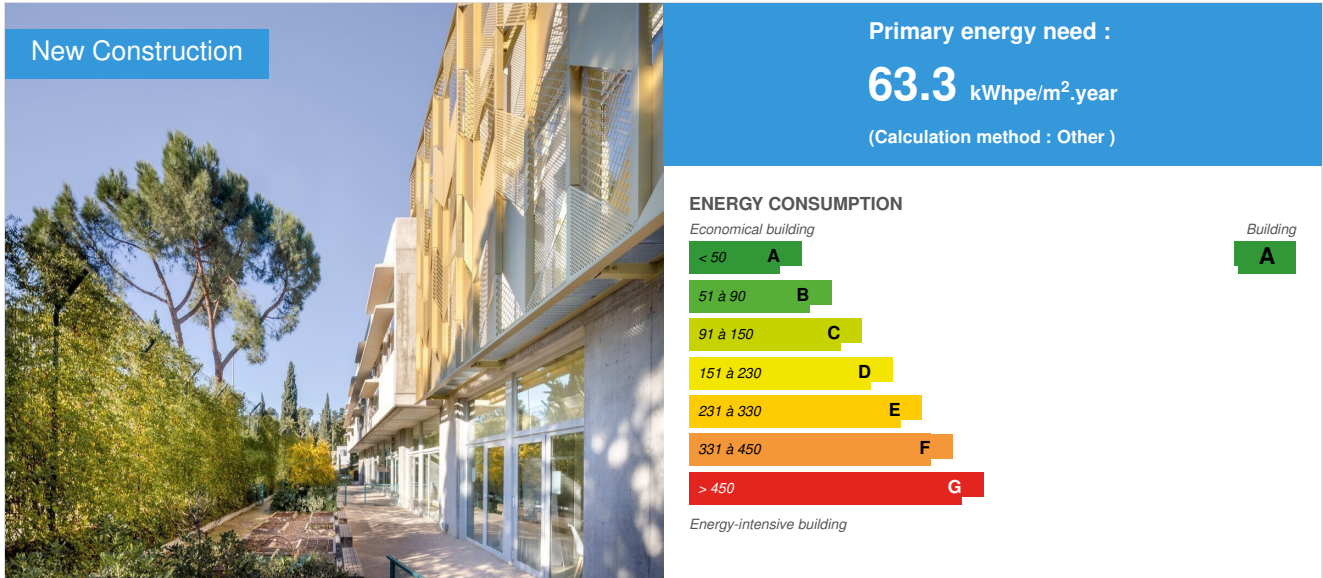


Conde de Orgaz Nursery School

by Nathalie Couineau / 2023-03-14 00:00:00 / International / 8 / EN



Building Type : Preschool, kindergarten, nursery
Construction Year : 2018
Delivery year : 2021
Address 1 - street : avenida de los madroños 28043 MADRID, Spain
Climate zone : [Csa] Interior Mediterranean - Mild with dry, hot summer.

Net Floor Area : 4 188 m² SHON (fr)
Construction/refurbishment cost : 5 431 000 €
Cost/m2 : 1296.8 €/m²

Certifications :



General information

En français

The new kindergarten is in keeping with the brutalist style and constructive sincerity of Sonrel, Duthilleul and Orgaz, the architects behind the building of the high school in the 1970s. The kindergarten displays pure forms in correspondence with the activities they regroup: the classrooms are contained in two volumes of white concrete, while a large ceramic volume houses the common spaces.

- More singular elements come in counterpoint to soften and enrich the spatiality. They also allow the building to cling to the site through a game of inside/outside:
- the volumes of the classrooms are shifted between the ground floor and the first floor, covering the courtyards and part of the forecourt in the same operation
 - small patios pierce the large volumes and bring light to the heart of the classrooms and the corridors
 - an overroof marks the central body and the circulations bringing natural light in the corridors and a natural ventilation system for the classrooms.
 - to the north, the facade is stepped up to welcome the diffuse sunlight, to respond to the slope of the land and to offer exterior extensions
 - staircases with more organic forms connect the floor directly to the courtyards
 - a large aluminum blind breaks away from the orthogonal grid and reinterprets the moucharabieh.

