Velodrome and Olympic swimming pool of Berlin (1999), the extensions of the European Court of Justice in Luxembourg (2008 and 2019), the campus of Ewha's University in Seoul (2008), the Fukuoka Tower in Osaka, Japan (2010) or the DC Tower in Vienna (2014).

The studio has also carried out various heritage conversion projects, such as the redevelopment of the Pavillon Dufour at the Château de Versailles (2016), the transformation of the Paris Longchamp racecourse (inaugurated in april 2018) or the transformation of the Poste du Louvre in Paris (completion in 2021).

His work received prestigious distinctions such as the Mies van der Rohe Pavilion Award in 1997, the World Architecture Award in 2002, the "Seoul Metropolitan Award" for the women University of Ewha in 2008, or the Gold Medal of Architecture from the french Accademy of Architecture in 2010. Dominique Perrault is also honorary professor at the Ecole Polytechnique Fédérale de Lausanne, Switzerland. In 2010 he' the curator for the french pavillon of the Architecture biennial in Venice and propose the theme "Metropolis?", a reflection around for french metropoles, in relationship with the Grand Paris project. He is the founder of DPAX, a multidisciplinary research platform exploring the new perspectives for an underground architecture. In

October 2018 Dominique Perrault launched, in partnership with EPFL and the American teaching platform edX, the first MOOC (massive open online course) dedicated to underground architecture.

Current studies and projects include the DC Tower II in Vienna, the Olympic and Paralympic Athletes Village – Paris 2024, the Gangnam International Transit Center in Seoul, Korea, the new Villejuif-IGR station of the Grand Paris Express public transport network, and the "Mission Ile de la Cité," an urban study commissioned in december 2015 by the president of the French Republic François Hollande that reflects upon the future of the thriving, historical center of Paris from now until 2040.

In November 2019 Dominique Perrault was appointed General Director of the Seoul 2021 Biennale of Architecture and Urbanism 2021.

<http://www.perraultarchitecture.com>

ATHLETES - PARIS 2024

Saint-Denis, Saint-Ouen, Ile Saint-Denis
2018-2024

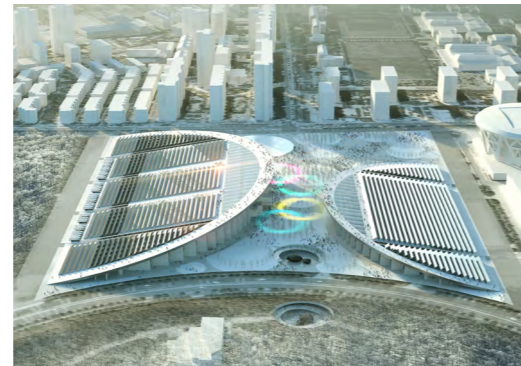
As a commissioned architect-urban planner, Dominique Perrault is developing the future athletes' village for the Paris 2024 Olympic Games. Covering nearly 51 hectares, the project aims to promote the transformation of a high-potential area on the banks of the Seine, in three communes of Seine Saint-Denis. During the Games, it will accommodate nearly 17,000 people, and will then be transformed into a new mixed neighborhood comprising 2,200 housing units and nearly 120,000m² of activities, offices, facilities and services.



OLYMPIC ICE SKATING RINK BEIJING 2022

Beijing, Chine
2016

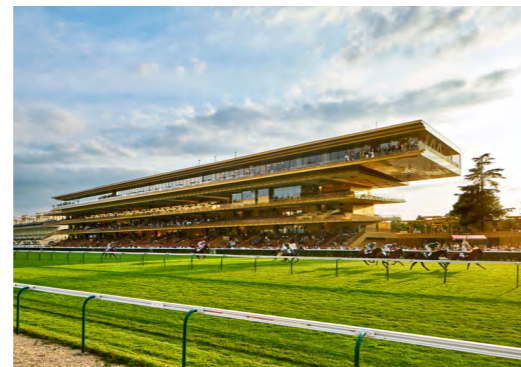
The project was elaborated within the framework of a competition for an Olympic ice rink of 12'000 places, for the 2022 Winter Olympic Games. The intention was to design a landscape rather than adding a new object to the site. Instead of designing a fixed architecture, the project imagines a sports facility that could stimulate the social life of the city and last beyond the Games. From the ground emerge two sloping roofs that take the shape of two half-discs. The project seeks to design an flexible and sustainable architecture that stimulates exchanges, whose spaces can be reconfigured to accommodate program changes after the event.



