

GLUMAC SHANGHAI OFFICE

COMMERCIAL OFFICE

Location

Shanghai, China

Project Address

753 Yuyuan Rd., Building C, 3/F
Shanghai, 200050 China

Project Type

Office, leased

Area

10,000 ft² (929 m²)

Year of Completion

2014

Occupant

Glumac

Design Team

Glumac, Gensler, Shimizu, GIGA,
Terrapin Bright Green

Keywords

Living Building Challenge
Historic Building
Biophilic Office Design

Awards

LEED Platinum CI v4

Biophilic Patterns

Connection with Natural Systems
Visual Connection with Nature
Biomorphic Forms & Patterns
Dynamic & Diffuse Light

*Prepared by Lilli Fisher for Terrapin
Bright Green.*

*All photos courtesy of Nobuko Ohara /
Nacasa & Partners Inc.*

“We at Glumac want to truly live our values of sustainability and pioneer in a region that stands to benefit enormously in building toward a sustainable future.”

Edwin Lee, Glumac Managing Principal

PROJECT SUMMARY

Glumac's Shanghai office occupies the third floor of a historic building constructed in 1912 by American architect Louis Sullivan, as part of a campus built for the Rockefeller family. Glumac and Gensler's innovative renovation of the 10,000 ft² space is the first project in Asia to target full Living Building Challenge (LBC) certification. The reworked office blends historic building details, traditional Chinese motifs, contemporary design, and biophilic elements to create a space that celebrates the heritage of its site and ensures the comfort of its occupants.

Glumac, a consulting and engineering firm specializing in cost-effective, sustainable design, views their offices as a testing ground for the latest technology in high-performance design. When their Shanghai branch outgrew its office, Glumac saw an opportunity to design a space that achieved sustainability goals above and beyond anything that had been built in China to date.

The site selected was a historic low-rise building inside a lush garden courtyard in the middle of busy downtown Shanghai. A desire to honor the site's cultural value flowered into a drive to create an office space that people would love to work in. Employees at Glumac

enjoy views of the courtyard from their desks in a sunny open plan office. Organic patterns and indoor plants bring the calm atmosphere of the garden into the space. The design builds off the attributes of the existing structure and employs creative solutions to the challenges inherent in Glumac's ambitious goals.

This innovative project was a collaboration between Glumac, Terrapin Bright Green, Gensler, Japanese construction partner Shimizu, and Shanghai-based green materials consultant GIGA. Glumac hopes that this space will plant a “seed of change” in China and encourage others to design for human and ecological health.

Above: The Kvadrat cloud climbs playfully across the walls and ceiling of Glumac's light-filled bistro, dampening the sound that reverberates from the exposed concrete floor. [P1](#) [P6](#) [P8](#) [P9](#)

NATURE IN THE SPACE

- [P1] Visual Connection with Nature.**
Indoor plantings, and garden views.
- [P2] Non-Visual Connection with Nature.**
The pleasant odor of indoor plants, the sounds of the birds that inhabit the garden courtyard.
- [P3] Non-Rhythmic Sensory Stimuli.**
Not significantly represented in the design.
- [P4] Access to Thermal & Airflow Variability.** Fully operational windows throughout the space, and doors to the patio which can be propped open.
- [P5] Presence of Water.**
Not significantly represented in the design.
- [P6] Dynamic & Diffuse Light.**
A light well and large windows flood the space with daylight; adjustable transparency of the glass wall and individual task lighting provide variability and control.
- [P7] Connection with Natural Systems.**
Ability to engage with localized waste, water, and energy systems.

