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Bridging Communities, Building Serendipity



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Jean-Luc Crochon was born in Paris, where he also graduated from the École Nationale Supérieure des Beaux-Arts. He quickly founded his own agency, whilst also working as consultant architect for RFR Peter Rice. In 1998, he created a joint agency with Cuno Brüllmann. For over six years, they worked on high-prestige projects, such as the restructuring of the Centre of New Industries and Technologies (CNIT) at La Défense, and the extension of the hospital Foch in Suresnes. The agency continues its development on different projects, research buildings, housing, offices and academic buildings. In 2018 Crochon set up CroMe Studio, another architecture studio dedicated to international projects, with Nayla Mecattaf. Crochon is a member of the Board of Directors of the Architecture et Maîtres d'Ouvrage (AMO) and a member of the Architectes Français à L'Export (AFEX).

Abstract

The Trinity tower, located in the Paris La Défense business district, is a 32-story, 140-meter tower, whose most outstanding feature is its construction upon a concrete slab, which itself is suspended above a seven-lane road, a first in France. A major feat of civil engineering, the slab is planted, providing 3,500 square meters of landscaped public space, linking the previously disconnected neighborhoods of the CNIT (National Center of Industries and Techniques) and Coupole-Regnault: a concrete solution for enhancing the quality of life of its users on an urban scale. Furthermore, Trinity is La Défense's first tower to develop an offset core, yielding a "heart of life," with exterior glass-walled elevators running along the façade. Diverging from the traditional office building format, Trinity is a tower conceived to facilitate open interaction with its environment, and promotes a new way of working.

Keywords: High-Rise, Office, Urban Design, Social Engineering, Structural Engineering

Introduction

In 2019, Paris' La Défense ranked fourth among the most attractive business districts worldwide, after the City of London, Midtown New York, and Marunouchi in Tokyo (Lhermitte et al. 2017). Built on an artificial slab 60 years ago on the western edge of Paris, La Défense, which had once benefited from cheap land, must today reinvent its model. Originally designed to vertically

separate pedestrian from vehicular flows, so as to create a more functional city, inspired by Le Corbusier's Plan Voisin, La Défense has overcome and reconstituted the morphological constraint of its raised plinth, which once made it difficult for users to understand and navigate (see Figure 1).

It has been a goal of the developer to make La Défense more urbane and more human-scaled. Over the last 10 years, several projects have been launched to sew the circular boulevard around the La Défense slab more tightly together, creating a real urban continuity that extends beyond La Grande Arche, reinventing the office park, and especially, infusing the district with new uses.

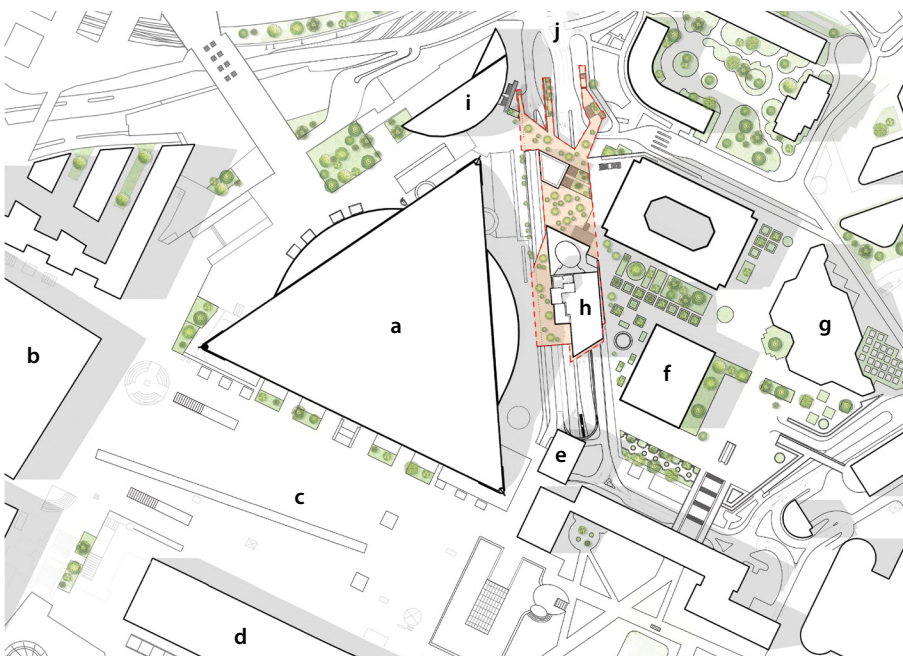


Figure 1. Site plan showing the location of Trinity Tower and its immediate neighbors.



