1. What is Holon Building ?

Holon Building, BROAD's original innovation, is a unique type of stainless steel building. Its columns and beams are made of thick-wall stainless section steel while its floor slabs are made of BROAD stainless steel B-CORE Slab, which is also BROAD's original creation that is ultra light yet ultra strong. No concrete is used in the Holon Building. The structures, walls and windows, MEP and finishes are all made in the factory, just like limousine manufacturing, ensuring the best quality. The only procedure to be done on site is bolt connection. Normally, 3 storeys can be erected per day on site. Each building module is shipped as a standard 40ft container (actually no container is needed), enabling convenient and low-cost worldwide transportation

Holon Building has five distinctive advantages: First, stainless steel is of high durability and earthquake resistance, showing strong vitality.
Second, residents' lives are enhanced and protected with BROAD Fresh Air System which provides 100% fresh air and filters PM2.5 by 99.9%. Third, thick insulation, 3 or 4 paned windows and fresh air heat recovery make Holon Building's carbon emission 80%-90% lower than traditional buildings, creating a better environment for our future generations. Fourth, Holon Building allows flexible changes to the floor and building layouts, and building height. The building itself can even be disassembled and rebuilt in another location. Fifth, compared with conventional building, Holon Building has higher quality but lower cost, which is exactly the reason why it will be popularized in the global market. Moreover, it is perfectly suitable for building luxury residences and skyscrapers, as well as affordable housing

Key New Technologies

No	Item	New Technologies	Distinctive advantages
1	Construction method	100% factory-made	Only bolt tightening is required on site, reducing cost and lowering risks to quality
2	Floor slab	BROAD stainless steel B-CORE slab	1000-year building resistant to earthquake, which is 10 times lighter than reinforced concrete of the same design strength
3	Structure	Extended structure system	Modules are delivered like 40 ft containers, unfolding on site doubles the width
4	Energy efficiency	Highly insulated building energy efficiency system	80%-90% less energy consumption than conventional buildings, comfortable, low-carbon and cost saving
5	Sound insulation	Exterior wall and window system have a superior sound insulation effect	Superior urban noise isolation, making the indoor space a retreat from the outside world
6	Air	BROAD Fresh Air System	Indoor air is 100 times cleaner than that outdoors, creating a healthy indoor environment

Key New Materials

No	Item	Material	Distinctive advantages
1	Structure	Stainless steel B-CORE slab and section bar	High durability, earthquake resistance (no concrete at all)
2	Roof	Stainless steel B-CORE slab	Permanent prevention of rain leakage, can be used for recreation area as swimming pool, green space or solar energy facility installation site
3	Water supply pipe	Stainless steel	Durability, quality water
4	Interior and exterior wall	Zinc galvanized steel slab with rock wool	Thermal and sound insulation, rain-proof, aesthetic and sturdy
5	Glass	Ultra-clear glass(tempered)	High transparency and no color reveal clear outdoor views
6	Floor, door, window frame	Bamboo wood	Renewable resources, solid and steady, aesthetic
7	Exterior sunshade	Electric blinds inside the pane	Energy efficiency, light dimming, gale resistance
8	Indoor thermal shade	Electric fiber honeycomb blinds with aluminum foil	Energy efficiency, sound insulation, shading

BROAD Factory-made Building: A Brief History

- In 2009, BROAD developed the factory-made steel-structured building, achieving a construction speed of three storeys per day.
- In 2010, in just one day, BROAD built a 6-storey BROAD Pavilion at Expo Shanghai.
- In 2015, BROAD built a 57-storey skyscraper in just 19 days
- BROAD built 58 factory-made buildings in 6 years, achieving the sustainable goal of Magnitude 9 earthquake resistance, 5 times higher energy efficiency, and indoor air quality 100 times cleaner than outdoor air
- In 2018, BROAD developed the BROAD stainless steel B-CORE slab, replacing carbon steel with stainless steel and halting production of carbon steel structure buildings
- In 2021, BROAD successfully developed the Holon Building, which has triggered the global initiative of "1000-year Holon Building protecting humanity"

