HOHO WIEN

Vienna, Austria [RLP Rüdiger Lainer + Partner]

2019	**Year**
cetus baudevelopment	**Client**
Woschitz Group	**Structural Engineer**
MMK Mayr-Melnhof/Kirchdorfer	**Composite Floor Panel Fabricator**
Hasslacher Norica Timber	**Glulam and CLT Fabricator**
Handler Bau GmbH	**Contractor**
Commercial/Residential	**Program**

The search for balance between ecology and economy has resulted in a cost-effective and flexible structure that will maximize environmental benefits through a prolonged service life.

Interior with exposed CLT floor as ceiling finish, concrete ring beam and spruce wall panels

Located in Seestadt Aspern, a new community under construction at the northeast edge of the city of Vienna, this 24-storey, 84 metre tall mixed-use project achieves a balance between ecology and economy, confirming the viability of hybrid mass wood and concrete construction even in large urban developments. In addition to offices, the project includes a hotel, gym, restaurants and apartments.

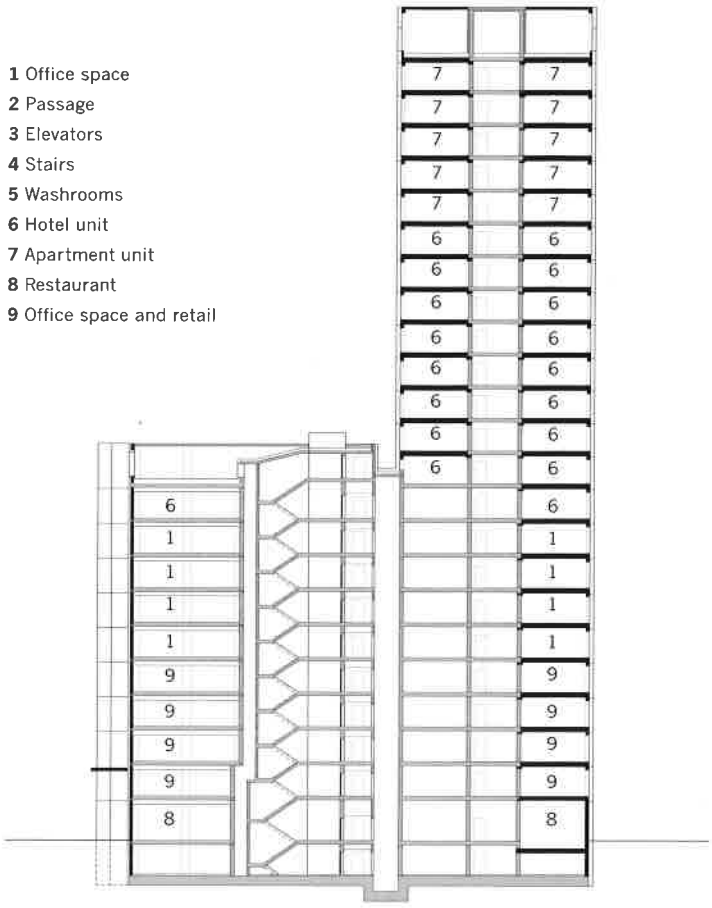
HoHo, short for *Holzhochhaus* (German for timber high-rise), is the centrepiece project for the Seepark Quarter, the new business district surrounding the underground station that links Seestadt Aspern to the city centre. When all phases are completed, the new community will provide living, working and recreational facilities for approximately 20,000 people.

