

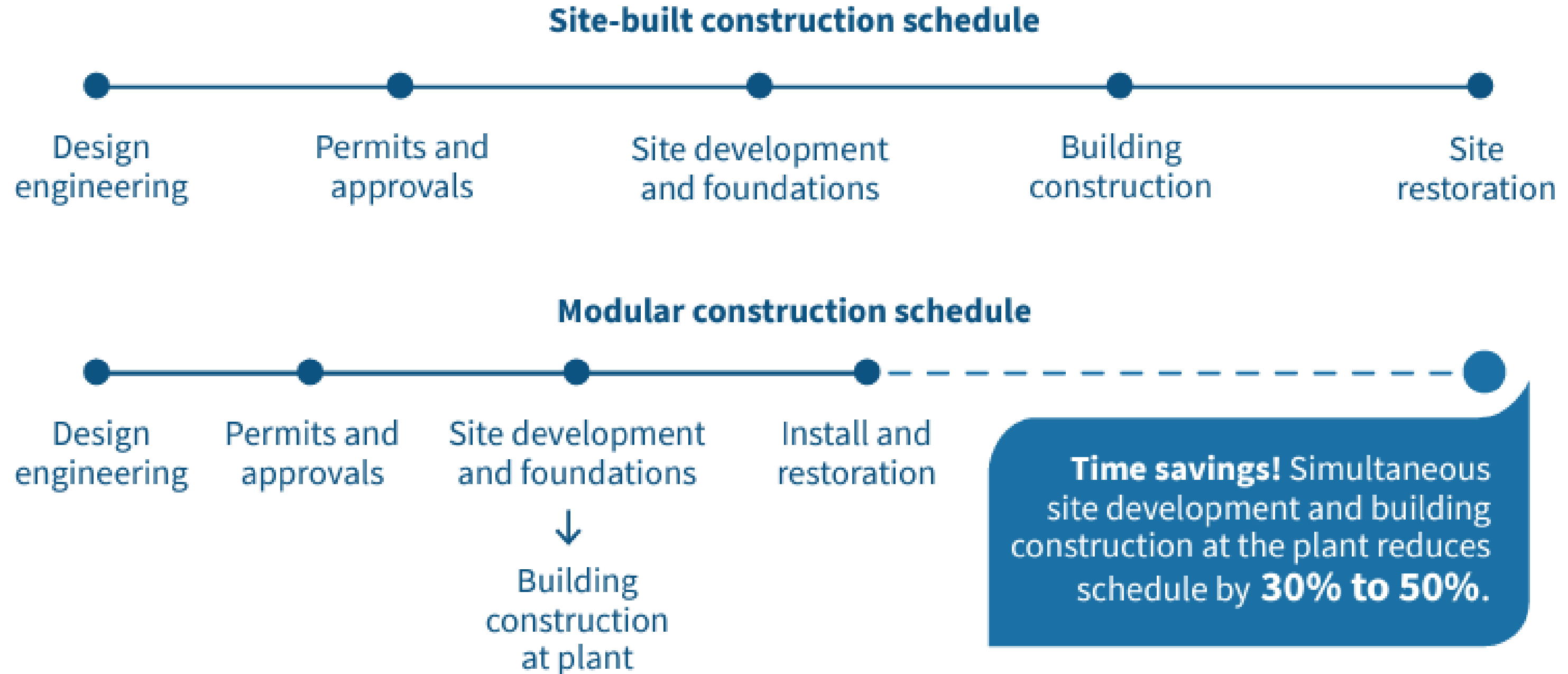


BROAD HOLON

BROAD Holon Sustainable Modular Multifamily High-Rise



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 LOW-CARBON ARCHITECTURE FOOTPRINTS

FROM CARBON STEEL MODULAR CONSTRUCTION TO STAINLESS STEEL FACTORY-MADE 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%.