NATURAL ANALOGUES

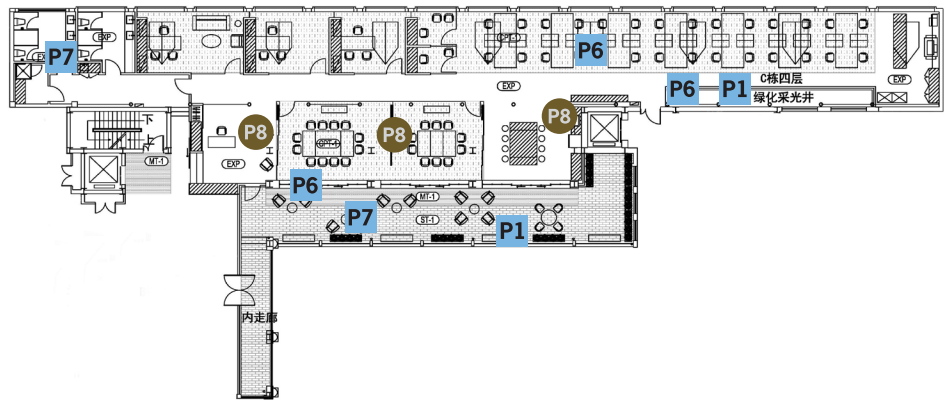
- [P8] Biomorphic Forms & Patterns.**
Kvadrat Cloud installation and the traditional Chinese “lucky clouds” pictured on the entry door, and engraved on the stools.
- [P9] Material Connection with Nature.**
Reclaimed wood reception desk and bistro table, unpainted strawboard columns and cabinets and reclaimed Chinese gray bricks.
- [P10] Complexity & Order.**
Not significantly represented in the design.

NATURE OF THE SPACE

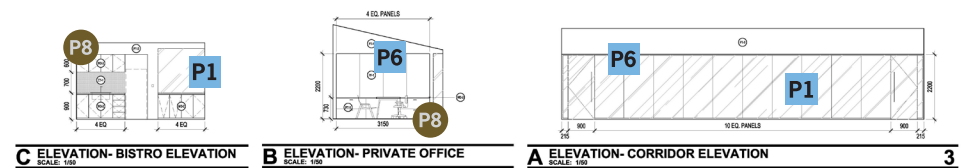
- [P11] Prospect.** Open office plan and an elevated long distance view from the patio.
- [P12] Refuge.** Movable partitions allow occupants refuge space when desired, landscaped courtyard separates the office from the city.
- [P13] Mystery.** A partially obscured view of plants at the end of the long hallway.
- [P14] Risk/Peril.** Not significantly represented in the design.

Floor Plan: The spine of the office is a long hallway, flanked on the north side by private and open plan office spaces and on the south by meeting rooms with adjustable partitions and the bistro. Daylight floods the office through the light well adjacent to the open office, large windows along the entire north wall, and glass with adjustable transparency on the south wall bordering the terrace.

Elevations: Daylight filters into all three of the spaces pictured in the above elevations. The kvadrat cloud adds visual interest to the bistro, and carpet with organic patterning creates a calm atmosphere in the private office. The corridor, which is adjacent to open office area, features a wall of air filtering Sansevieria trifasciata.



FLOOR PLAN



ELEVATIONS

[P7] CONNECTION WITH NATURAL SYSTEMS

Glumac's ambitious sustainability goals led it to install water, waste, and electricity systems that are dependent on natural processes. The localization of these systems facilitates engagement and provides occupants with **an awareness of natural processes, and seasonal or temporal changes characteristic of a healthy ecosystem.**

Intentionally exposed mechanical systems reveal the inner workings of the design while numerous educational posters explain each system's function and the processes by which it works. The rainwater catchment and filtration system and the dehumidification system supply recycled water to Glumac's restrooms, bistro and office plants. Knowledge of this system connects occupants directly with their water source, and may prompt a recognition of precipitation and humidity variation throughout the year.

Glumac's solar photovoltaic panels, installed on the roof of an adjacent building, are visible from one of the office's large windows. Corresponding signage draws attention to this system, eliciting an awareness of seasonal

variation in solar radiation, which is weakest during the overcast winter. In addition, topsoil created by the office's composting toilets is used as fertilizer on the indoor and outdoor plants, providing a unique connection to the soil nutrient cycle.

Residents of Shanghai are often discouraged from spending time outside because of the city's notoriously poor air quality. At Glumac, employees can view outdoor and indoor air quality indicators, in real-time on their smartphones using an app called RESET developed by GIGA. This interactive service reassures employees that the indoor air is safe and lets them know when it's a good time to step outside on the patio or open the windows, encouraging an ongoing interaction with the outdoor environment. Furthermore, the program reveals the invisible work of the air filtering plants installed to help to remove pollutants from the indoor environment. Glumac's Shanghai office gives occupants an opportunity to engage with the building's utility systems and understand how natural systems support them.