CONCEPT

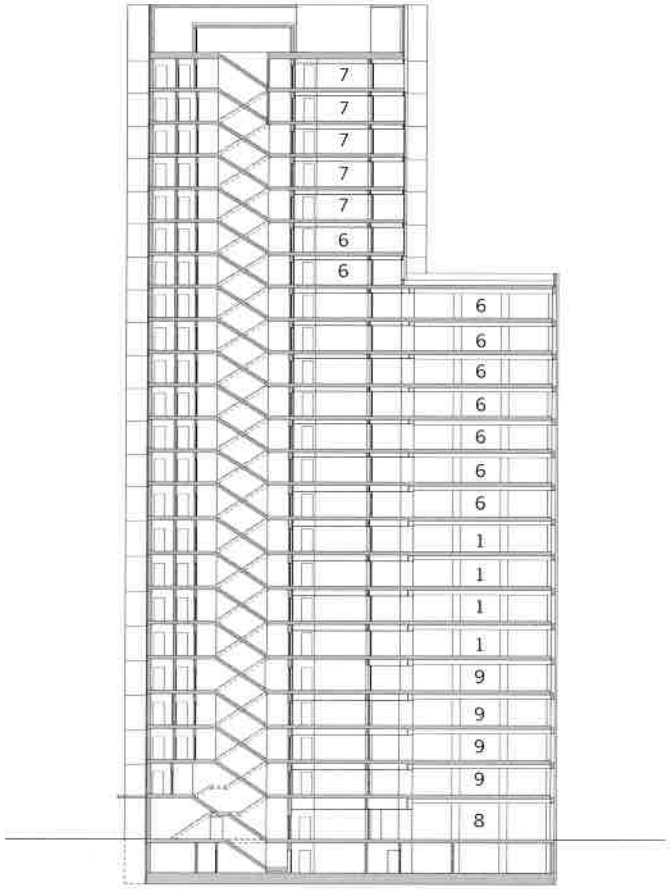
HoHo Wien represents the latest phase in the Austrian construction industry's decade long search for a more environmentally friendly yet cost-effective alternative to traditional concrete and steel high-rise buildings. While different in detail, it builds on the principles of simplicity, practicality and speed of erection that were established in LCT One, Austria's first contemporary Tall Wood building (pp. 166–175) Like LCT One, which was completed in 2010, HoHo Wien is a hybrid wood and concrete structure, comprising a kit of standard prefabricated components.

HoHo Wien also represents a programmatic departure from traditional office design. As the nature of work changes from a highly structured and location-based activity to a more flexible and individualized one, HoHo Wien offers not only a healthy and inspiring environment for workers, but ready access to a broad range of other amenities, through the integration of commercial, recreational and hospitality program elements. The focus on occupant well-being is underscored by the use of exposed timber components throughout the building.

1 Office space
2 Passage
3 Elevators
4 Stairs
5 Washrooms
6 Hotel unit
7 Apartment unit
8 Restaurant
9 Office space and retail