- a** Centre of New Industries and Technologies (CNIT)
- b** Grande Arche de la Défense
- c** La Défense Metro Station
- d** Les Quatre Temps Department Store
- e** Notre-Dame de Pentecôte Church
- f** Tour Areva
- g** Tour Total Coupole
- h** Trinity
- i** Tour Sequoia
- j** Avenue de la Division Leclerc

At the base of the new, ultra-modern office towers are restaurants, bars, shops and public spaces that have the potential to transform La Défense into a 24-hour-a-day district, a destination for white-collar workers and all Parisians, on weekdays but also on weekends.

If it is to become more urban and claim its rightful place as a desirable destination in “Le Grand Paris,” La Défense must not lose sight of its goal to become the top European business center. Its particularly low office vacancy rate reflects the dynamism of the French business center.

Trinity was designed as a comprehensive and contextual urban project for La Défense (see Figure 2). In order to successfully integrate into an atypical site, it combines three major axes in a single construction program: the erection of a building, the creation of major urban link, and a large-scale intervention to enclose highways. In other words, Trinity is at once a work of architecture and urbanism, with public benefits.

An Urban Project

Trinity was designed for a narrow site and a need to span a highway, but also for its immediate surroundings, which include several architectural icons: the CNIT and Tour Areva, smaller buildings such as Notre-Dame de la Pentecôte Church, and residential buildings. The tower was sculpted to slip into this dense urban context, keeping a 27-meter minimum distance from Tour Areva, while conserving views and perspectives for its neighbors, notably between Tour Total Coupole and the CNIT. Continuous exchange with the neighborhood via public consultation meetings throughout development enabled the project to mature and meet residents’ expectations.

The concrete slab built over the highway provides real solutions for creating urban connections and enhancing the quality of



Figure 2. Trinity was a significant site-repair project, resolving grade changes for pedestrians and bridging over an active highway. © Laurent Zylberman

life of its users. It links the previously disconnected neighborhoods of the CNIT and Coupole-Regnault, contributing to the transformation of the former mono-functional business center into an integrated city district. Furthermore, this slab is fertile, providing 3,500 square meters of landscaped public space, along a 200-meter stretch of the highway. The ground planes on different levels are now connected by broad stairways and public, panoramic elevators. The tower and its landscaping provide pedestrian routes across the 12-meter grade change required to reach the main public square of La Défense (see figures 3 and 4).

Local “lenhelin” stone (from Brittany) was used for the ground covering of the whole public realm. Sixty non-allergenic alder trees enhance the lower and upper levels, contributing to wind reduction for pedestrian comfort. The trees on the ground are echoed vertically up the tower, with about 20 planted terraces. By means of soil beneath timber decking, these areas are home to around 40 different plant species, whose varieties were inspired by mountain vegetation. At the top of the tower is a spire, symbolizing the urban seam repaired by the project.

The users of Trinity Tower are put at the center of this new urban oasis, which is accessible for pedestrians through a full-depth entrance hall opening onto both

public levels; the lower level leads to the Coupole neighborhood and the upper level leads to the CNIT neighborhood. Pedestrian connections serve to facilitate and improve access to La Défense’s largest transport hub, providing users with a landscaped and agreeable setting for their daily route.

The urban connections also benefit the neighborhood’s residents. The stairways, break-out spaces, and green spaces planted with trees have metamorphosed the formerly congested, noisy roadside landscape, into a pleasant environment, a fresh haven propitious to strolling. As well as pedestrian links, the project provides new premises for community services managed by the town, and restaurants open to the general public.