See more details about this project

<https://www.desclisetdescalques.fr/davy-croqueta>

Photo credit

Juan Sepulveda Grazioli y Paula Arroyo (Ojovivo)

Stakeholders

Contractor

Name : Agency for French Education Abroad

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Construction Manager

Name : Clicks and Layers

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Stakeholders

Function : Designer

Ale Estudio

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Co-contracting architect

Function : Designer

B-ground arquitectura

Berta Gonzales Salinero / estudio@b-ground.es / +34 633 54 64 33

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Architecte co-traitant

Function : Other consultancy agency

Switch / Oxalis SCOP

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Environmental consulting firm + Cerway certification

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Alarifes Tecnicos

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Economist + Architect of execution

Function : Other consultancy agency

Jofemar

Jose-Luis Gutierrez Malaga

Structural engineering office

Function : Thermal consultancy agency

JG Ingenieros

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Fluids / Electricity / Acoustics / VRD design office

Function : Others

Atelier Roberta

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<http://www.atelierroberta.com>

Landscaper

Type of market

Other

If you had to do it again?

Our main problem on the site was that we had to change the nature of the louvers, which were initially planned to be made of terracotta and were finally made of aluminum. I think that the project management team lacked a person specifically dedicated to this façade and the company never got around to it.

It's a pity that the original product had a much more traditional look.

In addition, our local fluids design office was relatively conventional and not very active in following an innovative approach. This sometimes slowed down the implementation of certain devices (difficulty in integrating them in the written documents or in proposing adequate equipment).

Building users opinion

The occupants seem to be satisfied, as the move-in was done during the year. The teachers, students and parents have taken possession of the premises with great ease. A small video presents the way the building is lived, it was made before the installation of the aluminum facade which took place in the summer of 2021. It is accessible on this link: https://vimeo.com/373391803?embedded=true&source=vimeo_logo&owner=5638926

Energy

Energy consumption

Primary energy need : 63,30 kWhpe/m².year

Calculation method : Other

Breakdown for energy consumption :

Calculation made in the PRO phase by Thermal Energy Simulation:

- Heating : 48.8 kWhpe/m².an
- Ventilation : 6.4 kWhpe/m².an
- Air blowers : 0.3 kWhpe/m².an
- Cooling : 1.2 kWhpe/m².an
- Lighting: 6.6 kWhpe/m².an

Gain compared to the reference building: 38.5%.

Envelope performance

More information :

The building was built with insulation consistent with the Spanish climate:

Vertical walls, R=2.5 m².K/W

Roof, R=3.5 m².K/W

Emphasis was placed on the inertia of the building to ensure optimal thermal comfort in summer

The joineries have a U_w of 1.4 W/m².K

The factors have been optimized according to the orientation of the facades, trying to ensure maximum natural lighting while preventing solar gain through external protection.

Building Compactness Coefficient : 0,41

Indicator : I4

Air Tightness Value : 1,00

Real final energy consumption

Final Energy : 53,90 kWhfe/m².year

Renewables & systems

Systems

Heating system :

- Condensing gas boiler
- Water radiator
- Low temperature floor heating
- Solar thermal

Hot water system :

- Condensing gas boiler
- Solar Thermal

Cooling system :

- VRV Syst. (Variable refrigerant Volume)

Ventilation system :

- Natural ventilation
- Double flow heat exchanger

Renewable systems :

- Solar Thermal

Renewable energy production : 5,00 %

Other information on HVAC :

The building was designed to operate at 100% natural ventilation, for Spanish regulatory reasons we were forced to double the system with a double flow mechanical ventilation.

The building remains resilient, without electricity, the natural ventilation can continue to function

The production of Sanitary Hot Water for the office and the checkrooms are ensured exclusively by the solar panels located on the roof in front of the kitchen.

Smart Building

BMS :

BMS system planned for the operation to manage mainly the mechanical ventilation and heating part. The natural ventilation part works in a totally low-tech way with a manual management by the user

Environment

Biodiversity approach

Pedagogical garden areas have been set up in different parts of the project and are equipped with composters. A composter has also been installed in front of the canteen to collect the waste that comes from it.

57 medium and large trees have been planted, as well as a large quantity of shrubs and climbing plants.

The composition of the plant palette was designed to offer several complementary plant strata. The species are selected to adapt to the soil and climate without watering beyond their installation period (2 to 3 years) and with moderate maintenance. These are endogenous species. The plant palette was studied by the project managers to avoid any presence of toxic species.

The southern boundary, between the kindergarten and the public space, is entirely treated by vegetation. A strong concentration of climbing plants against the existing fence, almost 4m high, allowed to constitute a dense vegetal screen, participating in the security of the site because limiting the visibility from the street.

Resilience

Hazards to which the building is exposed :

- Urban heat island
- Heat wave

Resiliency Measures Implemented:

- Natural ventilation important on comfort and indoor air quality, these are mechanically manipulable systems so as to avoid dependence on electricity for their use.
- The interlocking patio system allows for natural lighting of classrooms without the need for artificial lighting during the day.
- A significant number of deciduous trees have been planted, particularly on the south and west facades. These trees naturally protect the windows from solar gain in the summer. In winter, the rooms remain generously lit because the trees lose their leaves.

