Departmental Direction of territories and the sea of Morbihan-Vannes

by Sébastien Prud'homme / 2018-05-22 18:07:10 / France / 8630 / FR

Primary energy need :

47.6 kWhep/m².an

(Calculation method :)

ENERGY CONSUMPTION

Economical building *Building*

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building Type : Office building < 28m
Construction Year : 2015
Delivery year : 2016
Address 1 - street : 56000 VANNES, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 6 500 m²
Construction/refurbishment cost : 9 700 000 €
Number of Work station : 200 Work station
Cost/m2 : 1492.31 €/m²

General information

Identity card of the building:

Project management: Prefecture of Morbihan

Architect: AIA Lorient

Engineering: AIA Engineering + AIA Studio Wood + AIA Studio Environment

Level: R + 4 with LT in R + 5 (+1 SS level) - Max Height: 21,5m

Floor area: 6500m² SHON including 4500m² mixed wood-concrete floor (+ 900m² roof)

Facade surface: Facade Mixed Wood-concrete 1700m² - Wood structure 1350m² - MOB 200m²

Wood volume: 1200m3 including BLC: primary structure beam post 120m3 - Floor joists 390m3 - Facade (FMB + Str Wood) 110m3 - Sunbreaker 50m3

Cost: Total 9.7M € HT

MOE Mission: Design + EXE MOP MOE

As a promontory on the heights of Vannes, the arrival of the building of the DDTM on the site "The Troadec" allows to start **the momentum of renewal of the district** . The project integrates the green flow from the pond to the Duke by extending pedestrian paths and landscaping. The layout of a forecourt, as future connecting element of the administrative city contributes to the spatial continuity of these soft movements. The **slender volumetry of the project creates an urban landmark** in the landscape from the railway and the road, symbolizing the transformation of this geographical area of the city. The **wooden envelope** creates a variation of appearances throughout the year, depending on the inclination of its vertical sunshades. The **concrete base** is born at the foot of the landscaped park and extends east of the site to become the forecourt. The fully glazed facade of the upper ground floor raises the upper volume, and accentuates its **signal effect** in this urban environment. The outdoor terraces, scattered over all levels, are all possible extensions. Along the North / South crossing hall, all services are wrapped around a **central landscaped patio** and develop on 6 levels. The extension of the hall allows temporary exhibitions and places of exchange and conviviality.

The design of this high-performance and innovative office building respects several rules of the passive and bioclimatic construction: compactness of volumes, reduction to the minimum of the lossy surfaces, limitation of the thermal bridges thanks to thermal insulation by the outside, optimization of the lighting natural in offices, natural night ventilation, fixed or mobile solar protection depending on orientation, and constructive wood / concrete solutions. On masonry foundations and ground floor rise glued laminated spruce beams, supporting mixed floors with apparent poplar sub-surface. An innovative and patented process has been designed and implemented on the facade that combines the flexibility of a wood frame with the mineral finish of a prefabricated concrete wall.

Sustainable development approach of the project owner

For this building, the project owner wanted it to be an urban landmark with a strong environmental image. Here are the main objectives that were set by the project owner: THEME 1: Well-being - Acoustic environment quality - Natural lightning - Artificial lightning - Electromagnetic fields - Air pollution - Ventilation THEME 2: Energy - Bioclimatic - Energy performance objectives - Bilan on the building's life cycle THEME 3: Transport -Parket layout -Smooth movements - Motorways

Architectural description

As a promontory on the highs of Vannes, the arrival of the building of the DDTM on the site "The Troadec" allows to start the momentum of renewal of the district. The project integrates the couléeverte from the pond to the Duke by the extension of pedestrian paths and the landscaping of landscaped areas. The layout of a square contributes to the spatial continuity of these soft movements. The slender volumetry of the project creates an urban landmark in the landscape. The wood casing creates a variation of appearances throughout the year, depending on the inclination of vertical sun shades. The fully glazed facade of the upper ground floor releases the upper volume, and accentuates its signal effect. The outer terraces are as many spaces of possible extensions. Along the north / south corridor, all the services are wrapped around a central patio.