An Ex-Nihilo Land

In an environment as dense and constrained as that of the La Défense district, which houses 16 of France’s 20 tallest buildings, but where very little area is still available for new construction, the first challenge was to invent the landholding on which the tower would be built. The solution was a feat of civil engineering: a ground-level high-rise building, placed on a property comprised of a slab of concrete poured above the seven traffic lanes of Avenue de la Division Leclerc.

To solve this challenge, the project owner, the architect, the engineer, city and national governments collaborated jointly from the beginning of the project. Following a previous collaboration on renovating the CNIT in La Défense, the project owner Unibail Rodamco Westfield commissioned Cro&Co Architecture to consider this unusual project over the roadway. A relationship based on trust and honest exchange enabled the creation of an exceptional project, combining the client’s ability to carry ambitious projects with the architects’ creativity. The duo quickly enrolled the expertise of an engineer to fully exploit this extremely complex site. The local development agency, Paris La Défense, and the national government then joined the project, motivated by the shared desire to make a major contribution to the neighborhood.

“Pedestrian connections serve to facilitate and improve access to La Défense’s largest transport hub.”

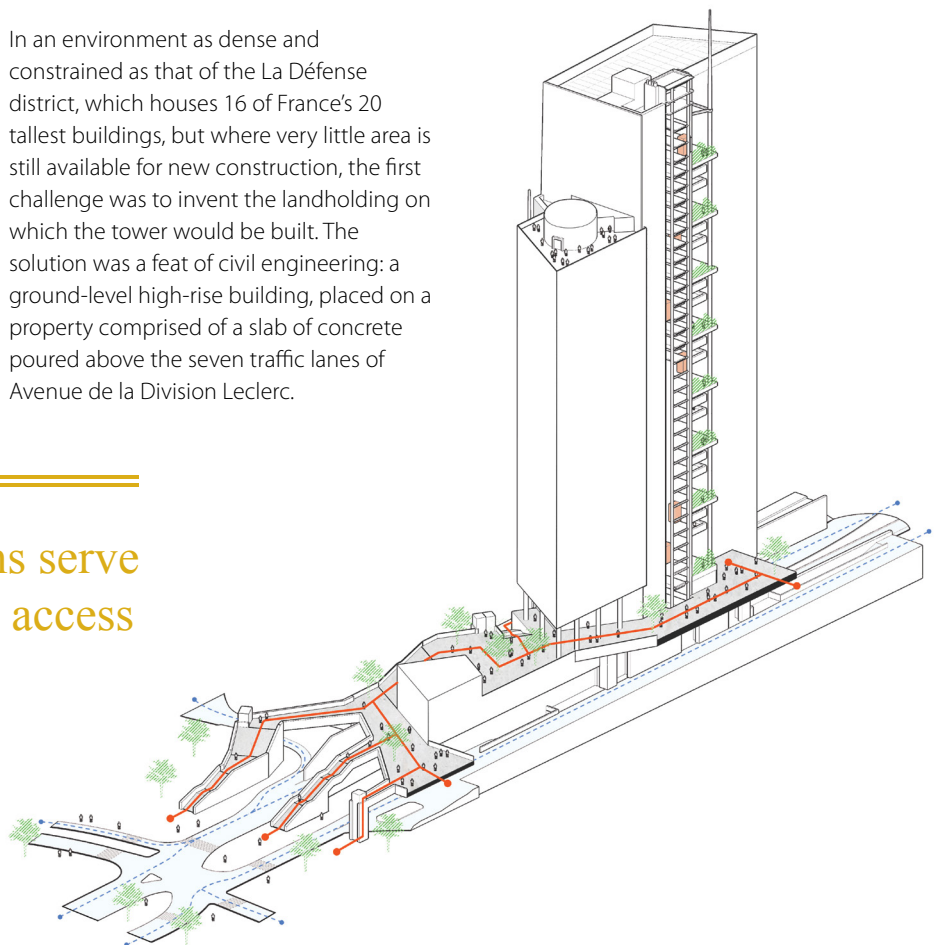


Figure 3. Axonometric view of Trinity, showing relationship of circulation routes and greenery through the complex.