[P8] BIOMORPHIC FORMS & PATTERNS

Glumac's renovated office features a Kvadrat cloud installation, a product designed by Ronan and Erwan Bouroullec in collaboration with Kvadrat. A crystalline structure made of green, white, gray, and black acoustic panels, the Kvadrat cloud climbs up the walls and ceilings, softening the hard edges of the space. Each polygon is composed of five triangles which come to a point, forming a pentagonal pyramid. The installation is not only visually striking, the acoustic panels that comprise it also absorb the sound that would otherwise reverberate from the exposed concrete floors in the reception and kitchen areas.

The cloud theme is continued through the incorporation of traditional Chinese lucky clouds, a symbol of good fortune and happiness. The decorative lucky clouds, represented on the glass entry door in abstract swirls, root the space in its cultural context. Two classical Chinese garden stools, painted white and intricately engraved with the same swirling pattern, are placed opposite the reception desk. In addition, the carpeting is patterned with organic forms resembling the flow of water or cirrus clouds. These **symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature** shape the unique character of Glumac's Shanghai office.

Left: An exposed section of the radiant heating system allows employees and guests to engage with the office's utility systems. [P1](#) [P6](#) [P7](#)



[P1] VISUAL CONNECTION WITH NATURE

Every desk in Glumac's open air office has a view out of one of the many large windows. The conference rooms and collaborative areas feature floor to ceiling windows and glass doors that lead out onto a terrace populated with plants. Sitting on the terrace, occupants look out on the mature trees and dense understory of the garden courtyard.

Research suggests that visual access to biodiverse environments such as this have greater positive psychological impacts than a vegetated area alone. The terrace is a popular place for office functions and barbecues. It is often used as a conference space when the weather is nice and, despite the availability of individual phone rooms, many employees prefer to take phone calls outside.

A wall lined with *Sansevieria trifasciata*, also called mother-in-law's tongue, and a variety of other potted plants supplement the window views. These indoor plants offer occupants close contact with nature and an opportunity to witness plant growth and development over time.

Glumac's Shanghai office provides its employees with restorative views to **elements of nature, living systems, and natural processes** which have the potential to increase both productivity and job satisfaction.

Right: The entryway to the office features a glass wall etched with abstract swirls of Chinese lucky clouds, a symbol of good fortune and happiness,

[P6] DYNAMIC & DIFFUSE LIGHT

Light is a defining element of Glumac's Shanghai office. The floor plan was designed to maximize daylighting in order to reduce energy requirements and meet net-zero energy standards. While the lighting design was conceived as an energy reduction strategy, Glumac quickly recognized its potential to have positive health impacts. The design took advantage of the existing lightwell, dormers, and windows to flood the space with daylight, which changes throughout the day, enhancing awareness of weather patterns and supporting circadian rhythms.

Overhead electric lights, triggered by an automated daylight and occupancy sensor, ensure that the office is always well-lit while occupied. Dynamic glass is installed on the southern wall to address glare and brightness. Occupants can press a button and the transparent glass will frost, diffusing the light as it enters the space.

Affording employees a high degree of control over light levels was a priority. Dimmable LED Tambient® desk lights, which project ambient light upwards and directed light downwards, provide an optimal lighting environment while reducing electricity use. By **leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature**, the lighting strategy ensures that employees are comfortable and engaged.

and a meter that displays indoor and outdoor air quality indicators. [P6](#) [P8](#) [P9](#) [P11](#)

HEALTH

Glumac's renovation transformed the drafty 3rd floor of a historic residential building into an exemplary demonstration of contemporary sustainable engineering solutions. Not only does this space meet the highest environmental standards it also exhibits strong biophilic design elements which have the potential to provide numerous health benefits, including:

[P1] Visual Connection with Nature

Lowered blood pressure and heart rate, improved mental engagement/attentiveness, positively impacted attitude, and overall happiness.

[P6] Dynamic & Diffuse Light

Positively impacted circadian system functioning.

