



**BROAD HOLON**

# **BROAD Holon Sustainable Modular Multifamily High-Rise**



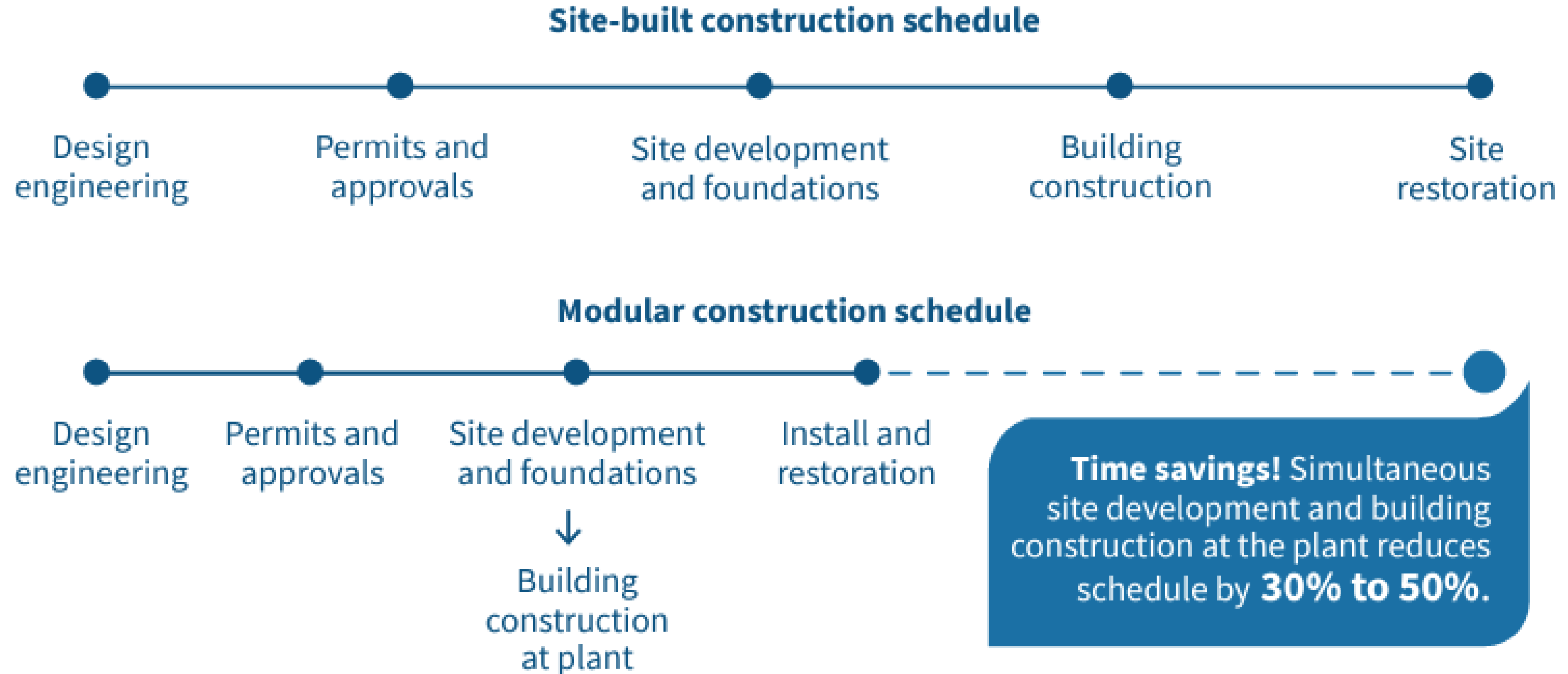




# The BROAD Group

- Global manufacturer founded in 1988, holding over 460 patents across several major industries
- BROAD operates across a diverse range of industries with the common goal of reducing carbon footprint, sustainable use of materials, and reducing both energy and material consumption:
  - ✓ BROAD Air-Conditioning: sustainable cooling through non-electric central air conditioning driven by waste heat, renewables, or natural gas and with a water-based refrigerant
  - ✓ BROAD Clean Air: Energy Recovery Ventilation and air purification systems
  - ✓ BROAD Sustainable Building: stainless steel based modular multifamily high-rise
  - ✓ BROAD Harvest Power: Wind turbines generating 30Mw of power, meeting the electricity needs for over 10,000 homes, longer lasting and recyclable turbine blades
  - ✓ BROAD B-CORE Slab: Produces B-CORE slabs for buildings, bridges and roads

# Modular Construction has a fast project cycle, ..but is that enough?





# The Critical Housing Shortage in North America

- Estimated shortage of housing units in the U.S. for sale or rent is estimated to range from 4 million units (Freddie Mac) to over 7 Million units (National Low Income Housing Coalition [1]), and extends across both affordable and market-rate housing sectors.
- The number of cost-burdened renters reached an all-time high: 21.6 million households (49%) [2]
- In 2021, 19 million homeowners (22.7%) were cost burdened – the highest level since 2013.[3]
- “The U.S. Needs to build more than 4.6 million new rental units for a variety of income levels. To meet this need, 325,000 units will be needed per year by 2030.”[4]



## The solution:

- ✓ *Fast construction and delivery of units*
- ✓ *Build to vertical density*
- ✓ *Industrialized Scale production*
- ✓ *Lower operating cost*

[1]<https://nlihc.org/explore-issues/why-we-care/problem>

[2] and [3] Habitat for Humanity - <https://www.habitat.org/costofhome/2023-state-nations-housing-report-lack-affordable-housing>)

[4] National Apartment Association and National Multifamily Housing Council

# BROAD SUSTAINABLE BUILDING:

## FROM CARBON STEEL PANELIZED MODULAR CONSTRUCTION TO STAINLESS STEEL VOLUMETRIC MODULAR BUILDING

**2009**

The “Prototype” – BROAD developed factory-made steel-structured building.



**2015**

“Mini Sky City” 57-storey building in 19 days

BROAD built 58 factory-made buildings in 6 years.



