Etterbeek Administrative Center

New Construction

Primary energy need :
49 kWhep/m².an
(Calculation method : )

ENERGY CONSUMPTION
Economical building

<table>
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<th>Energy Intensity</th>
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<td>Primary energy need : 49 kWhep/m².an</td>
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Building Type : Office building < 28m
Construction Year : 2017
Delivery year : 2021
Address 1 - street : 29 avenue des Casernes 1040 ETTERBEEK, Belgique
Climate zone : [Cfc] Marine Cool Winter & summer- Mild with no dry season.

Net Floor Area : 15 381 m²
Construction/refurbishment cost : 35 263 862 €
Number of Work station : 600 Work station

Proposed by : Emmanuel Bouffioux

General information

The new administrative centre of the Commune of Etterbeek, located at the corner of Avenue des Casernes and Rue Beekers, represents the central jewel in the crown of the urban revitalisation of the former military barracks of Etterbeek on the site of the Jardins de la Chasse. This is an exceptional opportunity for the renewal of an entire neighbourhood, a piece of the city and a municipality that cares about its image.

The primary purpose of the new headquarters is to replace the old municipal administrative centre dating from 1978, which, over the years of use, has become an environmental burden and a functional weakness due to the progressive development and increasing complexity of the administrative services.

The second is to improve the synergy between the administrative services and their services to the population.

The new administrative centre of the Municipality of Etterbeek is also a centre that is intended to be multifunctional. In fact, in addition to the administrative
services of the municipality of Etterbeek, it includes a neighbourhood police station and a Public Centre for Social Welfare (CPAS), thus considerably improving the visibility and accessibility of these other public services.

The co-relation of these two objectives is inseparable from the need to take part in this urban revitalisation of the former military barracks by means of a fair siting proposal that serves the public space.

Thus, the location of the buildings (administrative centre + adjoining housing, not developed within the framework of this application) is clear and dissociated in order to encourage communication between the existing neighbourhoods and the new development envisaged for the whole site (masterplan).

The new administrative centre is positioned at the corner of Avenue des Casernes and Rue Beckers for maximum visibility, while the housing is positioned in the continuity of Avenue des Casernes and the new housing planned for the interior of the block near the new park.

The separate siting of the two buildings allows for the creation of a pedestrian link between the planned park, located at the rear of the building, and the Avenue des Casernes and the new forecourt created by the setback of the administrative centre.

Indeed, the organic form of the municipal headquarters and this setback from the property line allows the creation of a generous public space on the scale of the new building.

The environmental challenges are also significant for such a building and must be adapted to the current regulations and standards within the city of Brussels. Thus, the passive resolution of the energy performance of such a building is quite a challenge. This was achieved by means of the following actions:
- the development of a triple glazed curtain wall with solar control technology
- the development of an efficient airtightness.
- the development of a thermal model studying the solar run in order to determine the distance between axes and the number of concrete slats suspended from the curtain wall, thus compensating for the additional solar shading required
- the installation of photovoltaic solar panels on the roof and the development of geothermal technology in the basement to provide heating and cooling needs, thus overcoming the need for fossil fuels
- the use of double flow ventilation with heat recovery.

Data reliability

3rd part certified

Photo credit

Georges de Kinder
Philippe Van Geloooven

Stakeholders

Contractor

Name : Commune d'Etterbeek - Travaux Publics
Contact : Dmitri DIELENS, ddielens@etterbeek.irisnet.be, +32 2 627 26 51
https://www.etterbeek.be/

Construction Manager

Name : BAEB - JASPERS-EYERS ARCHITECTS
Contact : Emmanuel Bouffioux, baeb@skynet.be, +32 2 376 06 10
http://www.baeb.eu/

Stakeholders

Function : Designer
Jaspers-Eyers Architects
Stefaan Van Acker
https://www.jaspers-eyers.be/

Function : Construction company
BPC
Vincent Peeters
https://www.bpc.be/

Function : Company
The wishes of the municipality can be summed up in three main objectives:

- The creation of a quality interior environment to serve; the reception of citizens when they visit the administrative centre, the staff, their fulfilment and cohesion in their workplace, and the service of political life through the development of a strong and inspiring architecture.

- The design of a central building as a connection point at the heart of the urban revitalisation of the former military barracks of Etterbeek into a housing district corresponding to contemporary societal, social and environmental issues.