Stakeholders

Contractor

Name : La Préfecture du Morbihan
Contact : pref-accueil-etrangers@morbihan.gouv.fr
http://www.morbihan.gouv.fr/

Construction Manager

Name : AIA Life Designers
Contact : aia.associes@a-i-a.fr
http://www.aialifedesigners.fr/

Stakeholders

Function : Company

CRUARD

couverture@cruard.com

http://www.cruard-charpente.com/
Implementation of the principle of the FMB® Façade

Energy

Energy consumption

Primary energy need : 47,60 kWhep/m^2.an

Primary energy need for standard building : 77,00 kWhep/m^2.an

Calculation method :

Breakdown for energy consumption : Heating accounts for 34% of energy consumption followed by lighting with 32%, ventilation with 23%, ECS with 10% and

auxiliaries at 1%.

Envelope performance

Envelope U-Value : 0,30 $W.m^{-2}.K^{-1}$

More information :

The design of this high-performance and innovative office building respects several rules of passive construction: compactness of volumes, reduction of waste surfaces to a minimum, limitation of thermal bridges thanks to thermal insulation from the outside, fixed or mobile solar protection according to the orientation, and constructive solutions wood / concrete. On masonry foundations and ground floor rise glued laminated spruce beams, supporting mixed floors with apparent poplar sub-surface. An innovative and patented process has been designed and implemented on the facade that combines the flexibility of a wood frame with the mineral finish of a prefabricated concrete wall.

Building Compactness Coefficient : 0,50

Indicator :

Air Tightness Value : 0,90

Users' control system opinion :

Winter office temperature control is controlled by room via the radiant panels. A general instruction is imposed by the GTB, and a shift of +/- 3 ° C is possible locally by the users. In summer the temperature is not controlled. The users can act for their comfort on the mobile solar protections and on the opening frames if the thermal discomfort is preponderant compared to the acoustic discomfort of the external environment.

Time schedules are provided for each system: CTA, radiator circuit, radiant panel circuit.

In a general way: appliances equipped with LED sources are installed in circulations and areas requiring special decoration. In offices, T5 source luminaires have very low luminance scrolling grids and are associated with a presence and brightness detector that allows automatic regulation of artificial lighting according to natural lighting.

Renewables & systems

Systems

Heating system :

- Radiant ceiling
- Wood boiler

Hot water system :

- Individual electric boiler

Cooling system :

- No cooling system

Ventilation system :

- Free-cooling
- Single flow
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Wood boiler

Renewable energy production : 36,00 %

Other information on HVAC :

Natural nocturnal ventilation in the offices, but also simple diurnal flow from the mid-season which is associated with the double flow associated with energy recovery

Installation of 825 m² of photovoltaic panels which represents 220 000 kWhEP (86kWc).
The annual EnR production provided by the PV estimated at 17 200 KWh EP / m².an

Solutions enhancing nature free gains :

Ventilation naturelle, conception bioclimatique,

Environment

Urban environment

Land plot area : 12 409,00 m^2

Built-up area : 13,00 %

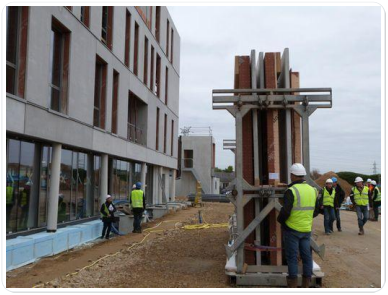
Green space : 6 109,00

The urban challenge is to sketch the transformation of this **former military site** , closed and hermetic, in a permeable district and open to the city, and thus participate in the revitalization of the **district of the station** (ZAC Nord Gare) . The project is an urban landmark in the landscape from the railway and the **RN 165** and carries with it the mutation of this geographical area of the city. The project also integrates the desire to **strengthen the green flow from the pond to the Duke** through the extension of pedestrian paths and the development of quality landscaped areas on the Troadec site.

Products

Product

Mixed Façade Wood Concrete FMB®



Cruard Charpente et Jousselin

contact@jousselin.fr

http://www.jousselin.fr/

Product category : Gros œuvre / Structure, maçonnerie, façade

The FMB facade is an innovative facade to obtain the structural flexibility of the wood and the mineral finish of the concrete. It is constituted
a load-bearing wooden frame and an outer concrete skin. Its assembly is mechanical and realized via SBB connectors.
This system ensures the structural homogeneity of the building while respecting the richness of the architectural bias. Insulating, mixed, lighter than a prefabricated concrete facade, the FMB facade (in structure carried or carrier) allows a saving of weight and material on the secondary supporting structure (beams, poles or foundations). It also incorporates reinforced insulation.
The mixed walls are prefabricated, their implementation, by simple mechanical assembly is fast (no scaffolding or props).
Its composition avoids thermal bridges, especially to connections on floors and slats.
The modules composing the FMB facade are of a non-limiting length and a floor height (max. 4.00m).