[P7] Connection with Natural System

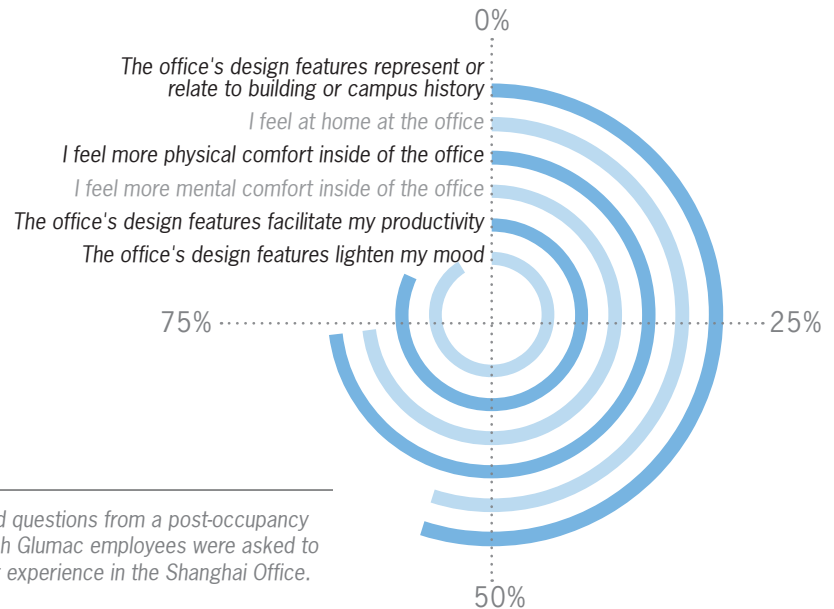
Enhanced positive health response; shifted perception of environment.

[P8] Biomorphic Forms & Patterns

Observed view preference.

In urban areas, most people spend the majority of their time at work. However, office environments often have a limited connection to the natural world. In June 2015 Glumac conducted a survey to find out how the design choices they made in the renovation affected their employees on a day to day basis. Of the employees surveyed, 82% reported that the design elements of the office space facilitated their productivity, and 91% said that the design elements lightened their mood during work.

In addition, 73% of employee survey respondents reported that they felt more physical comfort inside the renovated office space, and 73% reported that they felt more mental comfort inside the renovated office space. Through the incorporation of access to nature and natural processes, Glumac created a working environment that supports the health of both employees and the environment.



Right: Selected questions from a post-occupancy survey, in which Glumac employees were asked to reflect on their experience in the Shanghai Office.

ENGINEER'S PLAYGROUND

Glumac's Shanghai office is tracking net-positive energy and net-positive water goals, and promotes employee health and wellbeing through the thoughtful integration of exceptional IAQ standards (PM2.5<10) and biophilic design patterns. These achievements, however, did not come easy: "It's really the integrated team effort that made this project successful," remarked Quinnie Li, Glumac's Sustainability Manager in Shanghai.

The project's experimental nature required the team to respond nimbly to unexpected challenges. The initial air quality monitoring for LBC certification registered high levels of carbon dioxide. The culprit was not a flaw in the filtration system, rather, the influx was caused by the plants installed in the office's indoor greenwall.

During plant establishment, a portion of the roots die and decay, releasing carbon dioxide. The greenwall turned out to be problematic in many regards; it required large amounts of water, and the low-light ferns it was designed to support were damaged by the bright daylight that floods the office.

The team quickly re-evaluated the design and proposed a new strategy: a wall of *Sansevieria trifasciata*, or mother-in-law's tongue. This hardy plant requires very little water and thrives in full sun. In addition, it is an excellent air filtering plant, with the ability to remove a variety of air pollutants including carbon monoxide, nitrogen monoxide, and formaldehyde. Glumac's team interpreted this hurdle as an opportunity to find a more elegant solution. To this day, Glumac's office remains a dynamic playground for its engineers, who are encouraged to tweak elements of the design and building systems in the pursuit of continual improvement.

To share their experience of building an LBC office in Shanghai, Glumac has opened its doors for tours. Hundreds of people, including school children, university students, architects, energy experts, and government officials have come to learn about the unique design of the office space. Through these tours, Glumac encourages people to rethink the built environment, and realize its potential to promote ecological and human health.



Terrapin Bright Green

Terrapin is an environmental consulting and strategic planning firm committed to improving the human environment through high performance development, policy, and related research. We provide biophilic design strategies with measurable outcomes that place our clients' properties at the forefront of innovative design. Visit us at www.terrabinbrightgreen.com, or email us at biophilia@terrabinbg.com.

Glumac

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