**2021**

BROAD successfully delivered world’s first stainless steel low-carbon building



BROAD built a 6-storey BROAD Pavilion at Shanghai Expo within one day

**2010**



BROAD developed stainless steel B-CORE slab, two stainless steel plates held together with an array of extremely thin core tubes thru copper brazing process.

**2018**



*“the original aspiration of B-CORE Slab is to increase the strength of materials, reduce steel consumption and carbon emission in the construction process.”*





# BROAD HOLON AKA "LIVING BUILDING"

## THE DEFINITION OF A "LIVING BUILDING"

- **Flexible modularity:** The floor layout, room type and number of floors can be changed after construction is completed
- B-CORE and other stainless steels in Holon Building is one of the most **environmentally friendly construction materials**
- **Durability and unprecedented longevity**
- **Healthy Building:** Incorporating the BROAD's unique Energy Recovery Ventilation system (ERV) with HEPA filtration, 100% fresh air is delivered into the indoor spaces, eliminating cross infection and filtering PM2.5 by 99.9%.

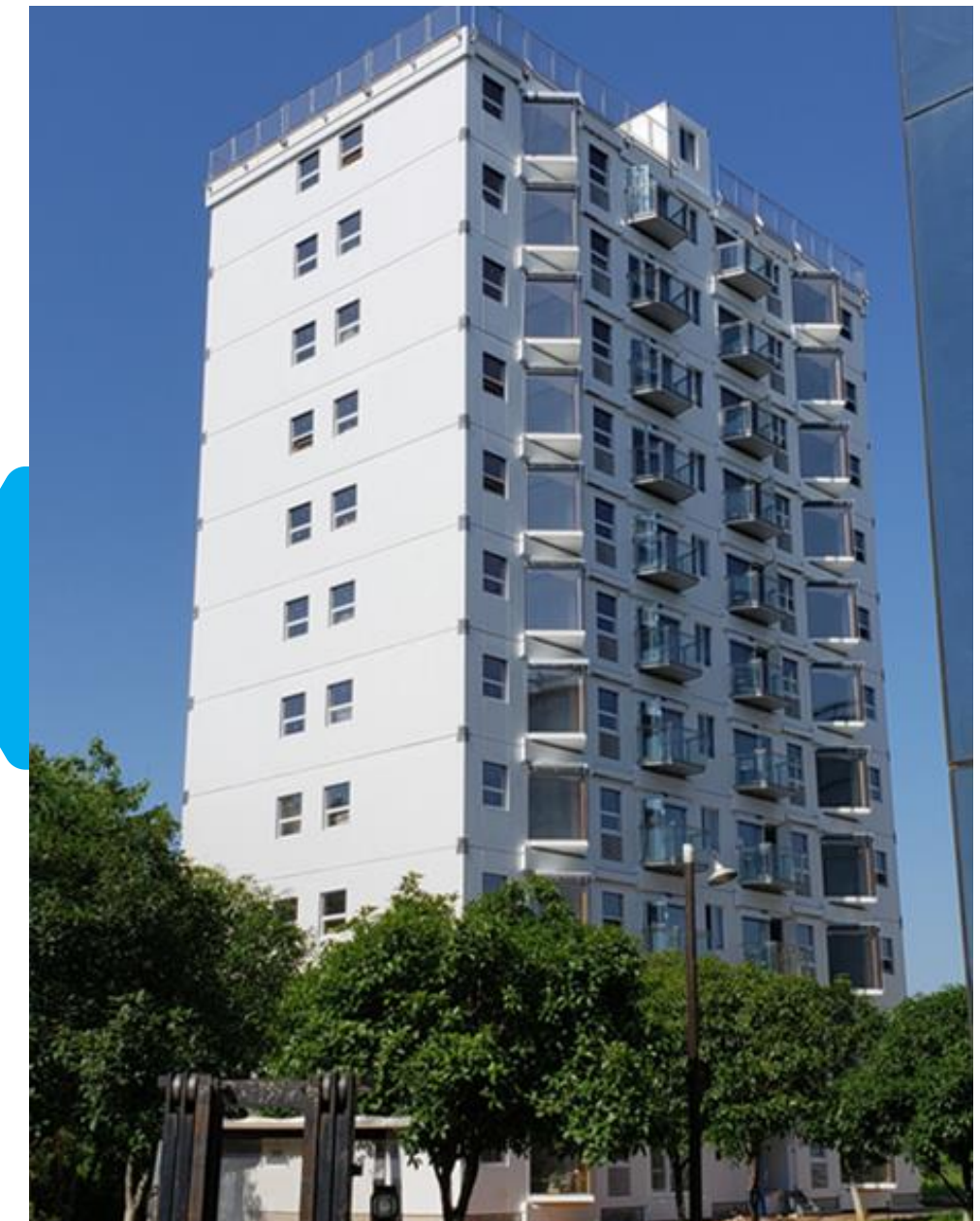


# THE BROAD ALL STAINLESS STEEL VOLUMETRIC MODULAR BUILDING

## Garden Home



BROAD is the first to use Stainless Steel not for the façade of a building, but for **all the building's load bearing structural members**



Turnkey Building erected in 28 hours in 2021 – the **first** Holon Building



# Why does BROAD use Stainless Steel for building framing?

- Stainless steel is non-corrosive, more than **30 x more resistant to corrosion** than carbon steel
- Stainless steel has superior ductility (the capability of steel to be stretched without fracturing or losing its inherent strength, measured in elongation, which for BROAD is **>40%**), enabling it to withstand high tensile stress
- Stainless steel is 1/10 the weight of reinforced concrete of the same area and design strength
- Stainless steel has one of the lightest impacts on the Earth of all construction materials, and is 100% recyclable regardless how many times the process is repeated



Team Stainless: "The Global Lifecycle of Stainless Steel"



