

TIMBER STRUCTURES IN THE NEW FACILITIES OF ÁGUAS EMENDADAS ECOLOGICAL STATION IN BRASÍLIA – BRAZIL

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ABSTRACT: The *Águas Emendadas* Ecological Station is a protected area located in the Federal District, and beyond the great biological diversity presents a dispersion of water quite unique, because its waters flows in different directions forming two big Brazilian rivers. Its facilities are composed of some buildings, some of them with timber structures as the Visitors Center. It has been proposed the use of pressure treated rounded eucalyptus as the structural element of the new buildings to be constructed, as the Administration building, the Control Center, Accommodation for researchers and fire department, Garages and the main gate. The buildings were designed according to bioclimatic principles as natural lighting and ventilation, thermal inertia, green covering and protection of the facades. Post-beam structures with bolted connections were proposed as the main structural system and secondary timber structures will be made of tropical hardwood. The architectural aesthetics resulting from the presence of wood suggests that no other building material transmits so much energy integration between the built and natural environment. This paper presents the design of new buildings, highlighting the integration between architectural and structural designs in wooden buildings.

KEYWORDS: Wood, Eucalyptus logs, Timber structures

1 INTRODUCTION

The *Águas Emendadas* Ecological Station is one of the protected areas in Federal District of Brazil, located at the *Cerrado* (Brazilian Savannah) biome. It has an extraordinary geographical location and it contains different types of vegetation formation of the *Cerrado* ecosystems. Other important characteristic of this area is the phenomenon of the water dispersal, which happens at its wetland (*vereda* in Portuguese). The water, which originates in the *vereda*, flows in different directions, forming two big Brazilian rivers: *Maranhão*, tributary to the *Tocantins* river; and *São Bartolomeu*, tributary to the *Paraná* river. *Águas Emendadas* means 'connected water', in English.

The Ecological Station has some facilities like small administration buildings and a Visitor's Center, which was built with timber structures of rounded eucalyptus. In order to keep the architectural aesthetics present in the station, it was proposed the use of eucalyptus logs as main structural material for the new facilities of the area. Existing buildings will be reformed and new buildings were proposed like the Administration building, Control Center, Accommodation for researchers and fire department, Garages and the main gate.

2 METHODOLOGY

The design of the facilities of the Ecological Station was conceived based in the following premises:

- To be designed according to bioclimatic guidelines, in order to be fully adapted to local climate, with some requirements as natural ventilation and illumination, thermal inertia, green covering and protection against sunlight in the facades, aiming to build a "sustainable building";
- To be in consonance with the existing facilities (made of timber structures) and to harmonize with the surrounding environment;
- To propose mixed building solutions between traditional concrete structures and timber structures, aiming to promote "greenest materials";
- To show the required integration between structure and architecture in wooden buildings;
- And finally to highlight the imposing architectural aesthetics that comes from the presence of timber structures in natural areas.

3 DESCRIPTION OF THE PROJECTS

The buildings were designed to be implanted in a specific area of the Ecological Station, where all the administration services will be concentrated in order to cause less impact in the preserved area.

Covered gateways will link all the buildings and native trees will be planted in the area, aiming to reconstitute the original vegetation that occurred in the region. Figure 1 shows a general view of the new facilities proposed to the *Águas Emendadas* Ecological Station.

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Figure 1: General view of the new facilities of the Águas Emendadas Ecological Station

Post-beam structures were designed for the new buildings, by using eucalyptus logs as the main material. Timber structures will receive bolted joints with galvanized metals and all the pieces will be stained. The main eucalyptus specie to be used in the structures will be *Eucalyptus citriodora*.

Secondary timber structures in the flooring and ceiling will receive sawed wood Tuturubá (*Pouteria oblanceolata*), an Amazonian hardwood that is more and more available in our market due to its resistance and structural behaviour. Figures 2 and 3 illustrate the plans and an external view of the Accommodation for researchers and fire department.

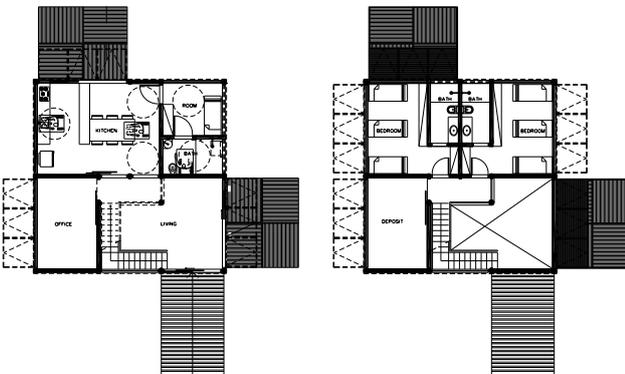


Figure 2: Plans of the ground and first floor of the Accommodation for researchers and fire department



Figure 3: External view of the Accommodation for researchers and fire department

The Administration building will be made from a reconstruction of an existing building in the Station. A mixed solution between armed concrete and timber structures was proposed. Figures 4 and 5 show two facades and an external view of the Administration.