This facade is the subject of an ATEX type B for this project

Costs

Construction and exploitation costs

Cost of studies : 1 230 000 €

Total cost of the building : 16 000 000 €

Health and comfort

Water management

Consumption from water network : 709,00 m^3

Consumption of harvested rainwater : 838,00 m^3

Water Self Sufficiency Index : 0.54
Water Consumption/m2 : 0.11
Water Consumption/Work station : 3.55
Realization of a design study for a rainwater recovery equipment:
- annual consumption estimated at 709 m3 (560 for the toilets, 65 for the watering and 85m3 for the cleaning - washing) on a volume harvested of 838 m3 in the year. Either 40m3 storage equipment providing 18 days of autonomy without rain covering the needs of the building. This 40 m3 cistern is used to supply toilets and taps for watering, cleaning and washing.

Indoor Air quality

We have designed the DDTM du Morbihan office building with a focus on indoor air quality.

We have based on three main factors, which are: Source limitation of emissions of potentially harmful substances: choice of products and interior coatings according to precise specifications Optimization of ventilation conditions Maintenance optimized and properly managed (note on the maintenance and the maintenance). Realization of a study on the provisions making it possible to ensure a good sanitary quality of the indoor air associated with a multicriterion study was thus realized in order to compare as well as possible the choice of the materials also the criterion indoor air quality has broken down according to the VOC emission threshold, compliance with REACH, compliance with the AFSSET protocol and the Floorscore protocol.

Comfort

Health & comfort :

The facades were designed by the iteration of dynamic thermal simulations and FLJ coupling the needs of hot, lighting and ventilation as well as the risks of overheating. A high ratio of bay windows promotes the penetration of natural light and the capture of winter solar gains: the frames are transformed into semi-curtain walls. Mobile solar protections, adapting manually according to the season, the solar race and the periods of the day, avoid the risk of dazzle and overheating in any season. For current floors:

- North-North East facade: external solar protection in fixed vertical wood slats, supplemented by external blinds for total concealment and interior blinds for protection against glare.
- East-South-East facade: L-shaped sun shading caps, supplemented by external blinds for total concealment and interior blinds for protection against glare.
- south-south west facade: external solar protection in movable vertical wood slats and interior blinds for protection against glare.
- west-north west facade: external solar protection in movable vertical wood slats and interior blinds for protection against glare.

The device consists of blinds micro-perforated canvas provides protection of users against glare. Ground floor:

- In the East: interior blinds + participation of vegetation nearby,
- South: interior blinds + overhang + wood blades in skirt,
- In the West: interior blinds + shutters + wood blades in skirt,
- North: interior blinds + wood blades in skirt.

Façade openings are used for natural ventilation during the day. Mechanical ventilation can be maintained at night by changing the schedule via GTB. Possibility of adding cold battery on the CTA in case of heat peaks.The architectural part for the project of the DDTM is to ensure wide access to the light of day both to promote the comfort of users but also to minimize the use of artificial lighting. Thus, we find: 100% of sensitive areas (offices, meeting rooms, lobby and relaxation area) that have direct access to daylight, 100% of traffic areas are equipped with lights at the gables. Glazed transoms at the level of partition walls between offices and traffic add an illumination in the second day of these spaces. The offices will be equipped with probes of presence and brightness, allowing to adjust the level of illumination. The offices are ventilated at 25m3 / h / pers, constant flow registers allow to guarantee this flow. Meeting rooms are equipped with a presence sensor or air quality to adapt the ventilation rate to the occupancy. Hourly programs allow the shutdown of ventilation systems during periods of vacancy. A terrace is fitted out for DDTM staff on the north side of the project; it is accessible from the local relaxation. It is sheltered from the prevailing winds of North and East orientation thanks to the presence of covered bicycle shelters located nearby. This terrace will enjoy a view of the landscaping planned on the north facade of the building (tree stems and shrubs).