- The proposal of an efficient and sustainable building corresponding to passive standards, and to the strong policy undertaken by the Brussels-Capital Region, in order to perpetuate the building while minimising operating costs.

Architectural description

In order to take part in this urban revitalization of the former military barracks of Etterbeek on the site of the Jardins de la Chasse, the proposal of a fair implantation at the service of the public space is essential.

Thus, the implantation of the administrative center and the housing building adjacent to it is clear and dissociated in order to favor the communications between
the existing districts and the new development envisaged for the whole site (see masterplan). The new administrative center is positioned at the corner of Avenue des Casernes and Beckers Street for maximum visibility while the housing is positioned in the continuity of Avenue des Casernes and the new housing projected in the interior of the block near the new park.

The distinct implantation of the two buildings allows the creation of a pedestrian link connecting the projected park, located at the rear of the building, to Avenue des Casernes and the new square generated by the implantation of the administrative center. This link allows a clear separation between the administrative building and the future housing, thus exposing the mix of uses present on the site.

The choice of building materials
Both inside and outside the building, simple and proven materials were chosen. Simple elements such as warm wood (FSC certified), neutral grey concrete, dark steel elements and many touches of natural green were chosen to enhance and echo the environment.

The façade is entirely made of glass, protected by sunshades. By combining green roofs and solar panels, it is not surprising that the new administrative centre in Etterbeek has an excellent energy score.

- water management
The project foresees the majority of the roofs as vegetated roofs and water retention basins in order to relieve the sewage network while recovering water for applications that do not require drinking water such as toilets and urinals, maintenance of the building and its surroundings as well as the cleaning of service vehicles. The green roofing and water retention system is also at the service of biodiversity.

The consumption of sanitary water (hot and cold) will be controlled through the adoption of systems to limit water consumption such as dual-flush toilets or flow-limiting taps. The project will have a grey water circuit supplying water to the toilets and urinals from the rainwater recovery tank, thus limiting the building's

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consumption of drinking water. The project will have a leak detection and water consumption metering system at each toilet block, which will also allow for the detection of any leaks. The building is also equipped with a leak detection system on the main water supply with a signal sent to the GTC.

- waste management

The construction site was the object of a very particular attention in terms of treatment of waste, their accounting and their minimization. In particular, no waste has been taken to a technical landfill.

- The tenant commits himself to use correctly the room dedicated to the storage of the waste placed at his disposal in the R-1 of 66m². This one is labelled to allow an effective sorting of operational waste.

Our energy design approach

In parallel to our environmental design approach, the project was subject to an energy optimization that is realized by first reducing, and as a priority, the energy needs of the building mainly through choices related to the envelope via passive design strategies. These choices make it possible to meet a primary objective in the design of a passive building: the minimization of energy needs while guaranteeing a high level of comfort. These are the following passive design strategies:

- Optimization of the building shape, allowing to reach a very high compactness (C=4.75), favorable to obtain high energy performances.

- Design of the envelope to meet the passive criteria by combining reinforced insulation, air tightness and optimization of the constructive nodes.

- Solar architecture combining a thoughtful choice of the building's location on the site, an optimization of the facades and their shape as well as the choice of the location and ratio of glazed surfaces. For the administrative center, the design of the exterior solar protection is based on a modulation of the geometry of fixed elements according to the summer solar gains to be protected for each zone of the façade. The choice of fixed elements also simplifies their maintenance as much as possible. These fixed elements are found in the form of architectural concrete slats and panels, directly suspended from the curtain wall.

- The choice of glazed surfaces also stems from a desire to maximize the natural lighting of the living areas, thereby increasing the level of visual comfort while reducing the associated electrical consumption.

The efforts made on the envelope allow us to greatly limit the complexity of the systems, and to use simple, efficient and proven technical systems, adapted to the limited remaining energy needs.

The primary purpose of a building is to protect its occupants from external conditions and to provide them with a high level of comfort throughout the year as well as optimal health characteristics. The design choices made and validated by the BREEAM approach will ensure

- A high quality of air thanks to the choice of VOC-free materials and the generalized double-flow ventilation allowing to ensure a hygienic air renewal in compliance with the PEB regulation.
- High hygrothermal comfort, thanks to the passive design of the project.
- A high level of visual comfort, thanks to the visual access to the exterior and the high levels of natural light.
- A high level of acoustic comfort (the building will comply with the NBN S01-400-1 standard).