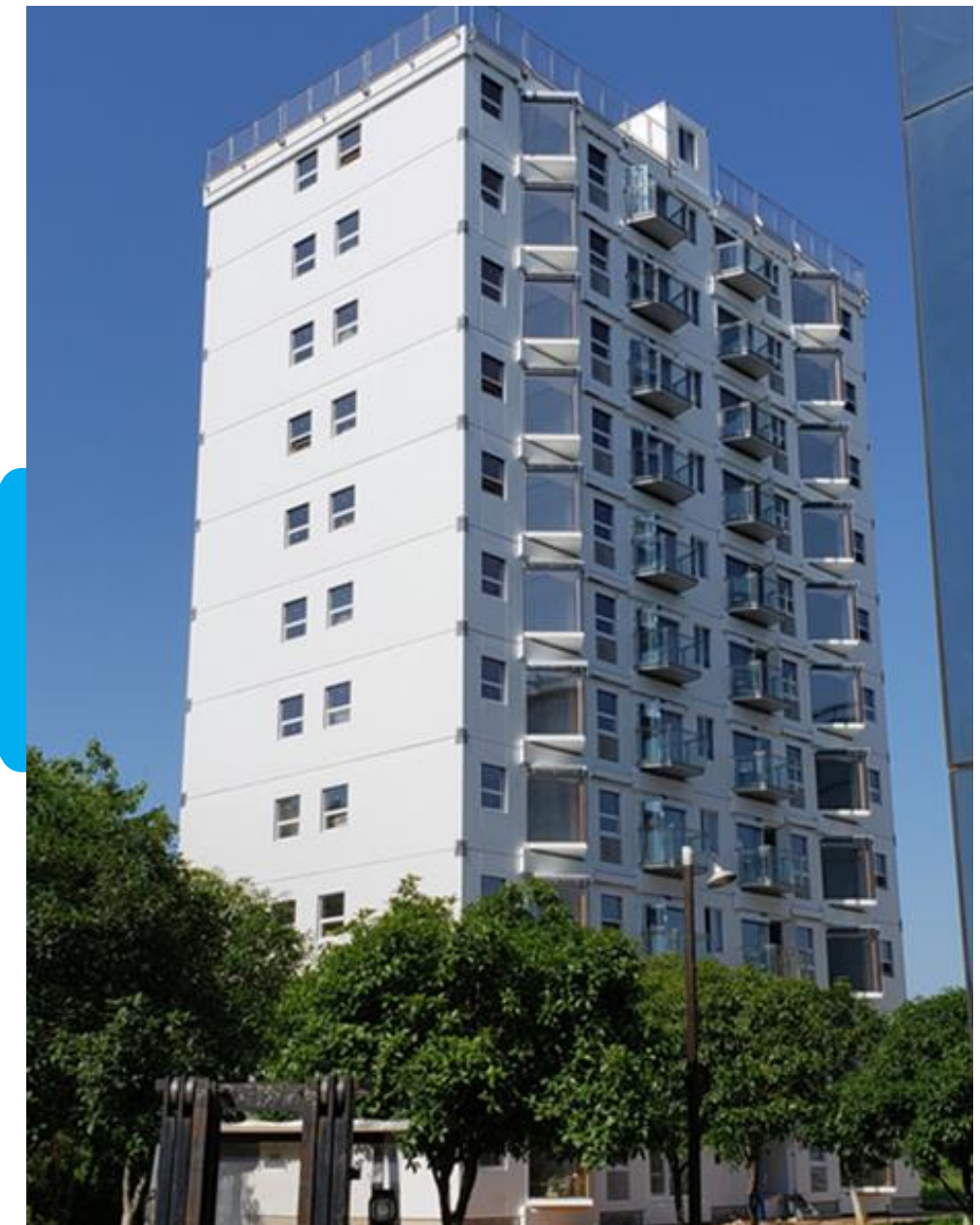


THE BROAD ALL STAINLESS STEEL VOLUMETRIC MODULAR BUILDING



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**

Garden Home



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



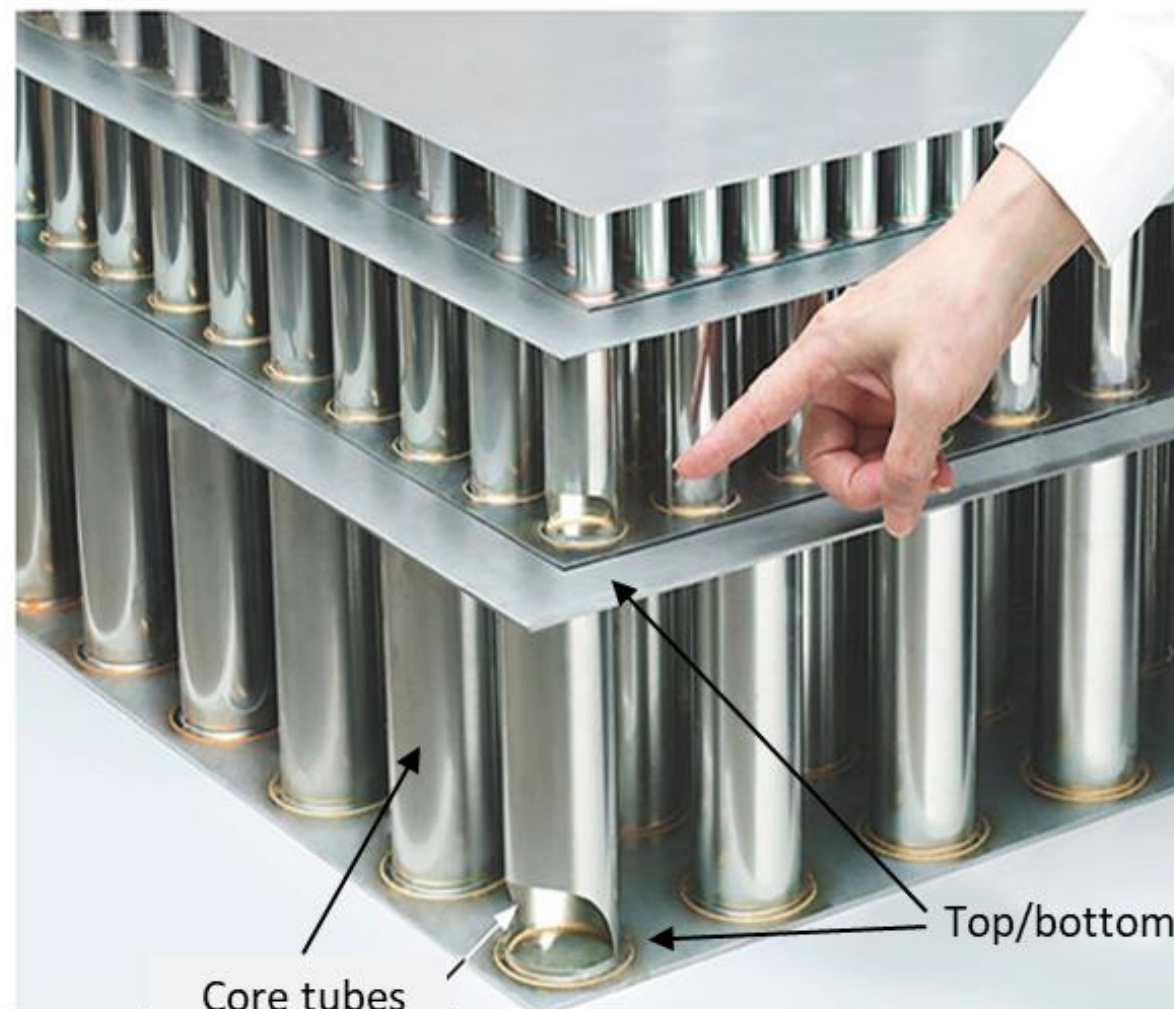
Team Stainless: "The Global Lifecycle of Stainless Steel"