Mitigation actions on soil and biodiversity :

The solutions to limit the heat island effect are the following:

- Roof terraces are covered with white gravel.
- The parking lots are made of permeable gravel and interspersed with vegetated surfaces.
- A large part of the circulation is made of stabilized concrete
- the forecourt is made of clear concrete

- in general, a significant amount of vegetation is planned, spread over all the courtyards
- the surfaces which do not have a mineralization constraint are planted.

An inverted waterproofing implemented on the roof, allows to realize a consequent water retention and to limit the flow of the rejections on the network.

Urban environment

The kindergarten site is integrated into the tree-lined campus of the French high school, which functions as a park in which the various entities are organized on a logic of plateaus forming the effects of promontories. It is a large educational complex.

The choice of positioning the building to the west of the parcel to avoid any mask on the neighbors to the east of the parcel at the end of the day, verified by heliodon.

The sources of noise from the project for the residents are mainly the two courtyards and the rooftop installations. The following solutions will limit the impact:

The courtyard of the large section is delimited by the western part of the building, which creates an acoustic barrier

The courtyard of the small section is built 80 cm below the street and is surrounded by a wall of 2.10 m (interior height) which provides an important sound barrier.

The noisy machines such as AHU and heat pumps are positioned on the roof of the building and are surrounded by acoustic screens that protect the neighboring buildings from their nuisance.

The parcel is bordered in its southern limit by tall pines, and the parcel opposite is a garden with trees.

The parish, always to the south, is the only building really visible from the parcel, even if it is set back.

50% of the classrooms have a direct view on the two exterior courtyards, so there is a strong challenge to offer them pleasant views.

The south-western façade looks out onto the wooded gardens and the pine trees that line the road.

Land plot area : 8 209,00 m²

Built-up area : 2 056,00 %

Green space : 6 129,00

Products

Product

Ventelles orientables

Uin2

Jose Delgado / +34 607 260 674

<https://www.uin2.com/>

Product category : Finishing work / Exterior joinery - Doors and Windows

It is a system of adjustable aluminum louvers with thermal breakers. We used them for all the living spaces of the project in order to create a natural ventilation through. They were installed behind prefabricated perforated concrete panels.

The solution was very well accepted, we preferred a manual operation rather than an electrical solution. This was also well received by the teaching staff in the idea of making the building an educational tool.

Health and comfort

Water management

Consumption from water network : 1 286,00 m³

Consumption of grey water : 357,00 m³

Water Self Sufficiency Index : 0.22

Water Consumption/m² : 0.31

Water Consumption/Children : 61.24

In the project, the rainwater recovery is carried out only for the watering of the green spaces. We have set up two systems:

A gravitational and pedagogical system to water the shared gardens positioned near the courtyard of the large section (two 1000 liter tanks),

We have estimated a global water consumption per functional unit (FU) of 0.32 m³/m² year (1349 m³/year) and a distributed water consumption of 0.31 m³/m² year (1286 m³/year).

Indoor Air quality

The project includes two separate ventilation systems, independent of each other, which can operate alternately.

A natural ventilation installation is set up, and its dimensioning was carried out in order to reach satisfactory levels of CO₂ in the spaces concerned, which was studied by dynamic thermal simulation.

A double flow mechanical ventilation system with heat recovery on the extracted air has been installed for all the rooms.

A flow rate of 12.5 l/s (45 m³/h) per person was taken into account for the dimensioning of the installations.

All ventilation specifications are based on a Spanish standard, the RITE ("REGLAMENTO DE INSTALACIONES TERMICAS EN LOS EDIFICIOS"), which is based on the 13779 standard.

The location of the site has been done in such a way as to maximize the free orientations. All classrooms are oriented North or South. A shift of the ground floor towards the south generates an overhang contributing to the solar protection of the refectory and the exercise rooms of the youngest. The plan has been designed to create patios between each pair of classrooms; these patios provide a double function of natural light and natural ventilation.

The project has been designed so that it can function at 100% in natural ventilation, both for the minimal hygienic air renewal in winter and for passive cooling in summer.

On the facade, openings with glass blades in the transom allow the entry of fresh air. To the south, these openings are covered with porous solar protections (openwork bricks). Each classroom has two openings, a smaller one for winter and a larger one for the summer period.

At the back of the classroom, other openings ensure the function of extraction, via ducts at the back of the patio for the rooms of the ground floor, and via emergencies in the roof for the R+1. All these devices are directly operable by users by mechanical means.

The central part of the building is dressed with an openwork aluminum cladding, which allows both to act as a solar protection in front of the windows and also in the corridor to make ventilation grids for air outlets.