Calculated thermal comfort : Dans 100% des locaux en moyenne, 9 heures en occ. (0,4 %) > 28 °C

Acoustic comfort :

The interior architectural layout planned for the operation of the DDTM ensures a clean and frank distinction between so-called sensitive / very sensitive premises and technical premises. The premises considered sensitive and very sensitive are the offices and meeting rooms. They occupy the current levels, from the ground floor up to level 4. The technical rooms are grouped at the level of the ground floor and semi-buried N5. The noise level of the equipment is limited to 75 dB (A) within these premises and the solid structure surrounding them will actively participate in limiting the propagation of sound to the sensitive areas of the upper ground floor.

In the current levels, the elevators are positioned at the level of the bracing cores and associated with the stairwells. This circulation space is separated from inter-office traffic via a landing door. Elevators and stairs are never adjoining a sensitive area or very sensitive. Systematically, one or more buffer spaces are provided at these locations.

Finally, downhill plumbing ducts are sealed with each other and located in the sanitary areas.

Several external elements represent a noise nuisance (classified national road, railroad ...) It is therefore foreseen the following provisions:

. façade isolation ≥ Regulatory isolation housing - 5 dB

. DnTA, tr ≥ 36 dB for the façade overlooking the RN 165

. DnTA, tr ≥ 31 dB for all other facades

Carbon

GHG emissions

Building lifetime : 15,00 année(s)

GHG Cradle to Grave : 136,00 $KgCO_2$ /m^2

Simulation under the ELODIE software in the design phase taking a 15-year building life hypothesis based on a mixed concrete wood structure

Life Cycle Analysis

Material impact on GHG emissions :
136

Material impact on energy consumption : 1 040,00 kWhEP

Eco-design material :

Use of a mixed wood-concrete structure (148dm3 / m² of wood) accompanied by a hemp wool insulation (Biofib'isolation type). Use of sourced organic paint based on seaweed.

Contest

Reasons for participating in the competition(s)

The project's assets for the Low Carbon category are:

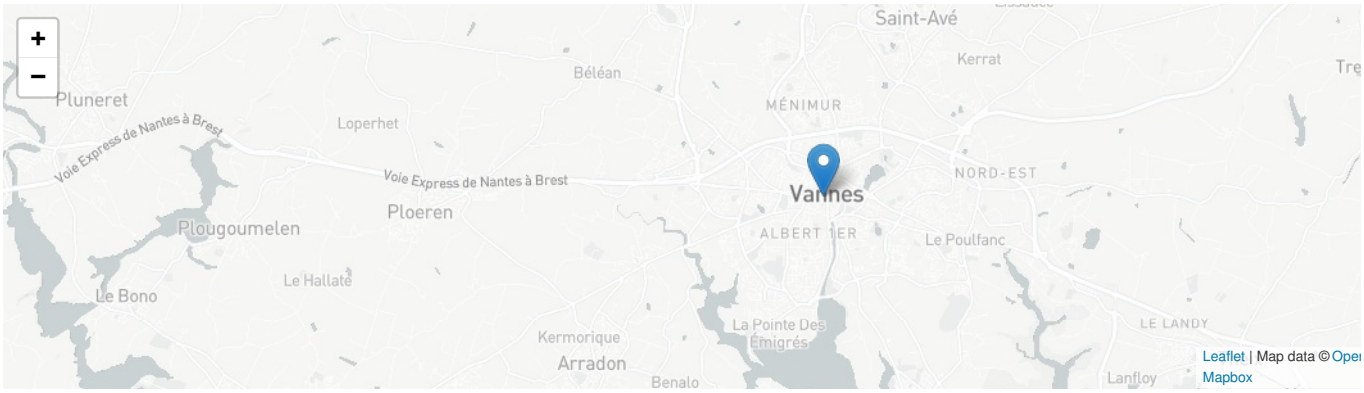
- A level of energy performance confirmed by an energy consumption of 47.6 kWh / m² (SHON RT) / year. This performance is ensured in particular by the implementation of a real passive and bioclimatic design of the building (compactness, adapted solar protection, optimization of natural lighting, natural nocturnal ventilation of offices ...) associated with efficient equipment including 2 wood pellet boilers (2x110 kW) and radiant ceilings for heating.
- A volume of biobased materials including wood used in the consequent project: 148 dm3 / m² thus this project contributes to the reduction of the carbon footprint. Indeed, the project uses the innovative and patented facade process which is the Mixed Wood Concrete Façade FMB which consists of a wood frame and a prefabricated concrete siding (to reduce the carbon impact and the time of implementation on site) subject to an ATEX (type B) for this project. The FMB façade provides the structural flexibility of the wood and the mineral finish of the concrete. Its assembly is mechanical and realized via SBB connectors. In addition, materials such as hemp or algae-based paints have been used on this project, always in this perspective of low carbon footprint.