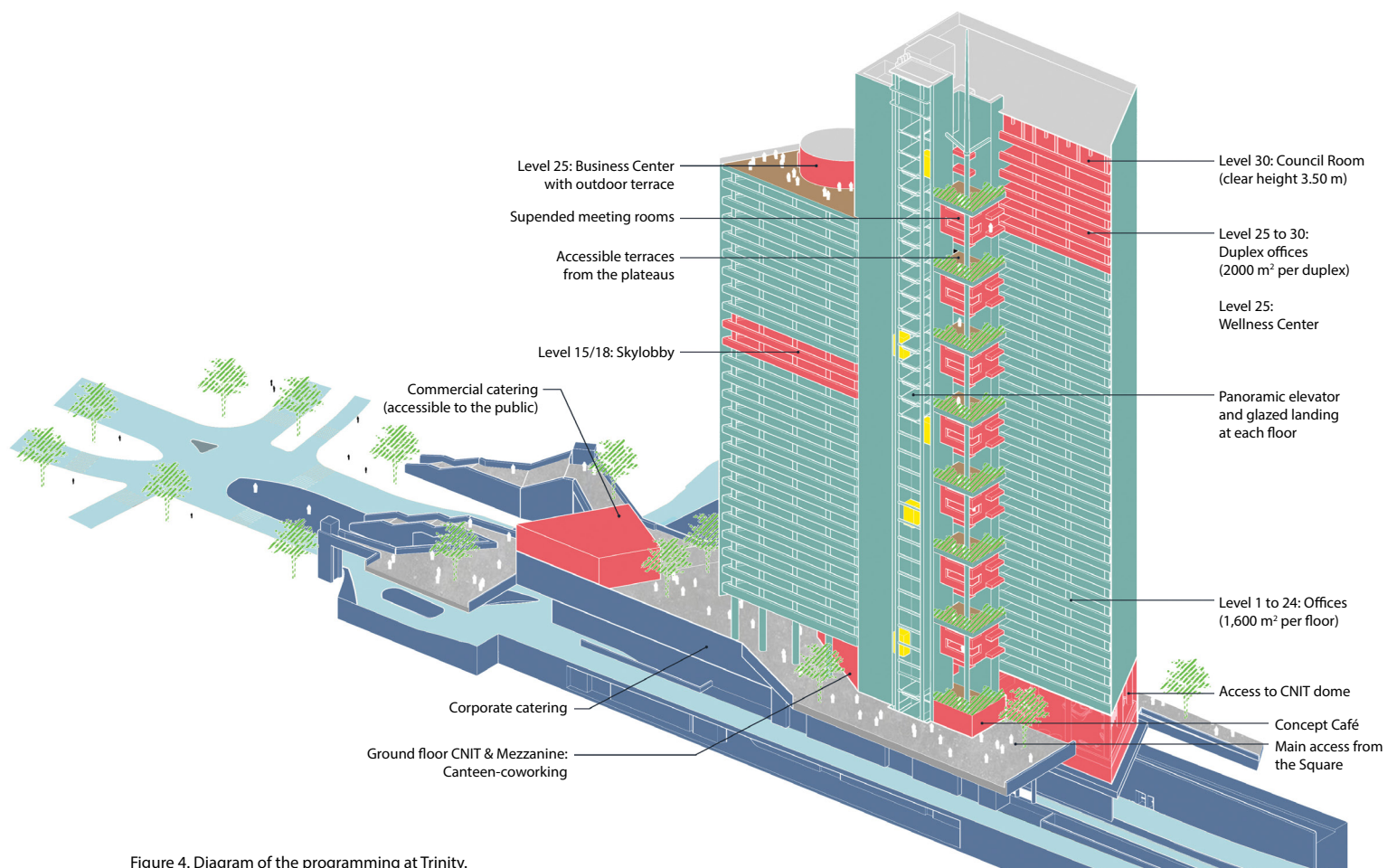


Figure 4. Diagram of the programming at Trinity.

The collaboration of this varied team enabled the construction of a tower on a previously “non-existent” site, a first in France, requiring the construction of a tunnel by a private company over the state-owned roadway, and keeping the traffic lanes open throughout the process (see Figure 5). Complex phasing provisions ensured that the entire neighborhood remained fully functional throughout.

Trinity’s ultimate realization is also the result of dialogue with the residents, managed by the developer and the architect with regular project presentations, gathering comments and requirements, and ensuring an adaptive, appropriate response. This successful partnership resulted in obtaining a building permit free of all claims from the municipal authorities of both adjacent towns, Puteaux and Courbevoie.