Section AA



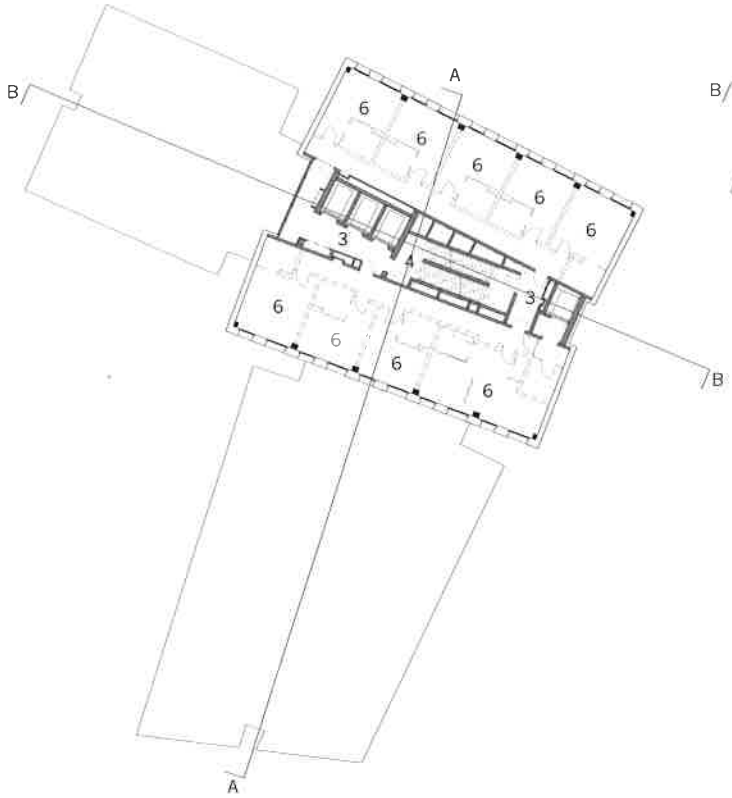
Section BB

CONSTRUCTION

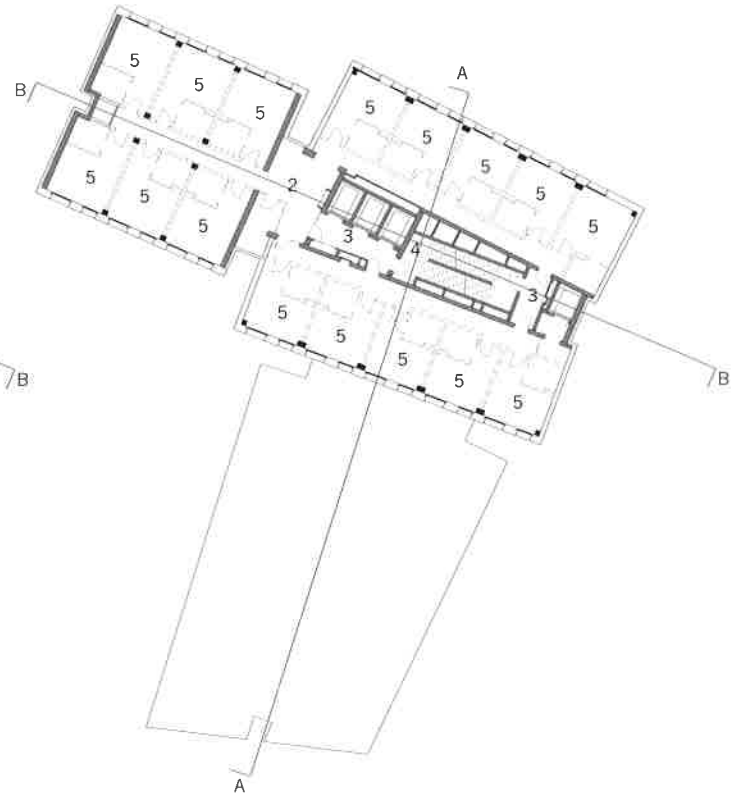
The three towers of the HoHo Wien development rise from a common concrete podium structure containing underground parking, to heights of 13, 18 and 24 storeys respectively. The building complex is L-shaped in plan and includes elongated concrete stair, elevator and mechanical service cores aligned with both arms of the L. These cores provide the required lateral resistance for the building, enabling the surrounding post-and-beam glulam frame structure to be open, flexible and uninterrupted by shear walls. Sectional, precast concrete ring beams extend around the perimeter of the structure at each floor level, tying the wood structure together and further limiting lateral movement. The interior glulam frame supports a simple system of prefabricated floor/ceiling and wall components, while exterior wall panels complete the kit of parts. The floor/ceiling system, known as XC® (X for cross-laminated timber and C for concrete), was developed by MMK and is a slender, high-performance composite panel with a bottom layer of CLT and a mesh of steel reinforcement over which an upper layer of concrete is poured in the factory. The composite construction enables longer unsupported spans, provides superior acoustic and fire performance, additional weight that reduces vibration and, at the same time, allows the wood soffit to be exposed as a ceiling finish. Typically, the floor panels are supported on the perimeter concrete ring beam at one end and the concrete core at the other. When the panel ends are secured and the sides of adjacent panels are connected to one another, the floor becomes a diaphragm that transfers