PARIS LONCHAMP RACECOURSE

Paris, France
2011-2018

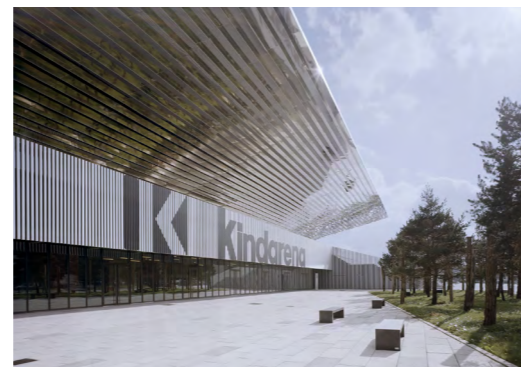
It is an emblematic architectural project, adaptable to future developments, but also a landscape project, a transfiguration of the territory, highlighting both the built heritage and the landscape heritage of the Bois de Boulogne. The project proposes to deconstruct all the old stands from the 1960s and replace them with a single grandstand, both more compact and functional. The buildings supporting equestrian activity, now scattered around the site, will also be demolished and rebuilt in the form of pavilions.



SPORTS HALL OF ROUEN

Rouen, France
2006-2012

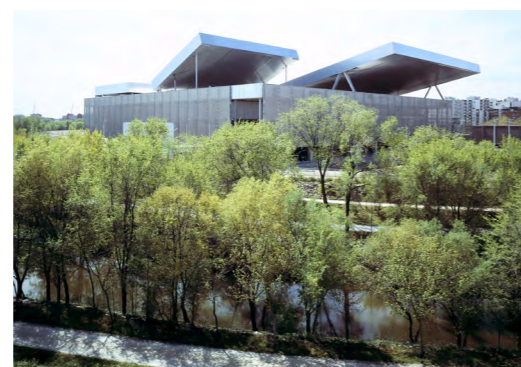
Close to the harbour area, the new lift bridge over the Seine and the city center of Rouen, the Sports Hall of Rouen becomes a pivot that articulates disparate urban ensembles. The building strives to be an «accessible relief»: as evidenced by the vast walkway inviting pedestrians to gather and melting equipment in the territory. The architectural design, makes extensive use of concrete and mirror-polished stainless steel, finely exploiting its plasticity to sculpt the volume; the result is a kinetic device dematerializing architecture, a new landmark radiating out over the city.



OLYMPIC TENNIS CENTER «CAJA MÁGICA»

Madrid, Spain
2002-2009

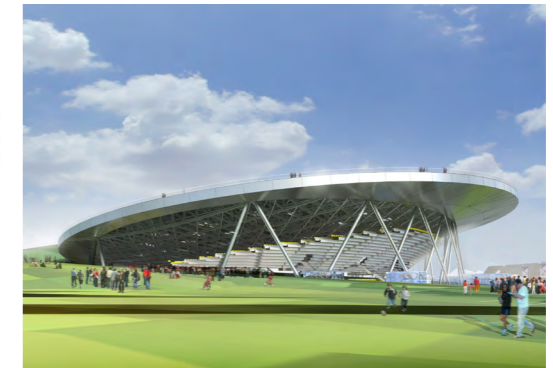
A sports facility built for Madrid's bid to host the 2016 Olympic Games, this project becomes a «magic box» and a new element in the Madrid landscape. The three sections forming the roof, move, open and tilt according to event needs and weather conditions, multiplying the potential of the venue, making this «box» a strong and constantly renewed silhouette.