Many specific technical solutions were developed in response to the site constraints. The framing design enabled the team to keep the road in service at all times. The roadway-covering structure was made of



Figure 5. While the tower was under construction, the highway was kept open at all times. © Laurent Zylberman



Figure 6. The offset core enabled unique design elements—a system of terraces and suspended meeting rooms, and a transparent elevator shaft. © Hugo Hebrard

concrete sidewalls founded on piles (850 micropiles of 250-millimeter diameter) to adhere to a very limited foundation area. The composite floor system of the high-rise was designed in order to minimize the total weight to be supported by foundations with limited bearing capacity: the tower core and columns were made of reinforced concrete, while the peripheral slabs around the core were made by castellated steel girders, in order to let ductwork and telecom networking cables pass through, and to provide the maximum free height in office areas. Atop these were placed concrete-filled corrugated steel floors.

The common design of the infrastructure and the building superstructure, usually built separately, was an asset to the overall project, as it enabled significant optimization: a 50 percent reduction of the concrete used for the tunnel construction and 7 percent for the high-rise. These savings equated to a reduction of 100 kilograms of CO₂ equivalent per square meter, and a gain of three floors of office area for the owner.

An Offset Core

Trinity is a living tower, and clearly expresses its ambition to support real interaction with its surroundings. Its offset core brings a new architecture to La Défense. Usually enclosed fully within the middle of the floor plate, and presenting an obstacle to programming, here the core is opened up and becomes the main expressive element of the project. Animated by the occupants, activity is revealed in the façade: the movement of the panoramic elevators (colored red and yellow, in a nod to the appearance of the Eiffel Tower's elevators), the terraces, the suspended meeting rooms, the kinetic façades; all elements lend a dynamism to the project (see figures 6 and 7). This dialogue between inside and outside creates an interaction with its surroundings that mutually enlivens the neighborhood and the building.

The offset core enables natural light to bathe the elevator landings, thanks to the



Figure 7. Communal areas in each four-story module look out on, and extend onto the terraces. © Laurent Zylberman

panoramic, glass-enclosed shaft. This openness provides comfort of use, ease of orientation within the building, and a very human architectural experience. The large, glazed openings also offer exceptional views of La Défense's landscape, particularly of the Grande Arche (see Figure 8).

A twin-cabin elevator system was chosen to optimize the number of shafts, and therefore gain net area. It includes two banks of elevators, for a total of 16 cars circulating in eight shafts (two cars per shaft). A combination of several capacities, around 1,600 kilograms or 21 people per car, and several speeds between 2.5 and 4.0 meters/second, optimizes the energy consumption of the vertical transportation system.

The treatment of the core interior, with wide corridors, wide-open cross doors, luxurious materials for the floor, ceiling and walls, and soft lighting, erases the feeling of crossing a "service area." This cross-shaped circulation area also connects to the terraces and the suspended meeting rooms or kitchens (see Figure 9).

Each office floor has 1,300 square meters of usable net area and a clear height of 2.8 meters. The main office area is divided into two 27-meter-deep halves (a dimension determined by the requirement for fire compartments), each having a triple orientation and connection to the core.

New Ways of Working: Serendipity/ Flexibility/Pooling

The design of Trinity considers the changes underway in the modern workplace, meeting current and future needs, including those of the Millennial generation. It offers solutions to replace conventional ideas, both spatial and temporal, that prevail in the work environment, escaping from standardized, mono-functional spaces and nurturing serendipity, flexibility and pooling, the essential elements of the new workplace.