ICONIC STAINLESS STEEL SPIRE OF
THE CHRYSLER BUILDING - 1930

HOLON BUILDING:

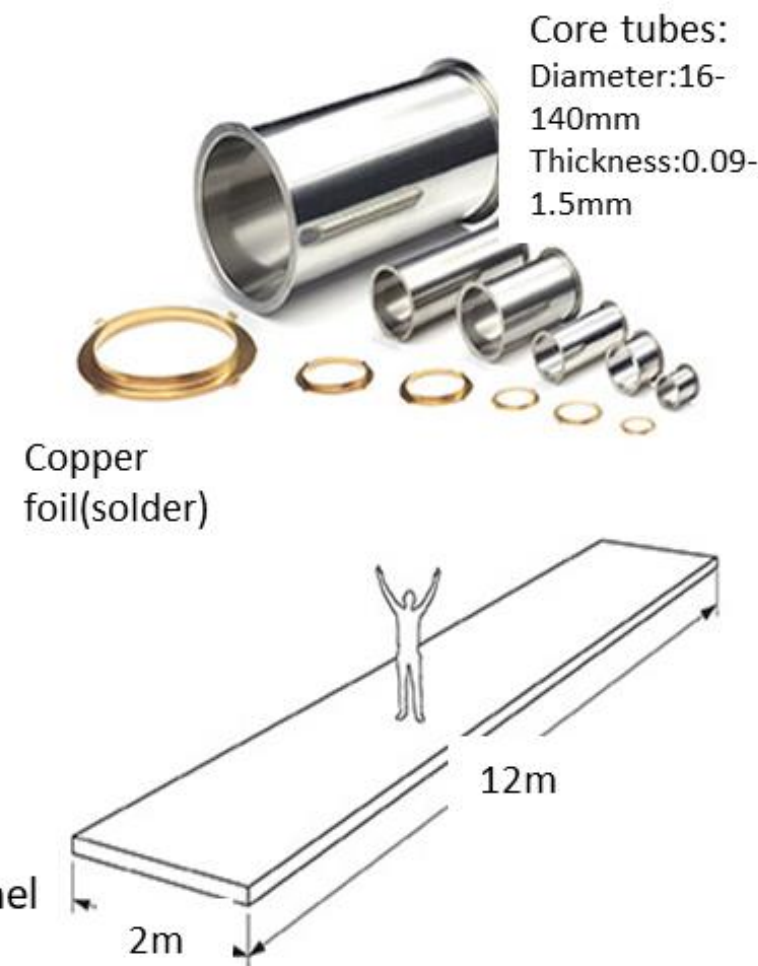
B-CORE SLAB



Core tubes

Top/bottom panel

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



Core tubes:
 Diameter: 16-140mm
 Thickness: 0.09-1.5mm

Copper foil (solder)

12m

2m

- Two plates with array of core tubes
- Ductility: Elongation > 40%
- Everlasting: Corrosion rate is 0.005 g/m²/hr
- Eco-friendly: Recycle & Reuse
- 10 x lighter than reinforced concrete of the same design strength