Floor panel with pre-installed mechanical services element

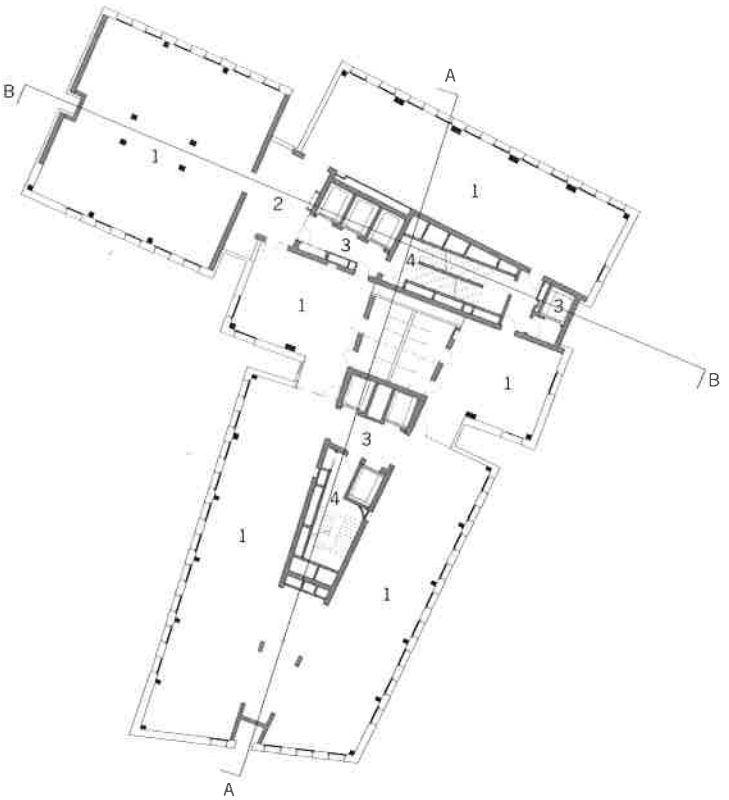
Concrete ring beam placed on top of the prefabricated column and wall panels below



18th–22nd floor: apartments



Ninth through 17th floor: hotel



Second through eighth floor: office space

1 Office space
2 Passage
3 Elevators
4 Stair
5 Hotel suite
6 Apartment unit

Interior precast concrete beams and free-standing timber columns, instead of concrete core walls, provide support of the floor panels.

lateral loads to the concrete cores and through them to the ground. At the perimeter, the concrete ring beam is supported on the glulam columns, which (as at LCT One) are integral with the CLT wall panels, enabling both structure and enclosure elements to be lifted into place with a single action of the crane.

All the structural connections are made using embedded steel rods that, in the case of the glulam columns, facilitate an end grain-to-end grain connection with those columns already installed on the floor below. Grout was used to make the final connection on site. The CLT wall panels (which were supplied with factory-installed windows, thermal insulation and a weather-resistant membrane) are non-structural, being required only to carry their own weight and resist the lateral forces acting directly upon them. The interior side of the panels is finished with a layer of spruce, chosen for its smooth surface and resistance to cracking. The panels are finished with a water-based coating that resists discolouration and the accumulation of dust.