Figure 8. Elevator lobbies are bathed in light due to the transparent shaft walls and offset-core design.
© Gaston Bergeret

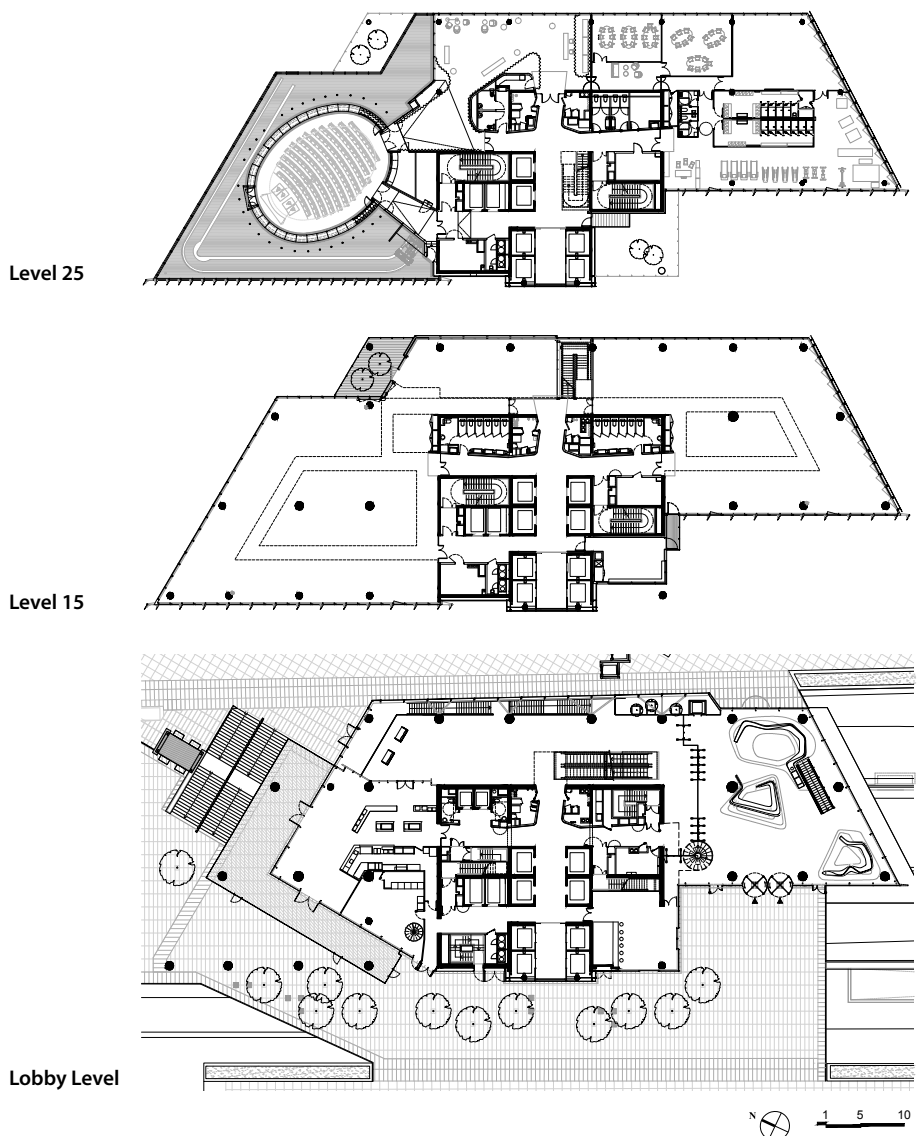


Figure 9. The offset-core plan afforded design opportunities such as panoramic office floor plates and elevator lobbies, and rooftop programming.

“The roadway-covering structure was made of concrete sidewalls founded on 850 micropiles of 250-millimeter diameter, to adhere to a very limited foundation area.”

Successfully creating places where we can cross paths starts from the belief that circulating people circulates ideas. In spaces for work and production conceived in Trinity, hierarchies meet both physically and figuratively: if “top-down” is seen as a hindrance to innovation, “verticality” makes a place for inclined planes, continuous ramps, niches and internal mezzanines. Workplaces become “floating cities” where people meet and converse, where they produce intelligently and urbanely, both within and outside the work site.

In connection with the elevator landing, a sequence of four-story modules combines a double-height terrace and two suspended

rooms with balconies, which can become improvised meeting rooms, and can be transformed into kitchens by the tenants. This takes into account the owner’s program, considering an ideal rental of four floors, so that each tenant has access to a shared module of terraces, balconies, meeting rooms, and/or kitchens. This configuration, propitious to serendipity, reflects new uses and allows flexibility of layout for the tenants (see Figure 10).