THE BROAD SUSTAINABLE BUILDING AUTOMATED FACILITY

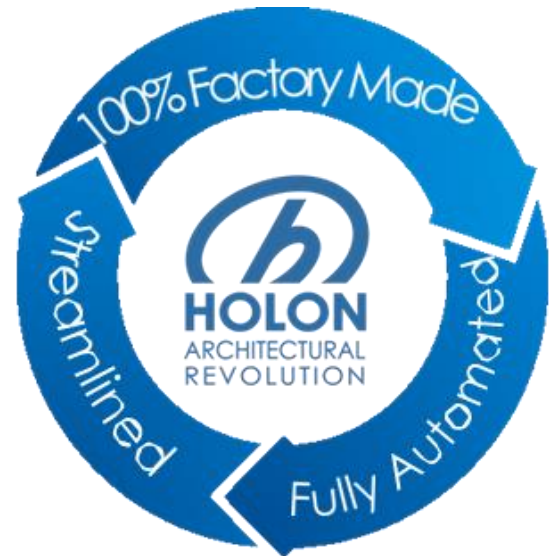
- Broad sustainable building covers an area of 755,000 f² on a campus of 300 acres
- Annual production capacity: 2.7 Million m² (29 Million sf)
- 100 robotic systems
- Multiple brazing ovens - one 40 x 8' B-CORE slab can be produced every 2 minutes
- 60,000 units per year



STANDARDIZATION AND MASS PRODUCTION

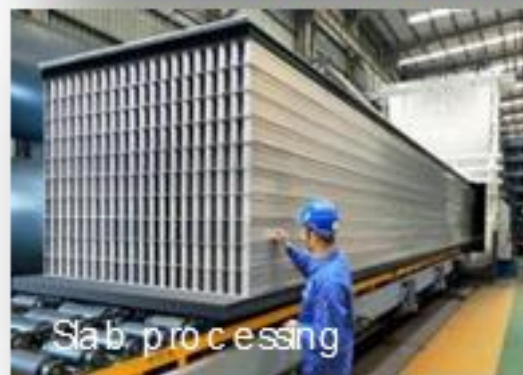
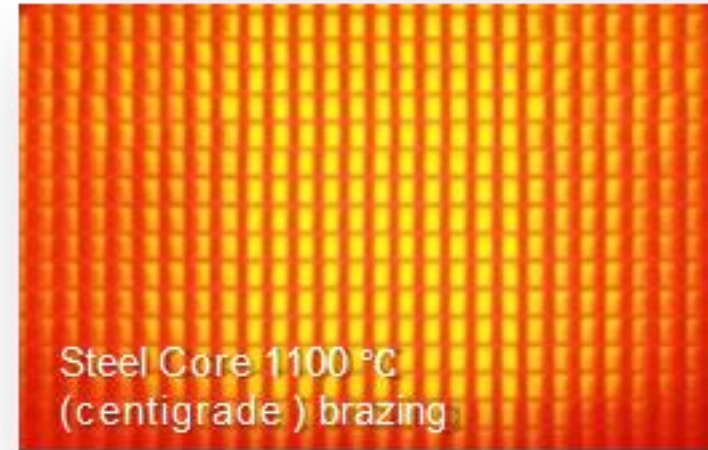
100% factory made, fully automated, streamlined production