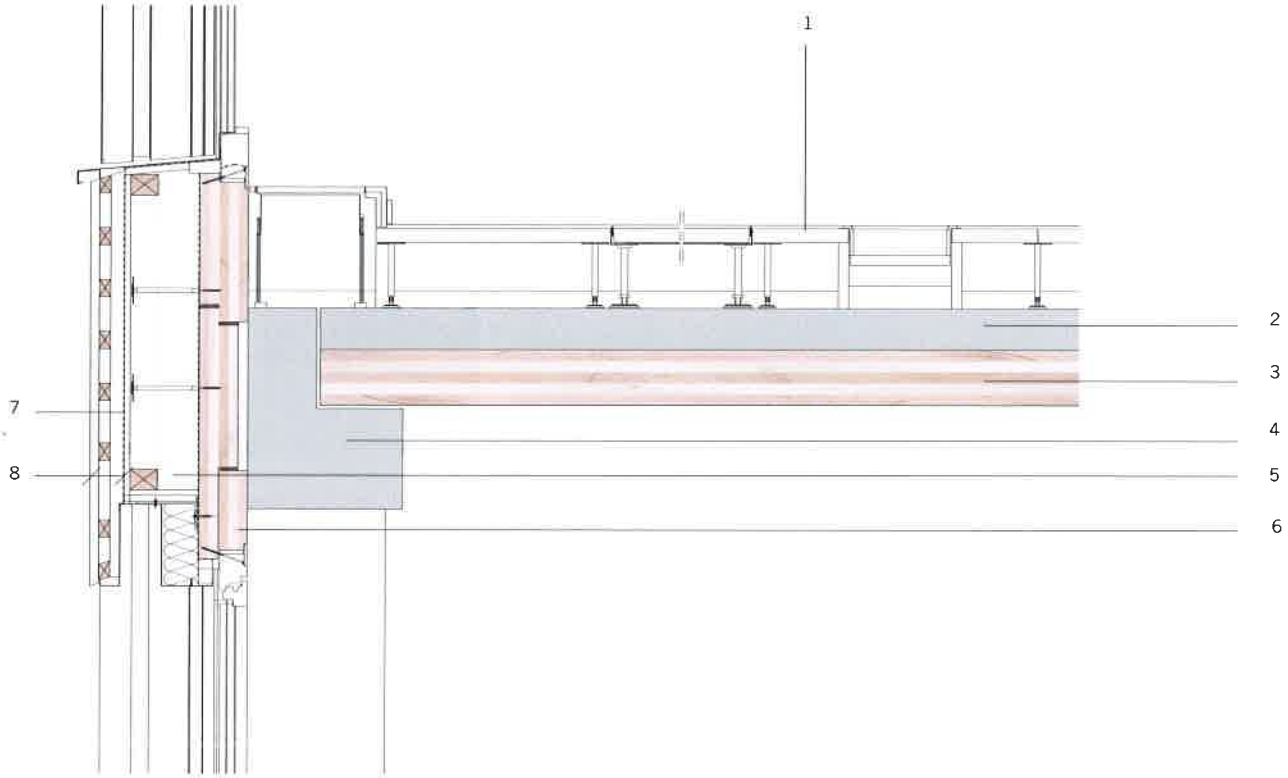
The local fire marshal was consulted from the outset to ensure that the innovative construction system could conform to the 90-minute fire resistance required for a building of this size and type. Among the strategies used to meet the requirement were: the oversizing of exposed glulam members (which range in size from 400mm × 400mm to 400mm ×1400mm); the use of sprinklers throughout the building; the reduction of the maximum compartment size from 800 to 400 square metres. Fire testing was carried out at the design stage and again before construction began. This process was simplified to some degree because of the similar structural connections used throughout the building.

For each storey, the kit of components (glulam columns, glulam beams, XC® floor panels and wall panels) were delivered from the factory to the site on a 'just-in-time' basis to minimize the need for on-site storage and to facilitate construction. Each floor took approximately one week to complete and enclose. The speed of construction helped protect the wood components from water damage.