ICONIC STAINLESS STEEL SPIRE OF  
THE CHRYSLER BUILDING - 1930



# HOLON BUILDING:

## B-CORE SLAB

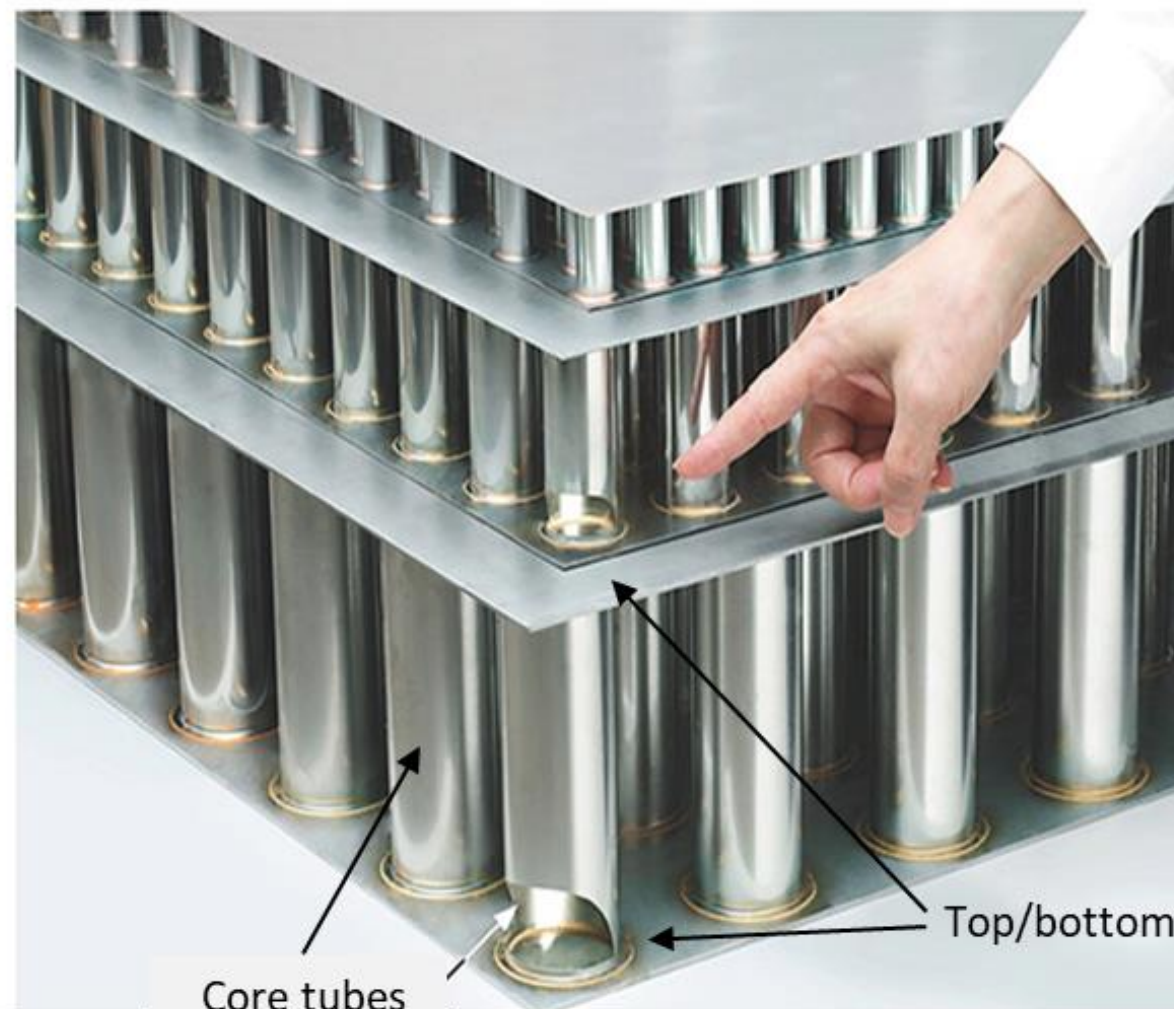
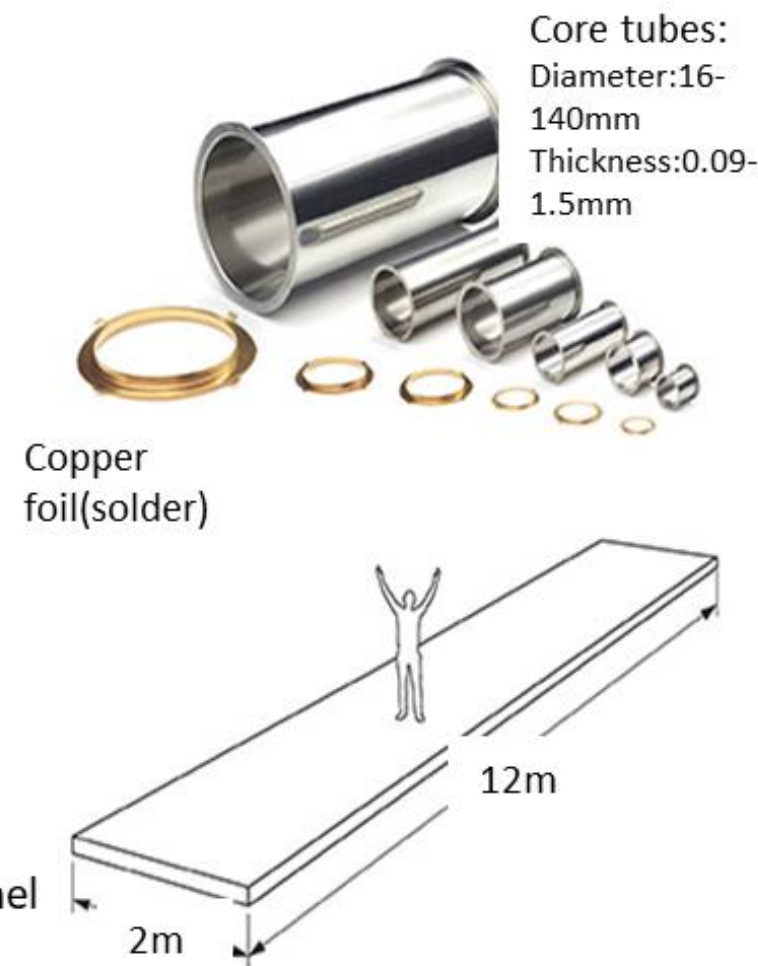