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



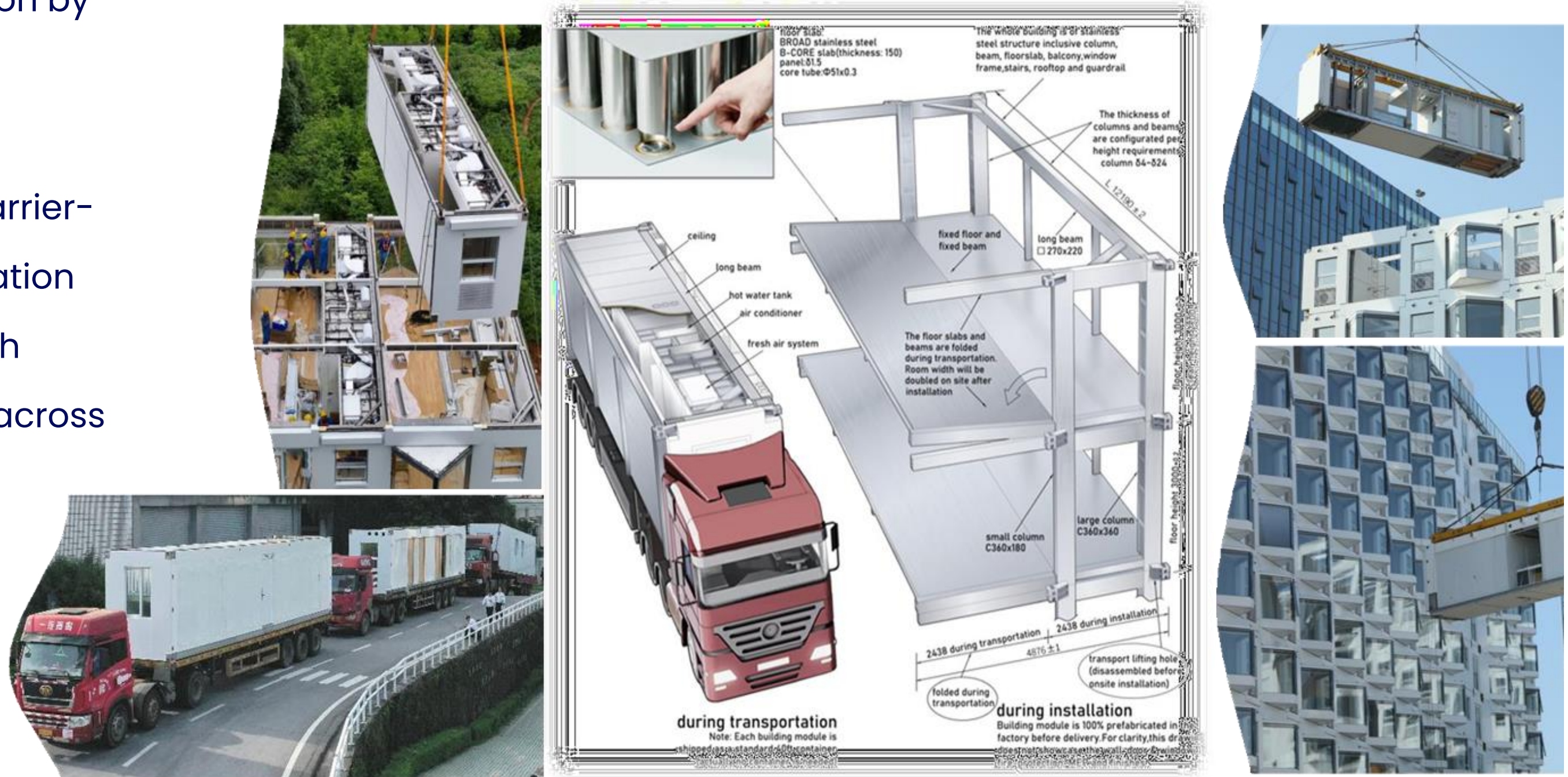
Construction time reduced significantly, nearly 100% of the building and fittings are pre-fabricated, installed, and debugged in factory.

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



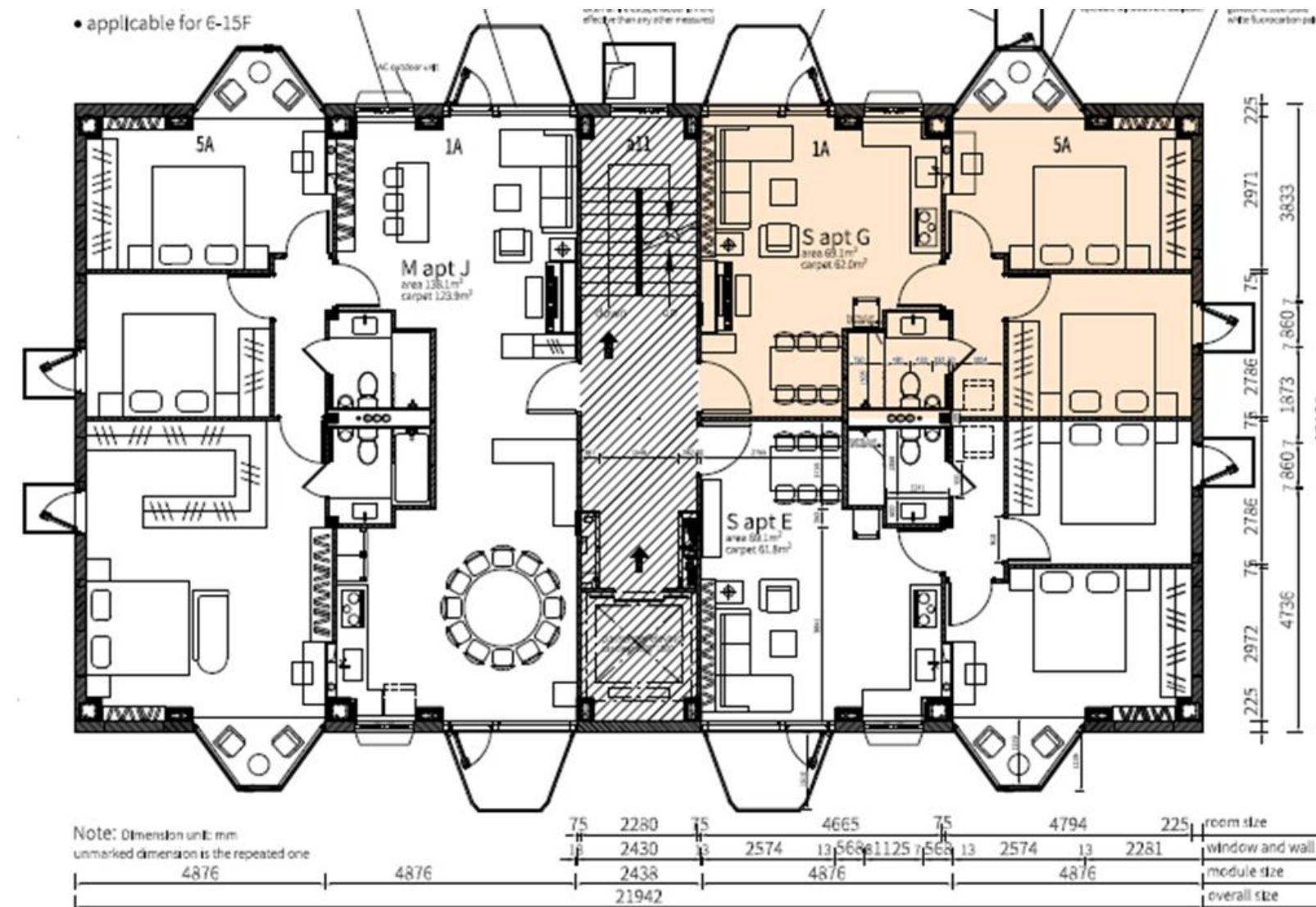
DESIGNED TO BE EASILY TRANSPORTED & INSTALLED