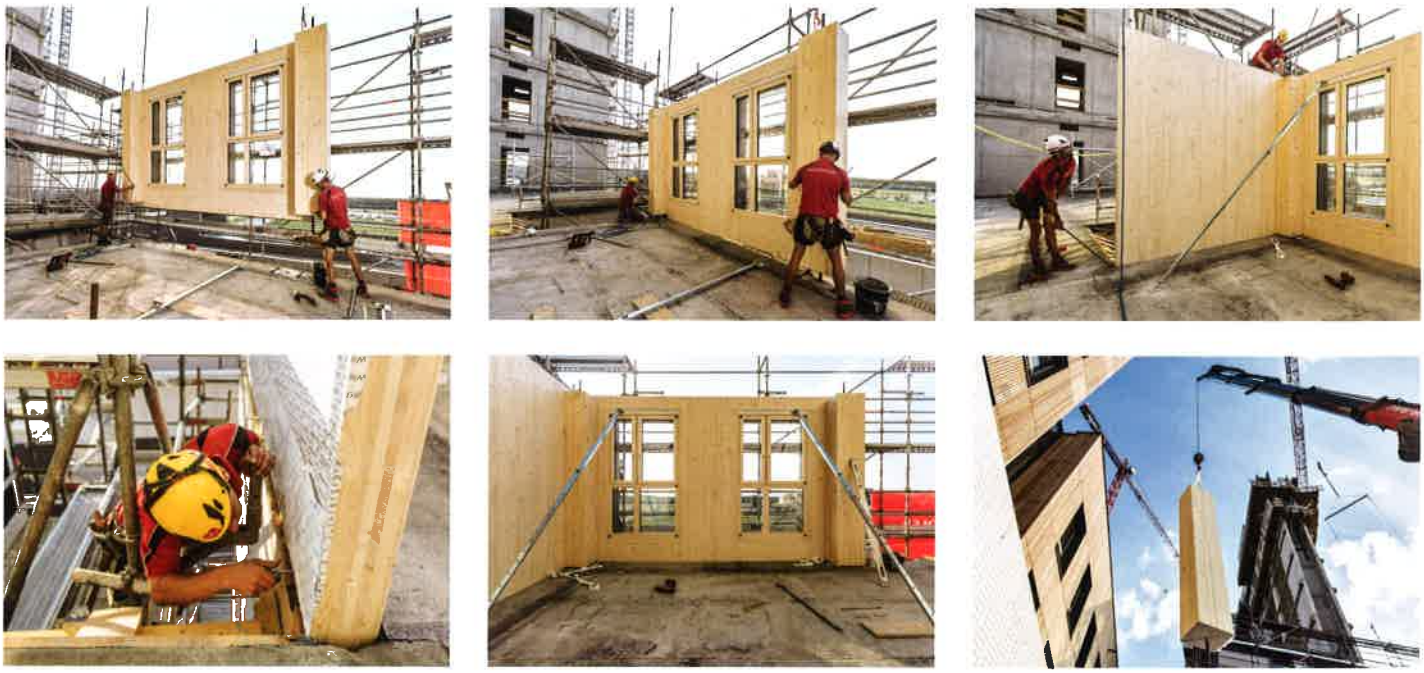
The exterior larch cladding used for the first two floors was installed from the ground using scaffolding. Starting with the third floor, fibre cement panels were used. The entire set of wood components for the building required only 50 truck deliveries from the factory to the site.