Plate Thickness: 1.5mm, 2.5mm, 4mm, 6mm (0.6" – 0.25")  
Slab Thickness: 100mm, 150mm (3.9" - 5.9")



- Two plates with array of core tubes
- Ductility: Elongation > 40%
- Everlasting: Corrosion rate is 0.005 g/m<sup>2</sup>/hr
- Eco-friendly: Recycle & Reuse
- 10 x lighter than reinforced concrete of the same design strength





# THE BROAD SUSTAINABLE BUILDING AUTOMATED FACILITY

- Broad sustainable building covers an area of 755,000 f<sup>2</sup> on a campus of 300 acres
- Annual production capacity: 2.7 Million m<sup>2</sup> (29 Million sf)
- 100 robotic systems
- Multiple brazing ovens - one 40 x 8' B-CORE slab can be produced every 2 minutes
- 60,000 units per year





# STANDARDIZATION AND MASS PRODUCTION

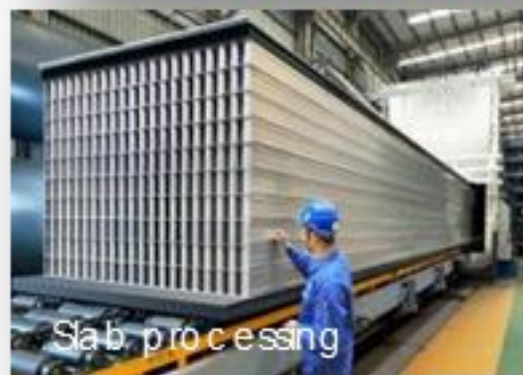
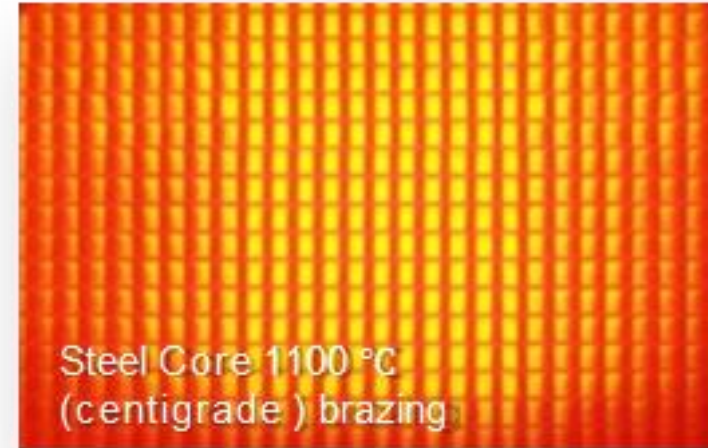
100% factory made, fully automated, streamlined production

- Controlled operating environment
- Robotics improve precision and quality
- Revolutionary productivity gains



*Construction time reduced significantly, nearly 100% of the building and fittings are pre-fabricated, installed, and debugged in factory.*

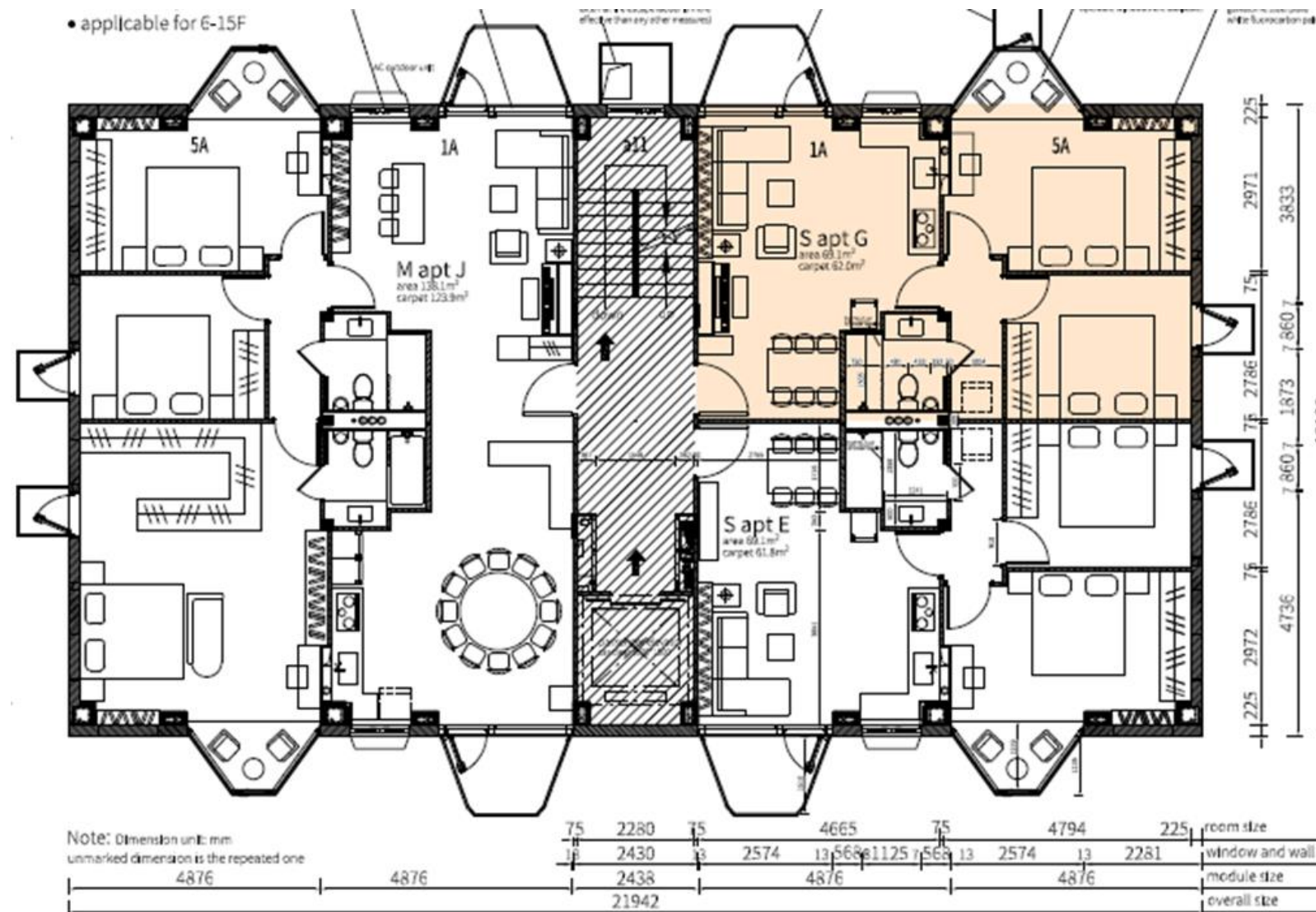
Holon does not use any concrete, scaffolding or formwork, and does not produce construction waste.





