© Roland Halbe

GLASS HOUSE

MAX NÚÑEZ

Profesor, Escuela de Arquitectura
Pontificia Universidad Católica de Chile

Pirque, Santiago
2018

Keywords

Habitat
Artificial
Tropical forest
Project
Vegetation

A house for plants has different requirements than one for humans. That is what industrial greenhouses have done for decades, and it is what, on another scale and without productive efforts, this glass house also achieves. The material and technical definitions, as well as the formal decisions, were made bearing in mind the wellbeing of vegetation literally transplanted from different climates to an exotic space in the Chilean Andean foothills.

The Glass House contains a small captive forest. Through various mechanical systems, it generates an artificial environment that is set up to recreate a fragment of rainforest at a different latitude. Its inhabitants are a variety of plants, ferns, palm trees, orchids, mosses, small trees, and some insects that have found their new habitat in this controlled environment. Here, humans are sporadic visitors, except for some intrusions from the gardener or the owner. This is mostly a space free of people: it is a house for plants.

The daily routine of these species is adjusted to their circadian rhythm, the sun's movement, its impact on the environment's temperature and humidity, and how this translates into the need for water and ventilation. These subtle atmospheric variables were integrated into the design, attempting to closely link this small piece of nature with the supporting structure and with the mechanical conditioning systems.

The roof is made up of two glass block vaults. The concave space under the vaults allows a sufficient interior height for the growth of small trees. In turn,

Planta / Plan
E. / S. 1: 100

the structural glass shell forms a continuous surface that prevents the projection of shadows. The inner face of the glass block is striated, which prevents the direct passage of the sun's rays, lowering the direct radiation on the leaves. The only interruptions on the vaults' surface are the structural expansion joints that allow them to resist a possible seismic movement. These striations are used to drive a system of small hoses in which micro-sprinklers moisturize the environment whenever the humidity drops.

At the ends of each vault, oriented north-south, there are top-hinged doors that open mechanically to produce cross ventilation when the interior