CONCLUSION

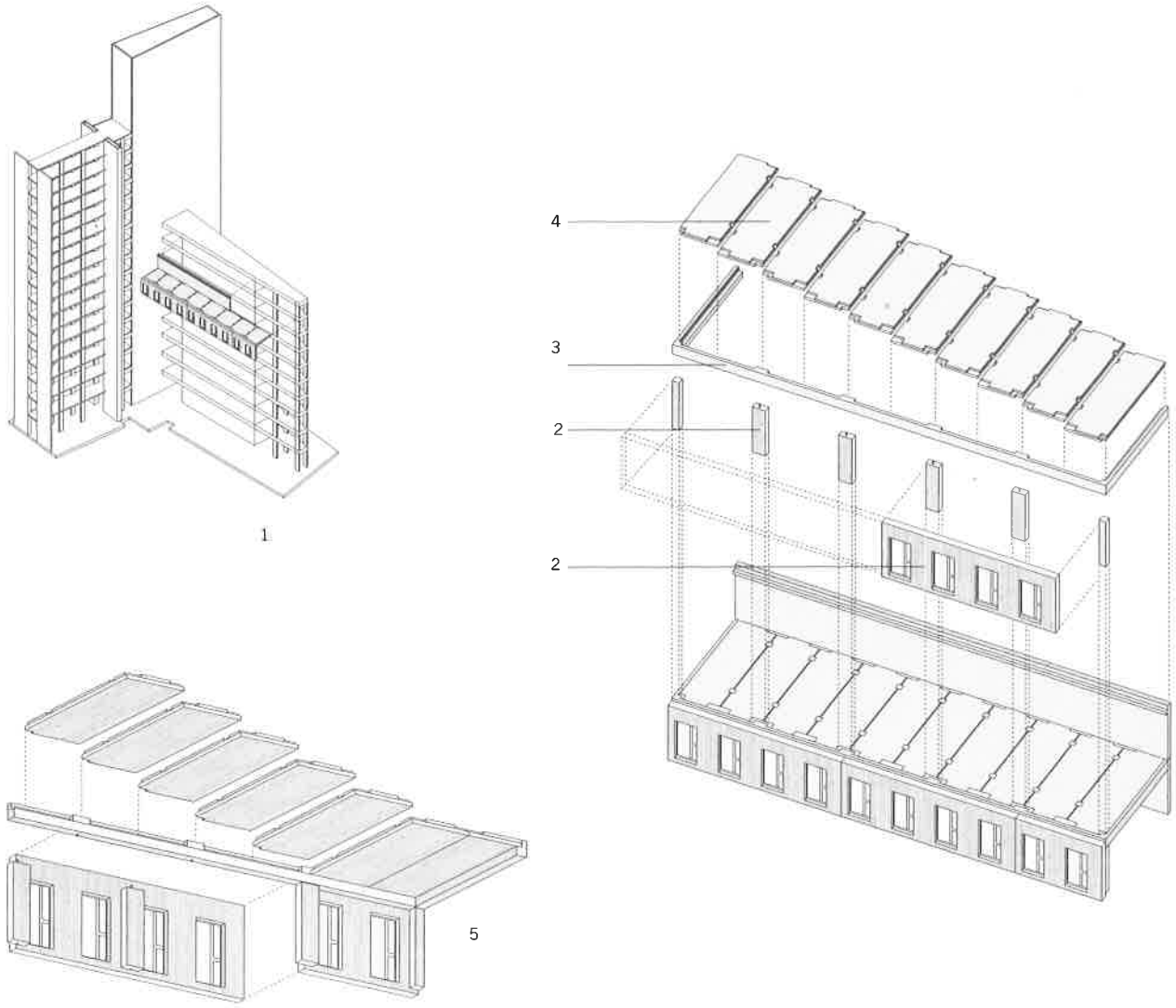
HoHo Wien provides further evidence that exposed mass wood structures are increasingly popular in particular with progressive companies. These companies want to provide their employees with a work environment that supports their well-being and thus enhances their performance. But questions are often raised about the impact of these buildings on the world's forests.



Detail section
1 Raised floor system **2** Concrete topping **3** CLT floor panel **4** Concrete ring beam **5** Wall insulation **6** CLT wall panel **7** Vapour-permeable exterior sheathing **8** Exterior larch cladding and support



Sequence of placement and installation of the prefabricated wall panels. The bottom right image shows the installation of an interior core free-standing column.



Construction sequence
1 Concrete core cast in place **2** Prefabricated wall panels including columns are installed on top of concrete ring beam and wall panel below **3** Concrete ring beam installed **4** Prefabricated XC® floor panel installed onto ring beam and supported by concrete core wall in the interior **5** Same installation viewed from interior.

Where the wood is harvested from sustainably managed forests, these concerns are unfounded. In Austria, for example, forests produce 30 million cubic metres of new timber each year, of which 26 million cubic metres are harvested, and 4 million cubic metres are left in the forest to increase timber stocks. The structure of HoHo Wien is approximately 75% wood and 25% concrete and includes 800 glulam columns and 14,400 square metres of cross-laminated timber panels. With this volume of wood, it is estimated that HoHo Wien saves 2800 metric tonnes of carbon dioxide emissions compared to a traditional concrete building of the same size. Moreover, RLP Architekten believes that the flexibility of the plan, which allows for easy reconfiguration, will increase the service life and contribute further to the long-term sustainability of the project.