Energy consumption

Primary energy need : 49.00 kWhep/m².an
Primary energy need for standard building : 85.00 kWhep/m².an
Calculation method :
Final Energy : 49.12 kWhel/m².an
Breakdown for energy consumption :
Net heating requirement: 14.06 KWh / m².year - Specific humidification requirement: 1.7 KWh / m².an - Net cooling requirement: 14.97 KWh / m².an - Net lighting requirement: 5.6 KWh / m².an - Net need for ventilation & domestic hot water: 12.8 KWh / m².an Total: 49.12 KWh / m².an

Real final energy consumption

Real final energy consumption/m² : 49.12 kWhel/m².an
Real final energy consumption/functional unit : 49.12 kWhel/m².an
Year of the real energy consumption : 2021

Envelope performance

Envelope U-Value : 0.36 W.m².K⁻¹

More information :

Energy optimisation is achieved by firstly reducing the energy needs of the building, mainly through choices related to the envelope via passive design strategies. These choices make it possible to meet an essential objective in the design of a passive building: minimising energy requirements while guaranteeing a high level of comfort. The following passive design strategies are used:- Optimisation of the building shape, allowing a very high compactness (C=4.75) to be achieved, which is favourable to high energy performance; - Design of the envelope to meet passive criteria by combining reinforced insulation, high air tightness and optimisation of the constructive nodes; - Solar architecture combining a well thought-out choice of the building's location on the site, optimisation of the façades and their shape, as well as the choice of the location and ratio of glazed surfaces. For the administrative centre, the design of the external solar protection is based on a modulation of the geometry of fixed elements according to the summer solar gains to be protected for each zone of the façade. The choice of fixed
elements also makes it possible to simplify maintenance as much as possible. These fixed elements are found in the form of architectural concrete slats and panels, directly suspended from the curtain wall. The choice of glazed surfaces also stems from a desire to maximise the natural lighting of the living areas, thereby increasing the level of visual comfort while reducing the associated electricity consumption. The development of a highly insulated, triple-glazed curtain wall with solar control technology that allows the passage of light and sunlight while reducing solar gain to a strict minimum.

**Building Compactness Coefficient:** 4.00

**Indicator:** n50

**Air Tightness Value:** 0.50

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### Renewables & systems

#### Systems

**Heating system:**
- Condensing gas boiler
- Individual gas boiler
- Geothermal heat pump
- Water radiator
- Low temperature floor heating
- Radiant ceiling
- Solar thermal

**Hot water system:**
- Individual gas boiler
- Heat pump
- Solar Thermal

**Cooling system:**
- Geothermal heat pump
- Radiant ceiling

**Ventilation system:**
- Double flow heat exchanger

**Renewable systems:**
- Solar photovoltaic
- Solar Thermal
- Heat Pump on geothermal probes

**Renewable energy production:** 75.00%

**Other information on HVAC:**
- Surface of hot / cold ceilings developed 9,814 m2 - Double flow ventilation with heat recovery (> 80%)
- Geothermal heat pump on probes 33% of the heating needs of the residential building (37 housing units) & 75% of the cold / heat ratio for the administrative center are provided by the geothermal heat pump on probes - Total area of thermal & photovoltaic solar panels developed 700 m2

**Solutions enhancing nature free gains:**
- Optimisation of the building shape, allowing to reach a very high compactness (C=4.75), favourable to obtain high energy performances. Design of the envelope to meet passive criteria by combining reinforced insulation

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### Environment

#### Urban environment

Etterbeek is a central municipality in the Brussels-Capital Region, adjacent to the European quarter and the famous Parc du Cinquantenaire. It was almost completely urbanized during the 19th century and today presents a homogeneous architectural character.

Close to both the city center and the Sonian Forest, this town is crossed by the prestigious Louis Schmidt and Saint-Michel boulevards which allow quick access to the European road network. This ideal geographical location is confirmed by the proximity of a series of services:

- 10 minutes walk from the ULB university campus
- 11 minutes walk from Etterbeek station
- 1 minute walk from tram and bus services
- 1 minute walk from the shopping center
- 12 minutes by car from the European district and its institutions
- 9 minutes by car from the exit of Brussels

It is also a commune that is very well known for the importance of its green spaces. In the lively district of "La Chasse", Rue des Tongres and Place Jourdan are privileged places for their local shops and famous markets.