Building candidate in the category

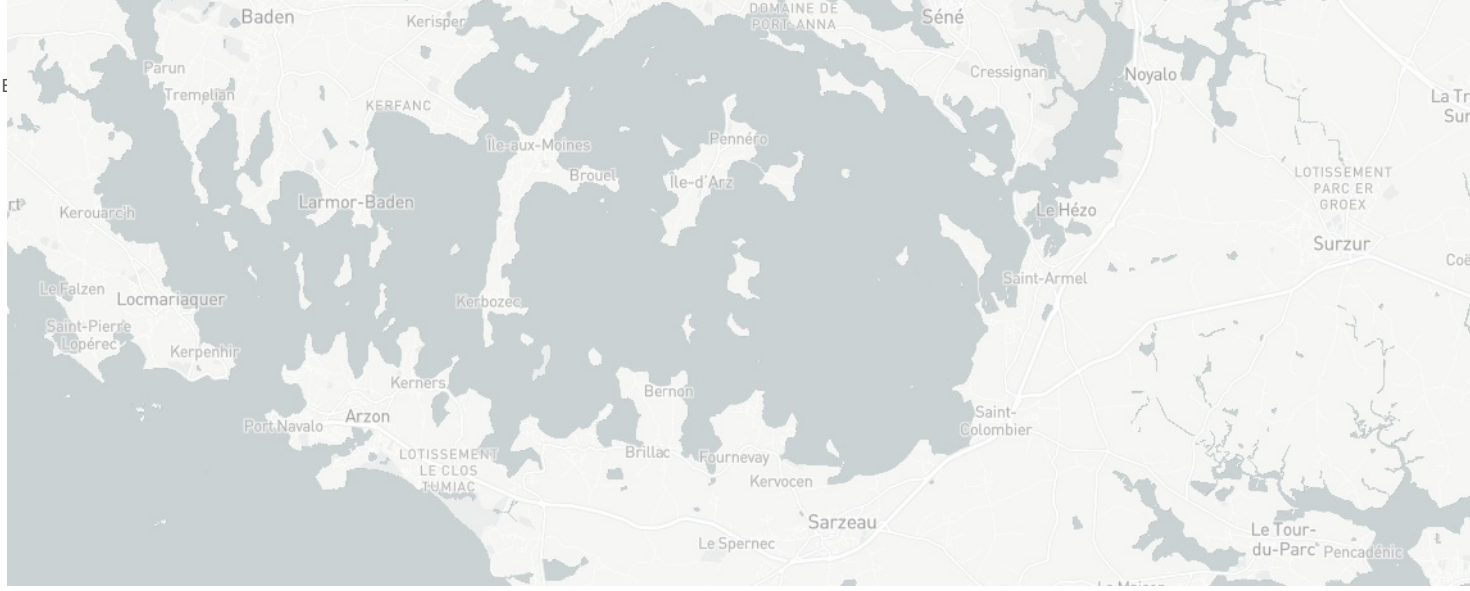
Bas Carbone

Coup de Cœur des Internautes

Prix des Etudiants



Date E


Baden
Kerisper
DOMAINE DE PORT-ANNA
Séné
Parun
Tremelian
KERFANC
Cressignan
Noyalo
Île-aux-Moines
Penneŕo
Brouel
Île-d'Arz
Larmor-Baden
Kerouarc'h
Le Hézo
LOTISSEMENT PARC ER GROEX
Surzur
Le Falzen
Locmariaquer
Saint-Armel
Kerbozec
Saint-Pierre Lopérec
Kerpenhir
Kerners
Bernon
Arzon
Port Navalo
Saint-Colombier
LOTISSEMENT LE CLOS TUMIAC
Brillac
Fournevay
Kervocen
Sarzeau
Le Spernec
Le Tour-du-Parc
Pencadénic