- Shipped as a HQ40 container, minimal on-site installation by bold connections.
- Enabling low cost and barrier-free worldwide transportation including any port in North America, and on flatbed across any jurisdiction.

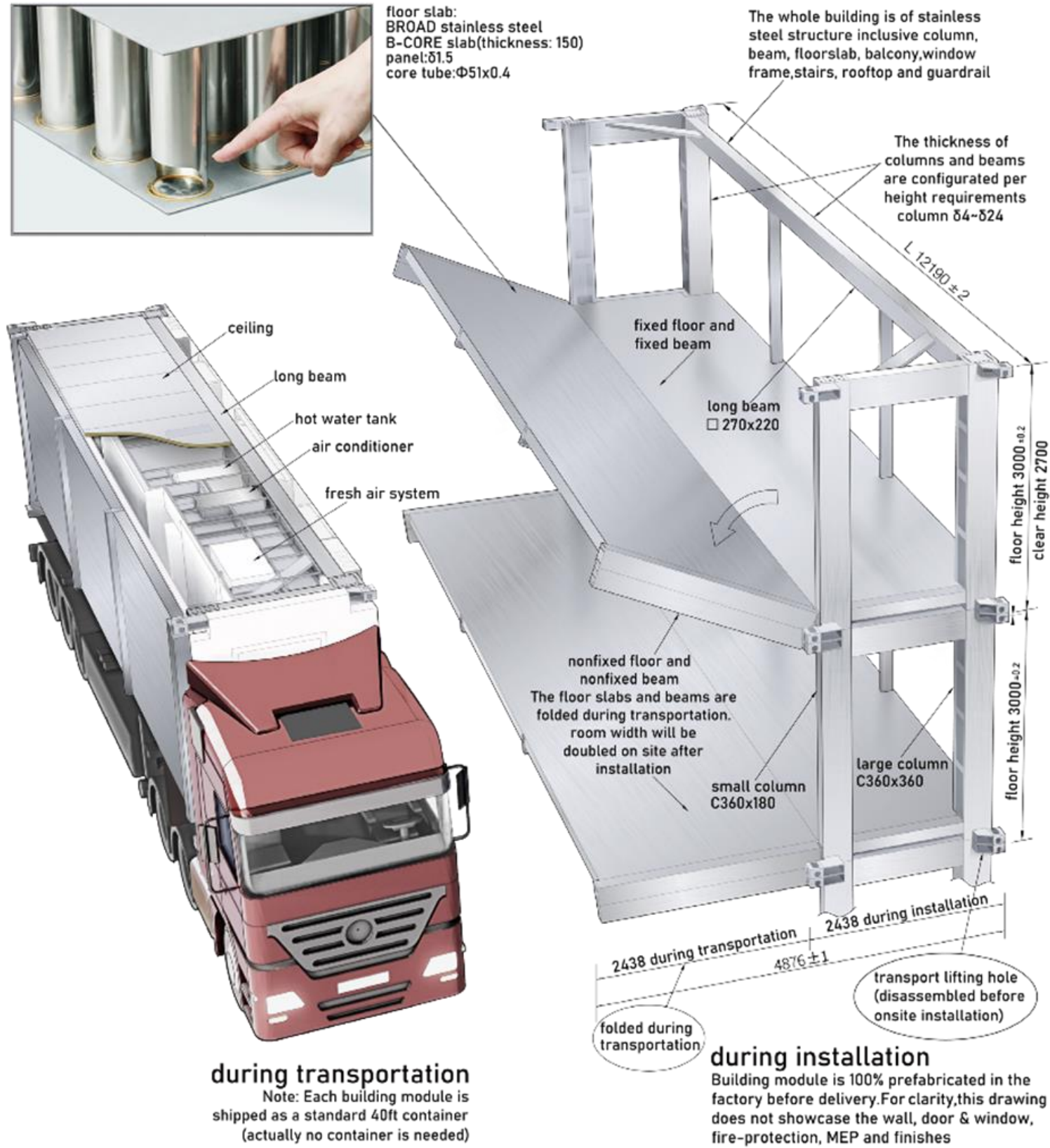


HOLON MODULE LAYOUT

- 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

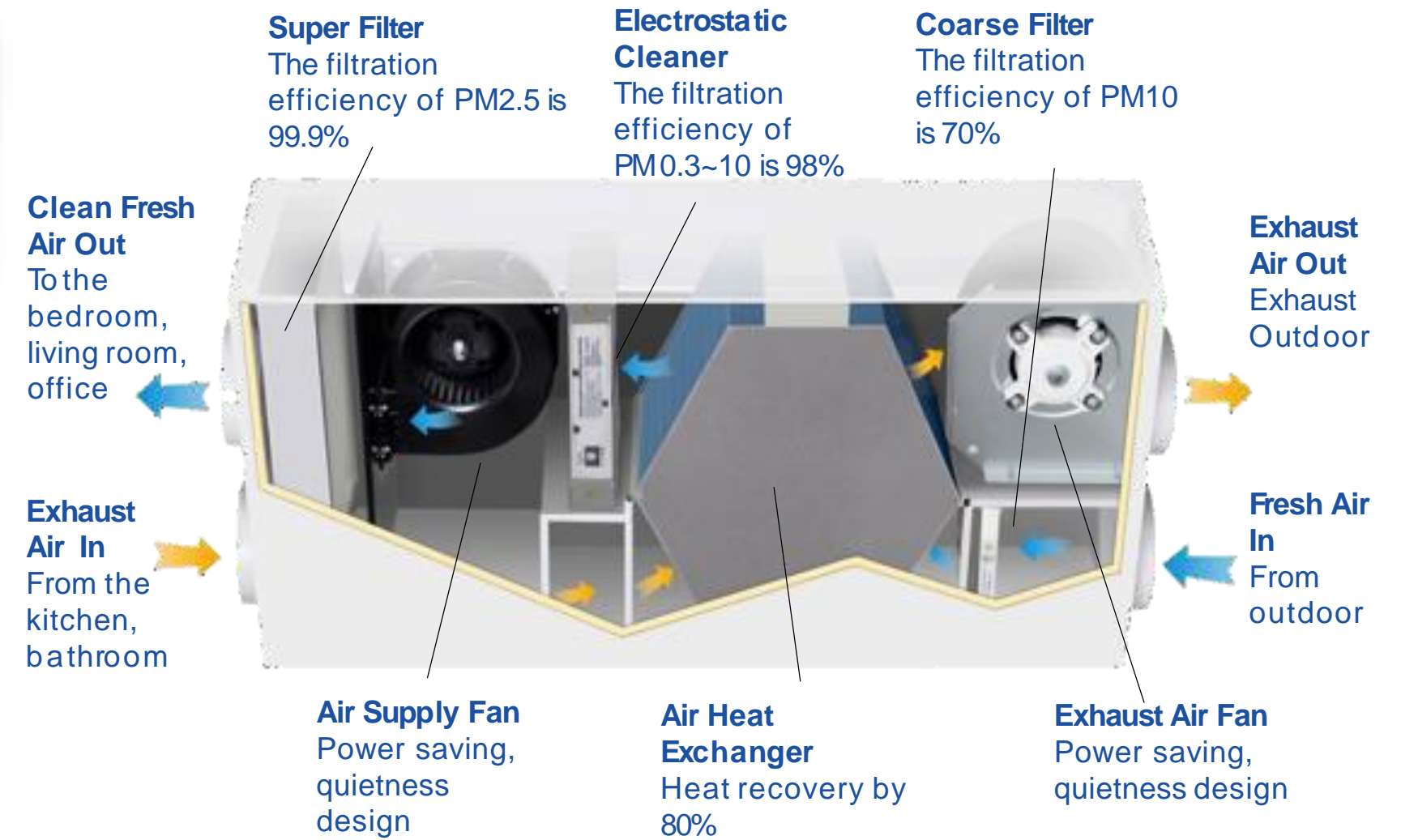
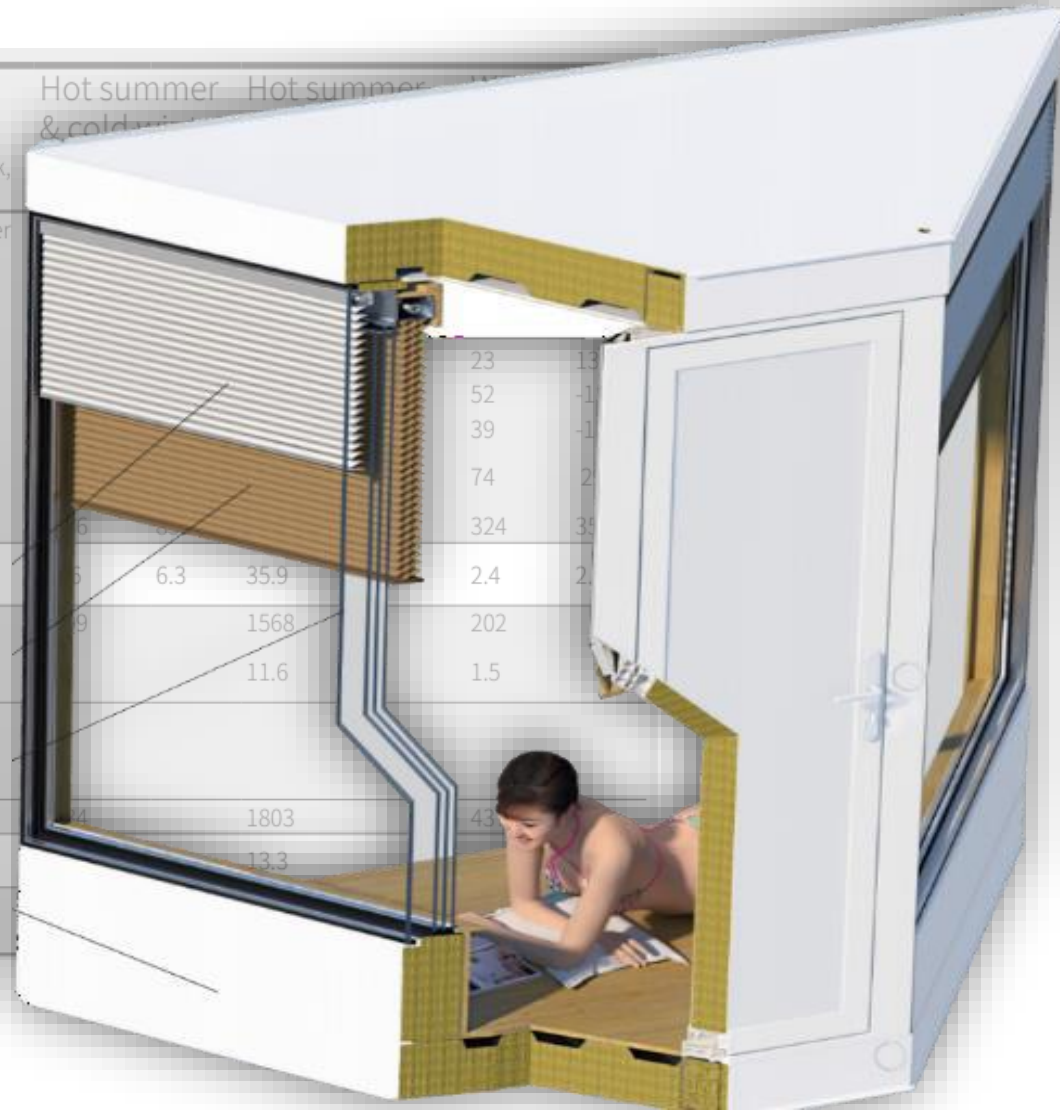