Etterbeek asserts its reputation as a mixed municipality where offices, shops and quality housing intermingle and complement each other. The urban revitalization of the former military barracks of Etterbeek on the Jardins de la Chasse site is a concrete example of this desire.

In order to take part in this revitalization, the proposal of a fair establishment in the service of public space is essential.

Thus, the location of the administrative center and the adjoining housing building is clear and separate in order to promote communications between the existing neighborhoods and the new development planned for the entire site (see masterplan).

The new administrative center is positioned at the corner of Avenue des Casernes and Rue Beckers for maximum visibility while the housing units are positioned in the continuity of Avenue des Casernes and the new housing units planned inside the block, near the new park.

The separate layout of the two buildings allows the creation of a pedestrian link connecting the planned park, located at the rear of the building, to the Avenue des Casernes and the new square generated by the retreating layout of the administrative center. This connection allows a clear separation between the administrative building and the future housing thus exposing the diversity present on the site.

The organic form of the municipal seat accentuates the setbacks established with respect to the surrounding built and non-built context, confirming its position in the public space by the creation and enhancement of resilient voids and sub-spaces in the service of urban composition. In front of the building, the square created by the layout of the buildings provides a more important visual framework and an environment adapted to the scale of the new administrative center.

In order to compensate for the footprint of the building, most of the roofs are vegetated. Their use is also coupled with that of a water retention basin so as to be able to retrieve the drainage network while making use of the recovered water for applications that do not require drinking water such as toilets and urinals, building and surrounding maintenance applications as well as cleaning service vehicles. The communion of green roofs and water retention is also at the service of the surrounding biodiversity.

Land plot area : 7 577.00 m²
Built-up area : 2 896.00 %

Products

Product

High-performance architectural concrete - in the form of passive solar shading directly attached to the curtain wall

Vicat
4 Rue Aristide Bergès - Les Trois Vallons 38080 L’Isle d’Abeau / +33 4 74 27 59 00

https://www.vicat.fr/

Product category : Gros œuvre / Système passif

The most innovative part of the project is undoubtedly its multiform organic envelope composed of lamellae & panels in high-performance architectural concrete suspended directly from the curtain wall. These, beyond the aesthetic aspect underlining the monolithic aspect of the building, ensure solar protection and develop differently over the whole façade according to the summer solar gains to be protected for each zone of the façade. The analysis of the sunlight patterns throughout the day in all seasons made it possible to draw up a thermal map of the building surface expressed as a percentage in order to establish a gap to be respected (see diagrams). As mentioned above, the ultra-high performance concrete slats and panels are also an important external architectural element. As mentioned above, the ultra-high performance concrete slats and panels are also an important external architectural element, giving the façade a vertical momentum and accentuating the organic curves of the volumes. All the facades have been treated in a regular way, according to the thermal maps mentioned above, in order to obtain an optimal access of daylight and a minimal solar impact. This also creates exciting and differentiated interior and exterior experiences. The vertical momentum of the building disappears in the night, the interior light emanates from the office spaces and underlines the horizontality of the internal open spaces (see day/night photo).

Costs

Carbon

GHG emissions

GHG in use : 10,00 KgCO₂/m²/an
Contest

Reasons for participating in the competition(s)

- Fully passive building
- Compact building, layout and orientation of the building to minimise solar impact and energy loss
- Highly insulated, triple glazed curtain wall with solar control technology, high performance air sealing and high performance concrete slats and architectural concrete boxes fixed directly to the curtain wall as sunshield
- Green roofs that promote biodiversity and also act as water retention basins to store part of the rainwater and thus avoid the risk of overloading the sewage system in the event of heavy rainfall
- Reuse of rainwater for all toilet flushing and sanitary equipment of secondary importance
- The installation of photovoltaic solar panels (±700 m²) on the roof and the development of geothermal technology in the basement in order to meet heating and cooling needs, thus eliminating the need to use fossil fuels
- The use of double flow ventilation with heat recovery (> 80%)
- Intelligent system for interior lighting
- Indoor bicycle parking spaces sized to the scale of the building and equipped with showers and changing rooms for employees
- External bicycle parking spaces for visitors

Building candidate in the category

Energie & Climats Tempérés