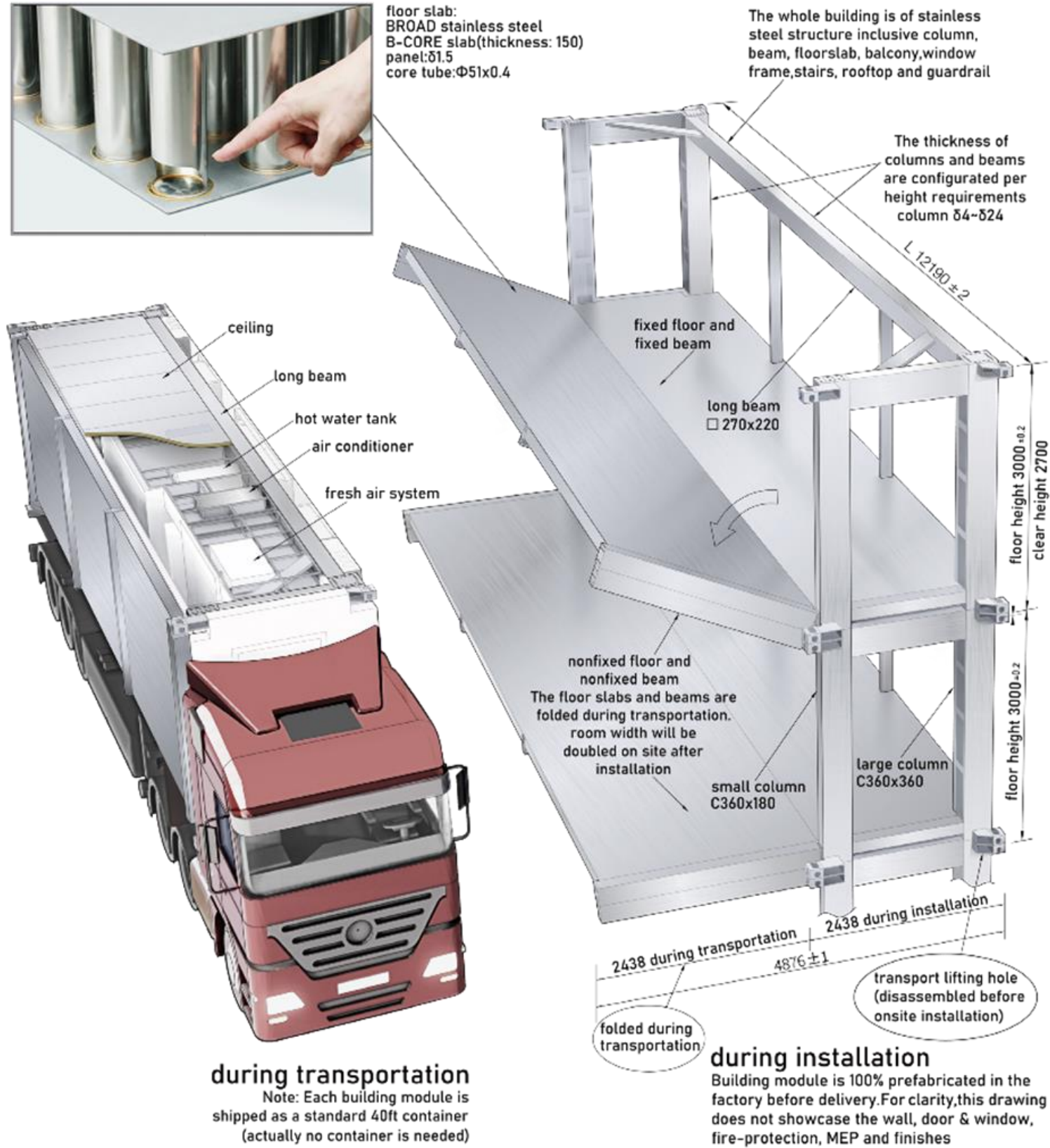
# HOLON MODULE LAYOUT

- Dimensions of a standard 40HQ container
- Room Mods and Lift Mods – economy of scale
- Housing units comprised of two adjacent modules
- All walls are non-load bearing