LEYENDA / LEGEND

1. Viga de acero doble T 558x300x12 mm, terminación acero. Canaleta en membrana asfáltica, pendiente 2% con placa de terciado e= 15 mm / Steel I-beam 558x300x12 mm, steel finish. Gutter in asphalt membrane, slope 2% with plywood e= 15 mm
2. Pestaña en pletina de acero e= 8 mm, con perforación. Terminación acero / Folding in steel plate e= 8 mm, with perforation. Steel finish
3. Bloque de vidrio SEVES 190x190x80 mm Doric, separación mínima de 2 mm, estrías en horizontal, instalado según instrucciones fabricante / Block of glass SEVES 190x190x80 mm Doric, minimum separation of 2 mm, horizontal stretch marks, installed according to manufacturer instructions
4. Subestructura arco en barra de acero Ø 50 mm, curvada en máquina. Terminación acero / Arch substructure in steel bar Ø 50 mm, curved in machine. Steel finish
5. Equipo de iluminación O/M tubo 50 Frost Led High Output 4000k 1758 / O/M lighting equipment Tube 50 Frost Led High Output 4000k 1758
6. Panel Leaf e= 12 mm. Terminación pintura Creizet gris metalizado aplicada con pistola / Leaf panel e= 12 mm. Finish of creizet metallic grey paint applied with gun
7. Subestructura de acero 50x50x4 mm @500 mm, con aislapol alta densidad e=50 mm / Steel substructure 50x50x4 mm @500 mm, with high density expanded polystyrene e=50 mm
8. Canaleta en terciado e= 15 mm más membrana asfáltica por definir / Gutter in plywood e= 15 mm plus asphalt membrane to be defined
9. Ángulo de acero 30x30x5 mm, para retorno de membrana. Terminación acero / Steel angle 30x30x5 mm, for membrane return. Steel finish
10. Ángulo de acero 200x200x8 mm. Terminación acero / Steel angle 200x200x8 mm. Steel finish
11. Ángulo de acero 50x50x4 mm / Steel angle 50x50x4 mm
12. Cortagoteras en ángulo de acero 30x30x5 mm. Terminación acero / Steel angle gutter cap 30x30x5 mm. Steel finish
13. Viga HBE300. Terminación acero / Beam HBE300. Steel finish
14. Diagonales de acero Ø 100 mm inclinados. Terminación acero / Steel diagonals Ø 100 mm slanted. Steel finish
15. Pilar de acero Ø 100 mm, inclinación 41,3°. Terminación acero / Steel pillar Ø 100 mm, inclination 41.3°. Steel finish
16. Pilar de acero Ø 100 mm. Terminación acero / Steel pillar Ø 100 mm. Steel finish
17. Baranda y pasamano terminación acero / Railing and handrail, steel finish
18. Superficie en piedra. Perforaciones para evacuación de aguas lluvia / Stone surface. Boreholes for rainwater evacuation
19. Sobrelosa Ball., pendiente 6% / Ball slab cover, 6% slope
20. Ventana termopanel, extra clear / Extra-clear thermopanel window, extra clear
21. Ángulo de acero 200x200x8 mm. Perforación de Ø 10 mm @1000 para bajada de aguas. Terminación acero / Steel angle 200x200x8mm. Drilling of Ø 10 mm @1000 for water descent. Steel finish
22. Puertas / Doors
23. Muro de hormigón armado, terminación moldaje placa fenólica / Reinforced concrete wall, phenolic plate cast finish
24. Membrana asfáltica / Asphalt membrane
25. Bolones gravilla / Gravel spheres
26. Dren ALL en PVC según proyecto sanitario / PVC ALL drain according to sanitary project
27. Polietileno / Polyethylene
28. Fundaciones según cálculo / Foundations as calculated
29. Emplantillado de hormigón según cálculo / Bedding mortar as calculated
30. Polietileno / Polyethylene
31. Radier e= 120 mm / Cement floor e= 120 mm
32. Tierra y gravilla compactada e= 100 mm / Earth and compacted gravel e= 100 mm

temperature surpasses 24 °C. The central support of both vaults allows moving the sprinkler water up through one of the columns and the electrical wiring which powers the opening of the ventilation windows through the other. Below, around the plants, a 1-meter-high plinth coated in expanded metal provides a glimpse at the ducts of the heating system that run along the perimeter, which is necessary to heat the environment when temperatures drop below 14 °C. These different mechanisms, coupled with a standard automated irrigation system, are operated simultaneously throughout the year by a digital controller – a common technology in greenhouses in the agricultural industry. For the four glass fronts surrounding the building's square plan, an extra-clear glass was used, making it more translucent for the human eye. Thus, the plants are more visible from the outside, turning the building into a large showcase that exhibits its inhabitants. **ARQ**

CASA DE VIDRIO GLASS HOUSE

Arquitecto / Architect: Max Núñez
Colaborador / Contributor: Carlos Rosas
Ubicación / Location: Pirque, Santiago
Paisajismo / Landscape: Juan Grimm

Iluminación / Lighting design: Interdesign
Superficie del terreno / Site area: 130 m²
Año de proyecto / Project year: 2018
Fotografía / Photography: Roland Halbe

Max Núñez
max@mnaa.cl

Architect and Master in Architecture, Pontificia Universidad Católica de Chile, 2004. MSc in Advanced Architectural Design, Columbia University, New York, 2010. The work of Max Núñez Arquitectos has been distinguished with the Design Vanguard Award 2017 from *Architectural Record*, and the Design Award 2013, 2018 and 2020 from *Wallpaper*. Núñez has designed the Atacama Regional Museum (Copiapó) and the Visitor Centers for the Laguna San Rafael National Park and for the Lake Jeinimeni Reserve (Aysén). His work is collected in *Trace. Max Núñez Arquitectos. Pista de despegue* (Editorial Constructo, 2015) and *Max Núñez Arquitectos. Colección de ideas* (Ediciones ARQ, 2018).