Carbon Reduction & Energy Saving

- **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 ² K=0.2W/m ² K	17	1443	92	1074
	Window	36m ² K=1.4W/m ² K	65	622	980	546
	Floor	100m ² K=0.15W/m ² K	554	225	319	319
Lighting	100W LED 3.3W/m ²	59	-110	128	-92	
	Including kitchen and home appliances	4	271	-191		
Heating & cooling demand / m ²	Total kWh/a	419	205	1890	1566	
	Annual average kWh/m ² a	3.1	16.3	14	11.6	
A/C power cons.	Total kWh/a	1361	1395	1568	202	
	Annual average kWh/m ² a	11.6	11.6	1.5		
Fresh air power cons.	Total kWh/a	235				
	Annual average kWh/m ² a	1.7				
Total annual	Total kWh/a	1596	1630	1803	44	
	Annual / m ² kWh/m ² a	11.8	12.0	13.3		
Equivalent to primary energy	Total kWh/a	30.6	31.3			
	Annual / m ² kWh/m ² a					

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





HOLON Building: Stainless Steel Green Modular Building

Optimize Energy Performance: **High Insulation & AI Control**

- ❑ HOLON building is highly insulated with a superior energy efficiency system which consumes **80% + less energy** than conventional buildings.

	HOLON Insulation Material	R Value	ASHRAE 90.1 Zone 5A Min. R-Value
Roof	rock wool	32	R-30
Exterior Wall	8.6" rock wool	28	R-19
Windows	Triple/quadruple pane, argon-filled	3/4	2.2-2.6

- ❑ Rockwool insulation provides excellent acoustic performance

Location	Sound Insulation	Location	Sound Insulation
Exterior Wall	50dB(A)	Between Units	45dB(A)
Between Floors	55dB(A)	Between Rooms	35dB(A)
Window & Door	40dB(A)		

BBA AI Control: Virtualized control for sunshade, lighting, IAQ, energy consumption

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



Workforce Housing, completed February 2023



The beginning



In progress

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



Completed

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.





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



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

Jeremy S Zimman

Director of Marketing

Holon Modular Building Systems



201-678-3010



www.broadusa.com



jeremyzimman@broadusa.com



401 Hackensack Ave, Suite 503
Hackensack, New Jersey 07601