# Holon Building: Unfold, Bolt & Stack



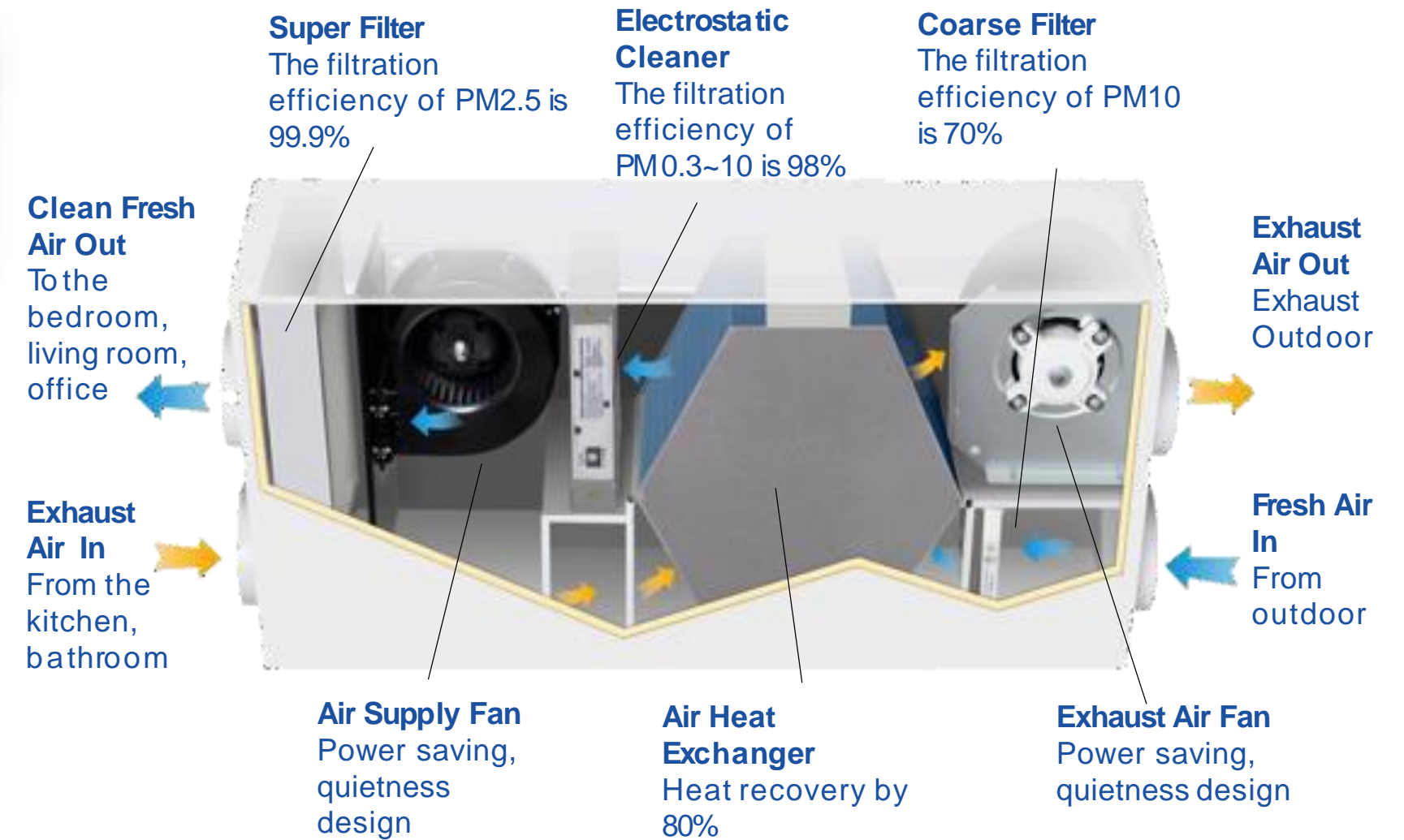
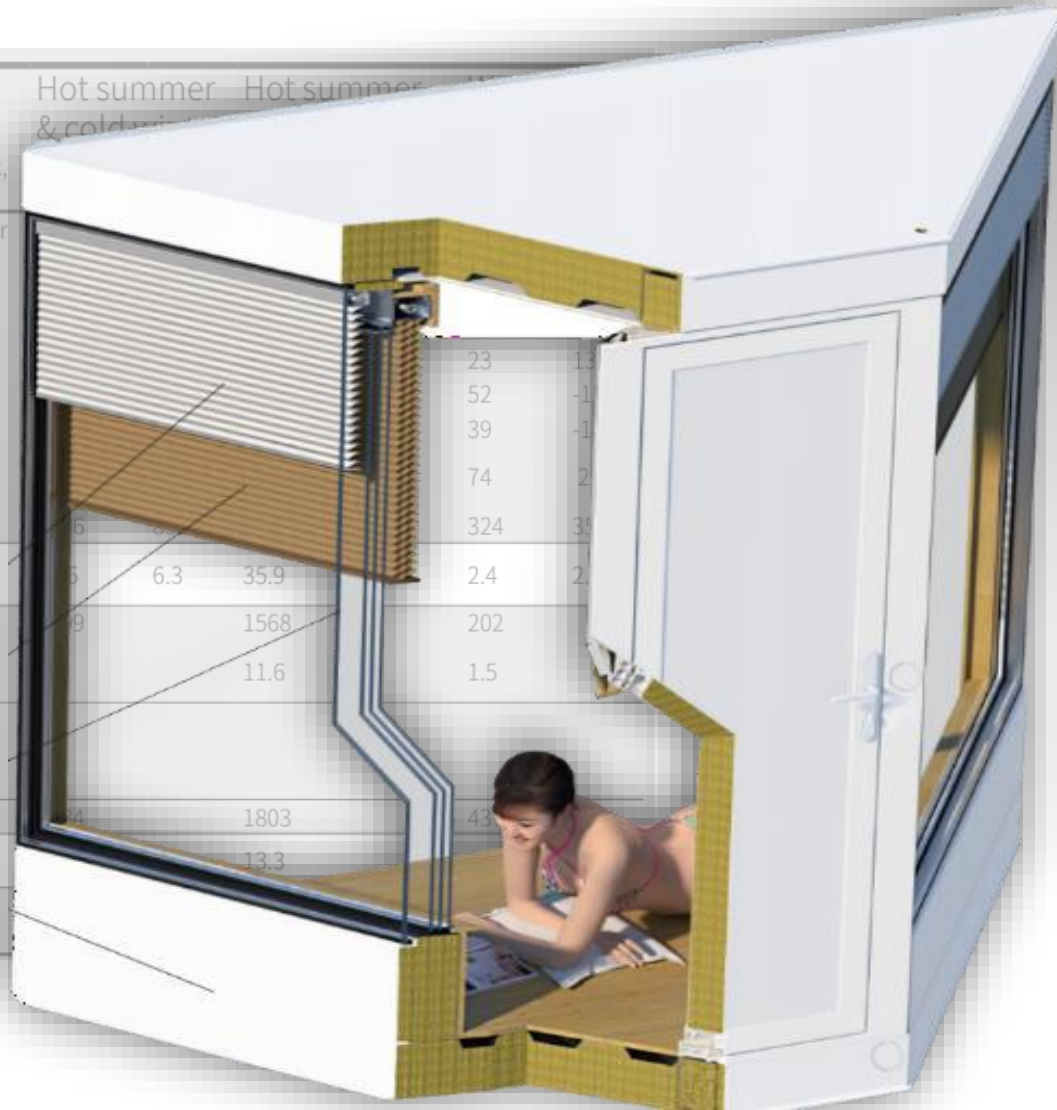