OLYMPIC VELODROME, LONDON 2012

London, United Kingdom
2007

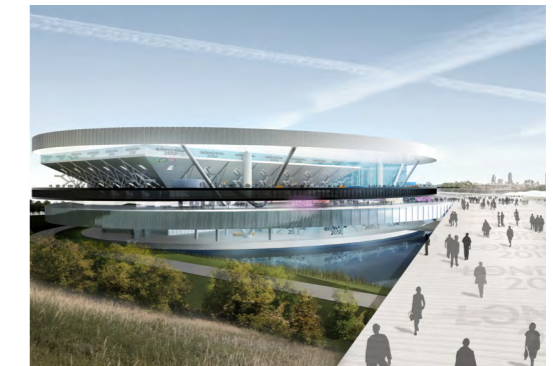
Project developed for an invitational competition for the London 2012 Olympic Games. The volume develops on 19'000 m² an Olympic track, temporary facilities dedicated to the event, and spaces dedicated to athletes, administration, public and media.



OLYMPIC SWIMMING POOL, LONDON 2012

London, United Kingdom
2004

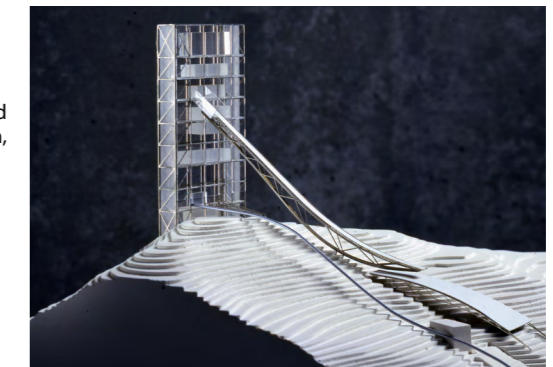
Developed as part of London's bid for the 2012 Olympic Games, the project is developing an Olympic Aquatic Center on 114,000 m². The project includes various Olympic pools and diving boards, preparation rooms for athletes, meeting rooms, and areas dedicated to health professionals and the media.



SKI JUMP

Innsbruck, Austria
1999

Project for a ski jump and its trail as well as several related equipment required for the site's sports activities: rest room, athlete preparation, press reception room, and restaurant.



VELODROME AND OLYMPIC SWIMMING POOL

Berlin, Germany
1992-1999

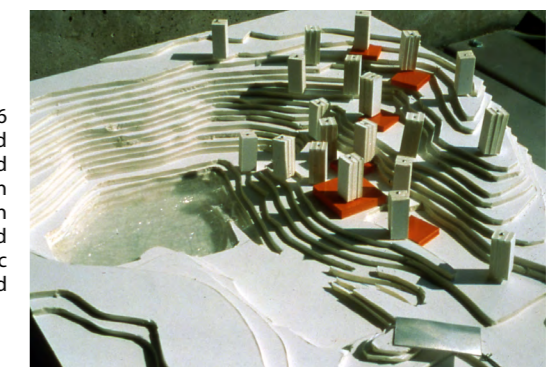
Undertaken as part of Berlin's reunification and its bid for the Olympic Games, the velodrome and Olympic swimming pool are located between a residential neighborhood and a brownfield site, in the middle of an intense traffic network. To reconcile these urban components, the project is embedded in an orchard, in which the simple volumes of the velodrome and Olympic swimming pool merge.



OLYMPIC ATHLETES VILLAGE

Kitzbühel, Austria
1997

Developed as part of a competition for Kitzbühel's bid for the 2006 Winter Games. The design principle consists in organizing around each building a public space, such as a square, an esplanade, and a mall. This concern to accompany each of the projects with an urban development plan draws the lines of urban composition for the district after the Games. To provide a pleasant landscaped setting for each of the sites, trees will be planted in geometric shapes as if to «grow» the city with its islands of buildings around the sports facilities and esplanade.



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