

# **ANNEX 5-B**

## **Case study**

### **SOCIAL HOUSING IN EVREUX**

Steel construction industry provides a wide range of material and systems that can be mixed together based on various degrees of pre-fabrication in factory. Combined with the advantages of a steel framed structure this new way of construction will provide fast track erection, flexibility in use and sustainability.

## SOCIAL HOUSING IN EVREUX



This building is promoted by the Social Housing Agency and Public Development and Construction Service of Eure (OPAC de l'Eure) in cooperation with France's Ministry of Town Planning and Housing. Architect team Dubosc & Landowski are involved in the promotion of steel intensive use in building from many years and has proposed an innovative design concept for this 51 rental residential housing plus a district library.

The design process has been completely re-thought using intensive steel dry construction approach. The use of concrete is limited to a minimum for basements and ground floor. Steel construction provide efficient material to allows for dry construction, factory made

products with efficient productivity and quality, improved job site organisation and fast track logistic.

The project consists of five four storey adjoined buildings, with 51 social housing flats ranging from 56 m<sup>2</sup> to 106 m<sup>2</sup>, two to five rooms plus a 328 m<sup>2</sup> district library on two levels. The upper flats are two level duplex with terraces and large openings to the outdoor. 22 covered parking are part of the building?

This project remains at human scale and participate to the urban renovation approach let by the city of Evreux – Normandy.

**Developer:**

OPAC de l'Eure

**Architect:**

Dubosc & Landowski

**Design Office:**

Bohic

**Contractor:**

Quille

• **Application Benefits**

- Fast track construction
- Intensive use of steel components
- Sustainability approach
- Lightweight construction and limited foundation work
- Reconfiguration and refurbishing approach
- Flexibility of space organisation
- Good acoustic insulation
- Easily disassembled
- Aesthetic and urban quality



*Mixing of material – steel frame and wooden circulation and posts*



*Intermediate platform showing wide open space for flexible arrangement of partitions – intensive use of steel elements*

### **Construction Details**

**Frame:** The entire structural frame is made with hot rolled steel sections. Bracings are made with flat cross bar system and integrated in partition wall for vertical bracings and in the slab's depth for horizontal bracing. This structural frame can be seen from many points of the building, both outdoor and indoor showing the radical new approach of design.

**The envelope** is a mix of wooden panels and steel sheethings giving an architectural contrast in colours and texture.

**Roof's** envelope is made from arched steel sheeting.

**Slabs** are dry mixed system called PCIS "Plancher Composite Interactif Sec" from ARCELOR made from a relevant combination of profiled deep steel sheethings for the structural aspect, mineral wool for sound and thermal insulation, plywood panels and a floating screed for circulation. Ceilings are made with two plasterboards panels. The structural beams are integrated in the slab's depth gaining thickness from the level to level height.

All those materials are widely available on the market. They can be handled and erected by a well skilled workers team in a fast track construction process.

**Slab's performance:** The slab is 32 cm thick, weight  $daN/m^2$  and can span up to 6 meters for a live load of  $150 daN/m^2$

plus distributed load of  $100 daN/m^2$  (partition and finishing's).

Fire resistance is 30' with two 13 mm plasterboards for the ceilings.

Thermal and acoustic performances are better than required one, allowing for a quality label in France "EDF-Innov'elec"

Concrete is used on limited area, mainly in the basement and ground floor.

The lightweight of the slabs, combined with the structural frame has deeply reduced the gross weight of the building allowing for limited ground foundation. This was convenient for the construction site of poor bearing load.

This building has been erected in less than 9 months.

Large parts of the elements were produced in factory allowing for precise work, quality delivery, economical and fast track erection process.

This construction process is competitive on the housing market in France. Final cost is less than  $775 Euro/m^2$ . The steel frame cost share is less than 20 %.

This building meets all the criteria for an economical and sustainable construction. Flexibility and recycling are keywords