Comfort

Temperature level :

We have calculated by Thermo-Dynamic Simulation, the number of hours exceeding the Givoni diagram in percentage of occupancy. For a wind speed lower than 1m/s, we have a discomfort of about 1.5% of hours compared to the hours of occupation if we consider a 100% natural ventilation solution.

A simulation was also carried out with a double-flow mechanical system with active cooling (this is not air conditioning), this solution shows slightly better results with an overrun of about 1% of the occupancy hours.

It is this second solution that has been implemented.

Humidity control :

There is no provision for humidity control. With the Madrid climate, this is not a priority concern.

Acoustic comfort :

The acoustic study carried out in the PRO phase of the design, allowed us to define the surfaces of absorbent materials per space. The main solutions retained are absorbent wood fiber panels, used in the ceiling and in the return on vertical wall areas, as well as acoustic PVC or linoleum floors from Forbo.

Acoustic calculation results

Refectory; Reverberation = 0,93 s

Dormitories: between 0.62s and 0.71s

Offices: between 0.61s and 0.69s

Meeting room: 0.72s

Library: Reverberation = 0.61s

Sensitive areas: Refectory; Reverberation = 0.93s

Teacher's room: 0.74s

Visual comfort :

The general organization of the project allows the classrooms to be organized around patios, which constitute real light wells that lead light directly into the classrooms.

This arrangement provides a generous complement of natural light at the back of the classroom.

All the classrooms are sensitive to glare, which is why all the glazed parts of the classrooms have interior blinds.

Horizontal shading takes place above these patios to filter the light, as well as to provide effective solar protection.

These patios also serve as a relay of natural lighting in the circulations. A set of roofs forming a long linear skylight also bathes the floor corridors in light.

95% of the premises meet the high requirement (FLJ of 2%), and the remaining premises meet the low requirement. Views are provided to all spaces except for some pantry spaces and some sanitary facilities.

Ergonomic design :

The generous dimensions of the classrooms (65m²), allow for the development of several (library, collective, collaborative or individual learning) offering a variety of teaching situations variety of educational situations in line with the elementary level.

The classes are organized in pairs, separated by a patio around which are organized a sanitary block and a painting area. This configuration allows an immediate proximity of these spaces with the classrooms, conferring them a status of full-fledged learning place.

The furniture elements were chosen by the future users who took care to consult the project management. A great modularity of organization results from this work, today there are as many configurations as there are classrooms.

All the north-facing classrooms as well as all the classes of the small section installed on the first floor, benefit from an outside extension, allowing a complementary pedagogical situation.

Quality of life and services

The drop-off and pick-up of children, identified as the main nuisance for local residents due to the high proportion of parents coming by car, was worked on well in

advance, relying on the already well-developed shuttle service set up by the parents.

Complementary measures were planned in order to relieve the traffic at the entrance to the nursery school during peak hours. On the one hand, at the level of the forecourt, a drop-off system for buses allows to free the public road from this constraint.

At the level of the high school plot, small pedestrian paths guided by the high school's animators, allow the kindergarten children to cross the site from the bus parking lot located in the upper part of the site, to the kindergarten: a high entrance and a landscaped path have been built opposite the main entrance to accommodate these pedestrian flows.

Carbon

Initiatives promoting low-carbon mobility

5 connections have been provided in the parking lots to allow the recharging of electric vehicles (=10% of the spaces)

Racks for bicycles have been installed on the school premises for teachers, showers are accessible in the kitchen changing rooms.

On the scale of the school in general, a system has been set up to gather the shuttles in the upper part of the site and that access to the kindergarten is organized in the form of pedestrian convoys inside the compound. This was done in order to limit the congestion of the peripheral arteries.

The site remains easily accessible by public transport:

Various connections are available within 20 minutes of the nearest bus station.

Metro line 3 and buses 70, 11 to the southwest, buses 111 and 153 to the northeast, also less than 20 minutes away on foot, and the ESPERANZA metro station is also accessible (11 min, 800 m).

Two bus lines are accessible within 450 m of the kindergarten entrance (120 - 122).

The parent-teacher association organizes 22 school bus lines to serve the entire city - see site analysis and Cerway's email response on this topic.

The departures of the 22 school bus routes are timed to coincide with school exits.

For Bus 120, the frequency of service during rush hour is between 9 and 12 minutes.

For Bus 122, the frequency of service during rush hour is between 9 and 13 minutes.

Contest

Reasons for participating in the competition(s)

The construction project for the new kindergarten at the Lycée Français de Madrid has been awarded the Excellent level in design and execution of the international HQE label. It is the first building in Spain to obtain this distinction, which attests to a bioclimatic design, extensive work on natural ventilation and materials.