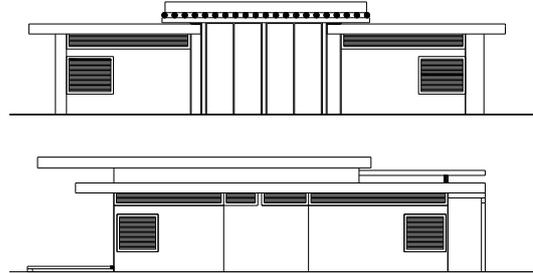


Figure 4: Facades of the Administration building



Figure 5: External view

It will be implanted an Information and Control Centre that will be the main building of the Station. In that building will be located a library, auditorium, exposition hall, refectory and a control centre that will monitor the Ecological Station area. The plan and facades of the building is illustrated in Figures 6 and 7.

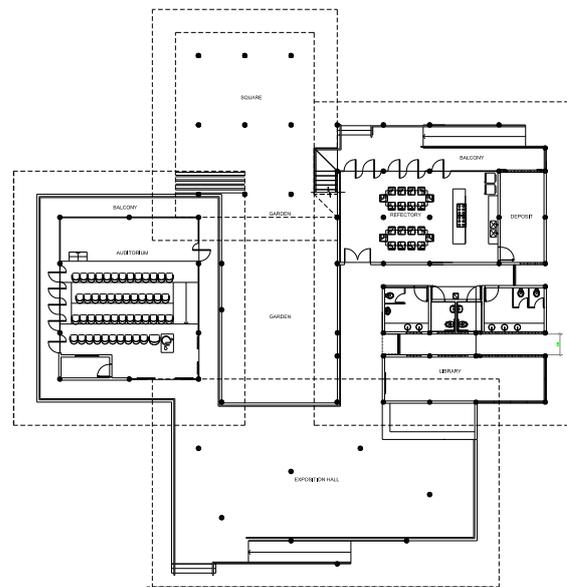


Figure 6: Ground Plan of the Information and Control Centre

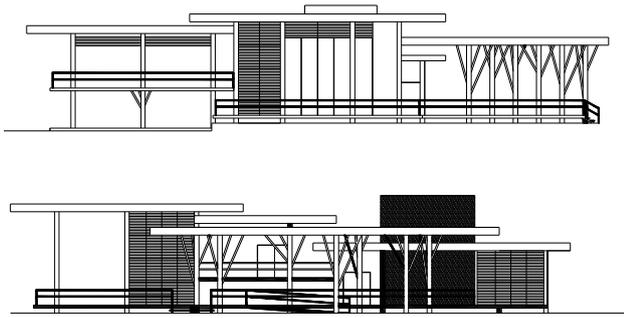


Figure 7: Facades of the building

Asymmetric timber structures were proposed to support “covered squares”, to be implanted in the Administration Building and in few points of the covered catwalks that links all the buildings, as illustrated in Figure 8. Those structures will reproduce trees designs and will be integrated to the surrounding vegetation.



Figure 8: An example of “covered square”

A huge deposit will be constructed with mixed constructive solutions using timber and metallic structures. Figure 9 shows an external view of this new building.



Figure 9: The central deposit of the station

The main gate of the Ecological Station was designed to be an attraction to visitors and to highlight the access from the highway.

It was designed according to the architectural aesthetics presented in the other buildings. The name of the ecological station will be highlighted in the facade and the timber structure will be viewed by the visitors: that will be their first impression of the area. Figures 10 and 11 show the plan and an external view of the main gate.

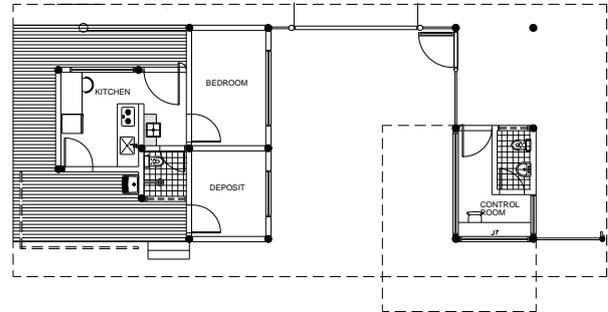


Figure 10: Plan of the main gate



Figure 11: External view of the main gate

4 CONCLUSIONS

The use of eucalyptus logs as the main structural material of the new buildings of *Águas Emendadas* Ecological Station reveals the several possibilities of building in wood, and wood is the only renewable and sustainable building material.

The outstanding architectural aesthetics that comes from the presence of wood suggests that no other material transmits with so much energy the integration between the built space and the natural areas.

Eucalyptus wood can be made available in short space of time and at quite accessible price in Brazil. At the same time, it's imperative intensify the use of Amazonian hardwood in the building sector, because the rational use of our forest-based products means adding value and protecting the forested areas in our country.

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