# Carbon Reduction & Energy Saving

- **100% fresh air with no recycled air**
- Unique **3 stage filtration**: Filters 99.9% PM2.5
- Electrostatic Cleaner: kills pathogens, neutralizes allergens
- Air-to-air energy exchanger: **80% energy recovery efficiency**

Climate zone		Severe cold	Cold	Hot summer & cold winter	Hot summer & hot winter	
		Harbin, Moscow	Beijing, New York, Tokyo			
Heating & cooling demand	Item	Parameter	summer	winter	summer	winter
	Exterior wall	66m <sup>2</sup> K=0.2W/m <sup>2</sup> K	17	1443	92	1074
Heating & cooling demand / m <sup>2</sup>	Window	30m <sup>2</sup> K=1.4W/m <sup>2</sup> K	65	622	980	546
	Floor	100m <sup>2</sup> K=0.15W/m <sup>2</sup> K	554	225	319	546
A/C power cons.	Lighting	100W LED 3.3W/m <sup>2</sup>	59	-110	128	-92
	Electricity	100W/m <sup>2</sup> including kitchen and home appliances	4	271	-191	4
Fresh air power cons.	Total	kWh/a	419	205	1890	1566
	Annual average	kWh/m <sup>2</sup> a	3.1	16.3	14	11.6
Total annual	Total	kWh/a	1361	1395	1568	202
	Annual average	kWh/m <sup>2</sup> a	11.6	11.6	15.6	2.0
Equivalent to primary energy	Total	kWh/a	235	235	235	235
	Annual average	kWh/m <sup>2</sup> a	1.7	1.7	1.7	1.7
Equivalent to primary energy	Total	kWh/a	1596	1630	1803	43
	Annual / m <sup>2</sup>	kWh/m <sup>2</sup> a	11.8	12.0	13.3	0.5

*Superior insulation, multi-glazed (4 paned) windows, 100% outdoor air conditioned to avoid heating/cooling spikes: Greatly reduces reliance on A/C*





# The first all Stainless Steel Modular Building: November 2019



BROAD is the first to use stainless steel for all structural members of a building

## “F” Building:

- 16 stories
- 43 days to erect
- 6 month cycle: Design, expert review, government approval, prefab, installation, occupancy

Notice the small footprint! The entire structure is supported by just four B-CORE pillars, 1 m wide each.

\*Info: Click: [F Building](#)



# Garden A-1, erected June 2021



- 11 story  
32,000 sf
- 56 modules  
manufactured in  
15 days
- Stacked onsite in  
under 29 hours
- Includes all MEP  
and interior  
fixtures, ready to  
move in
- LCA: 20 x lifespan  
of a conventional  
reinforced  
concrete building







# BROAD Home Garden wins first prize at MBI “Awards of Distinction”

Awards of Distinction are awarded by Modular Building Institute at the World of Modular convention each year

- BROAD Holon Building won First Place in the category of Multifamily 25,000+ sf at World of Modular 2022
- The award criteria are
  - ❖ *Architectural Excellence*
  - ❖ *Technological Innovation*
  - ❖ *Sustainability*
  - ❖ *Time to completion*





# BROAD wins Global Innovation Awards from CTBUH (2013, 2022)



 2013 CTBUH Global Innovation Award

BROAD Group won the 2013 CTBUH Global Innovation Award for its factory-like prefabrication technology used in the sustainable building T30 Hotel, which is the first time in the history of Chinese architecture to win this award.

 2022 CTBUH Global Innovation Award

BROAD Group wins the 2022 CTBUH Global Innovation Award again for its world's first stainless steel building – Holon Building



# Workforce Housing, completed February 2023



The beginning



In progress



Completed

- 5 buildings, 3 x 12F, 2 x 13/F
- 2000 units
- 18 days to erect 5 buildings, average 6 days per building



# JINDU RESIDENTIAL TOWER

- Xiangyin, China
- Apartment complex built in January 2024
- 262 modules:
  - 8 room mods/floor
  - 2 lift mods/floor
  - 2 machine room mods
- 202 units, average area 732 sf
- Installation: 5 days with two cranes