Even the stairs become places of conviviality. The six top floors of the tower merge into three duplexes, using open communicating stairs to connect through double-height areas.

The tower has a total of eight planted terraces, 12 vegetated loggias, and 23 balconies, comprising 1,500 square meters of outdoor spaces, which guarantees exterior access to each floor, either to the east or to the west (see Figure 11).

Sustainability

The new, modern workplace also deeply integrates sustainability and environmental issues. By incorporating high environmental standards, Trinity Tower has received both Haute Qualité Environnementale (HQE) Exceptionnel and BREEAM Excellent certifications. Beyond certification, sustainability, in terms of “common sense,” was always part of the design development.

The first gesture of sustainability for Trinity is hidden below its site. As it is built above a vehicular road, it enables a double use of the site, one of many ways in which high-rise density is a factor of sustainability. Further upwards, the façades are fully glazed to optimize natural light and views. Conceived as a block with modules of 1.35 meters’



Figure 10. Each of the four-story modules along the core combines two suspended common rooms, which can be converted to kitchens by the tenants. © Laurent Zylberman



Figure 11. Planted terrace. © Laurent Zylberman

width, to match the French office standard, the façade elements have been completely prefabricated in the workshop, then lifted by crane to reach the floor plate and mounted from the interior with two fixing points each. The specific combination layers makes the façade very efficient in terms of energy consumption, by limiting solar gain. On the western façade, a filter made of vertical printed glass blades helps with solar protection, while generating another reading of the façade: it erases the horizontal strips of the fire-resisting band (see Figure 12).

The façade includes an operable window in every second bay, so that there is a possibility in every single office to hear exterior sounds and breathe fresh air. Openings are narrow, vertical pantograph elements, so as to avoid security problems.

Cutting-edge technologies are used, including decentralized air handling units (AHUs) on each floor, heat recovery systems, retention tanks, generalized leak detection, CO₂ detection, dimmable lights, light sensors, presence detection, and a fully automated building management system (BMS). And thanks to its exceptional situation, close to the La Défense transit hub, the developers chose not to create a car park (only delivery vehicles have access to the basement), instead providing bicycle storage to encourage non-motorized transport for local use. Greenery on the terraces and the public connections, with the continuous soil pit below the decks, provides a permeable floor through which to collect rainwater and improve the local climate for users.

Conclusion—and Continuation

La Défense has felt, and continues to feel the influence of the same architect/owner team. In 2009, the team handled the rehabilitation of the iconic CNIT with the owner, to transform it into a real piazza, which today has become a 24/7, super-connected scene, with offices, shops, restaurants, congress centers and upscale hotels. But the story does not stop there, because a few steps from the Trinity Tower, the CNIT is about to



Figure 12. The façade is rendered with printed glass blades that obscure separations and aid solar protection.
© Hugo Hebrard

begin a new mutation, by integrating a metro station in the basement that will be connected to the piazza through a new retail gallery.

Elsewhere at La Défense, in 2019 a major renovation took place at Carré Michelet, a 37,500 square-meter office building designed according to the same values as the Trinity Tower, including 1,400 square meters of terraces and green areas, workspaces and circulation areas intended to encourage exchanges and informal meetings, and distribution of natural light across the entire depth of the floor plates, thanks in particular to the large glass façades and an atrium, as well as the creation of pedestrian links between separated neighborhoods.

The design, development and construction of Trinity has lasted over 10 years; it has been a long venture, but also an outstanding opportunity to work out concepts beyond a single building that can be reproduced and adapted to other projects nearby, in support of a better-integrated and more well-balanced community. ■

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Project Data

Completion Date: March 2020

Height: 140 m (459 ft)

Stories: 32

Tower Gross Floor Area (GFA): 49,000 m² (527,432 ft²)

Primary Function: Office

Owner/Developer: SCI Trinity Défense / Unibail-Rodamco Westfield

Architect: Cro&Co Architecture (design)

Structural Engineer: Setec TPI

MEP Engineer: Barbanel

Main Contractors: Bateg (subsidiary of Vinci Construction France)

Other CTBUH Member Consultants: Arup (vertical transportation)

Other CTBUH Member Materials Suppliers: thyssenkrupp AG (elevators); Sika Services AG (sealants)

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