# JINDU RESIDENTIAL TOWER

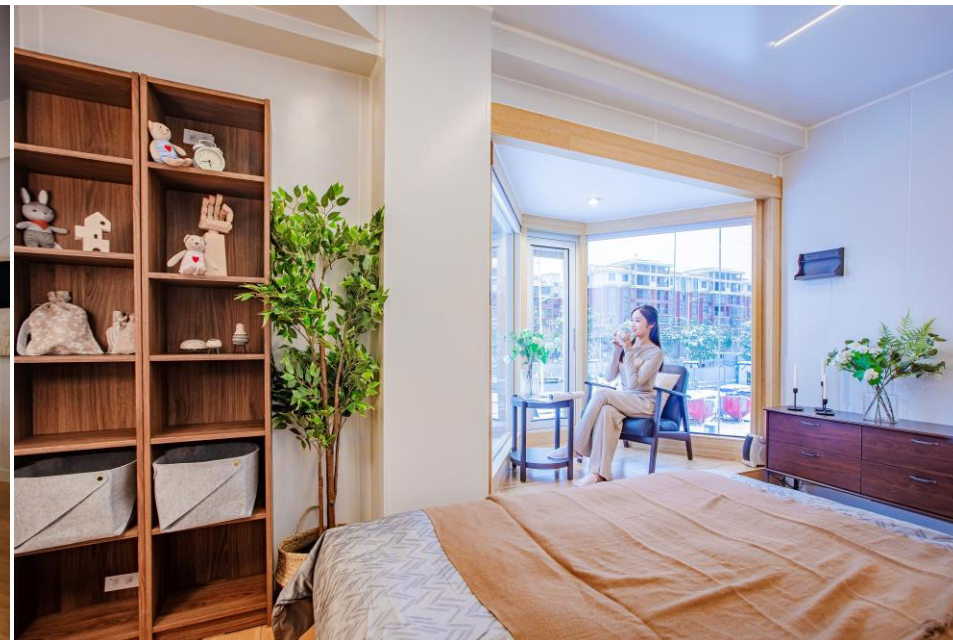
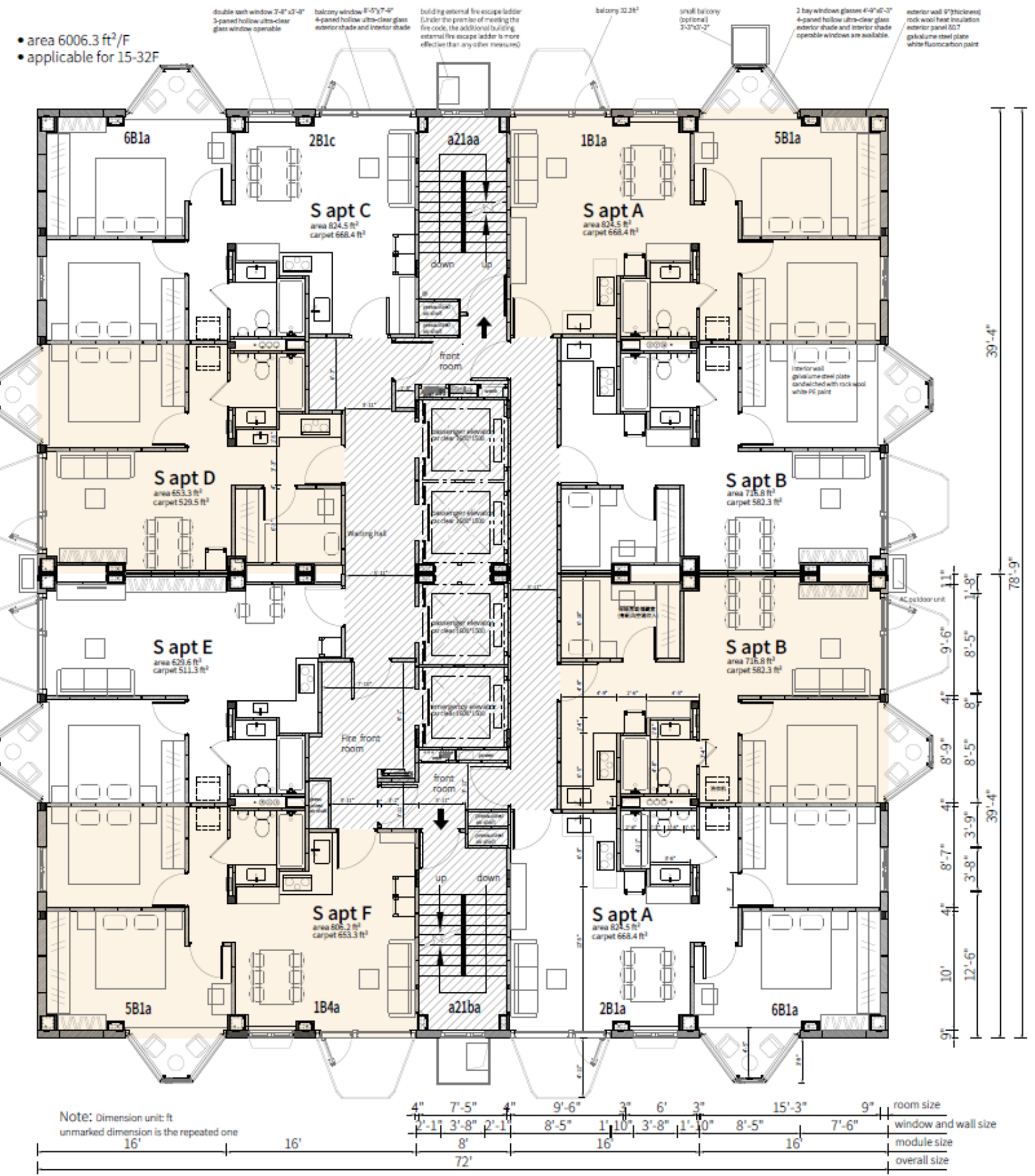
- Building parameters:
  - Area: 181,545 sf. 5,800 sf/floor
  - 1 under ground level, 26 residential levels
  - Residential: 8 2BR units/floor, 732 sf
  - Height: 262 '
- Exterior walls: galvalume steel SIP with 8.6" rock wool
- Interior walls: Reinforced calcium silicate composite.





# JINDU RESIDENTIAL TOWER

## Floorplan











# HOLON Building: Stainless Steel Green Modular Building

The Holon Building incorporates sustainable construction technologies into a highly energy efficient, high air quality, everlasting modular building with ultra low carbon footprint



World's First Stainless Steel Low-Carbon Building





# HOLON Building: The New Era in Industrialized Building Construction

**HOLON**

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