2. Building Rated Parameters (Common standard)

No	Items	Parameters	Notes
1	Room module transport dimensions	12,190 x 2,438 x 3,000 mm	Shipped as a standard 40ft container (actually no container is needed)
2	Room module installation dimensions	12,190 x 4,876 x 3,000 mm	The installation and transport dimensions for lift modules are the same
3	Module transport weight	Room module ≤ 15t, stair ≤ 11t	Stowage materials and tools are included
4	Building floor height	3 m (clear height 2.77 m)	Height of the non-standard floors can be 6 m, 9 m, 12 m
5	Structural material	Stainless steel (30 times more resistant to corrosion than carbon steel)	floor slabs are made of BROAD B-CORE slab while columns are composed of stainless steel channel and square tubes
6	Standards applied	Conform to the local building standards	A basic premise: approval by local building departments
7	Insulation K-value	Exterior wall 0.2 W / m² ℃ Roof 0.16W / m² ℃	Rock-wool insulation thickness 220 mm (40 times better than that of reinforced concrete)
8	Window K-value	≤ 1.4 W / m² ℃	4-paned large windows, 3-paned small windows
9	Additional thermal isolation	Exterior sunshade, indoor thermal shade	Fresh air heat recovery efficiency 80%
10	Energy calculation	Separate metering	Water, electricity, fresh air system and A/C consumption are calculated independently by each household
11	Indoor temperature	Winter 23 ℃, Summer 24 ℃	Occupants are able to adjust the temperature in each room
12	Fresh air volume	≥ 40 m³ / person / hr.	Or 3 m³/m²/h (CO_2 concentration limit 800-1200 ppm)
13	Air freshness	100% fresh air	No mixed return air (fresh air heat recovery rate 80%)
14	Fresh air cleanliness	PM2.5 filtration efficiency 99.9%	Indoor air is 100 times cleaner than that outdoor air
15	Building energy consumption (A/C, fresh air system)	13 kWh / m² · a (in areas with hot summer and cold winter)	Chilly area: 27 kWh, cold area: 22 kWh, hot summer and warm winter area: 16 kWh, mild area: 4 kWh
16	Standard delivery items	Turnkey project: including building construction, MEP, and decorations	Excluding foundation and other engineering works outside the building

3. Energy Efficiency Calculations

medium apartment as example, building area 135 m²

Climate Zone			Chilly		Cold		Hot summer & cold winter		Hot summer & warm winter	Warm	
			Harbin, Baotou, Moscow, Ottawa		Beijing, Lanzhou, New York, Tokyo		Shanghai, Changsha, Rome, New Delhi		Guangzhou, Taipei, Dubai, Rio	Kunming, Guiyang, Sydney, Nairobi	
Heating & cooling demand	Item	Parameter	summer	winter	summer	winter	summer	winter	summer	summer	winter
	Exterior wall	66 m² K=0.2 W / m² K	427	2004	730	1431	1459	820	2189	27	577
	Window	36 m² K=1.4 W / m² K	305	1431	510	1022	1020	448	1530	42	336
	Fresh air	200 m³ 80% heat recovery	129	407	348	332	464	277	835	12	146
	Lighting	100 W LED 3.3 W / m²	26	-96	70	-78	93	-65	167	12	-48
	Personnel	500 W per 5 people	75	-265	202	-216	269	-180	484	34	-135
	Electrical	600 W Including kitchen appliances and furniture	87	-324	233	-264	311	-220	560	39	-160
	Total	kWh / a	1047	3158	2092	2227	3574	1080	5765	166	716
Heating & cooling demand / m²		kWh / m² a	7.7	23.4	15.5	16.5	26.5	8.0	42.7	1.2	5.3
A/C power cons.	Total	kWh / a	3345		2701		1499		1863	276	
	Annual average	kWh / m² a	24.7		20.0		11.1		13.8	2.0	
Fresh air power cons.	Total	kWh / a	235								
	Annual average	kWh / m² a	1.7								
Total annual		kWh / a	3580		2936		1734		2098	511	
Annual / m²		kWh / m² a	26.5		21.7		12.8		15.5	3.7	
Equivalent to primary energy		kWh / m² a	68.9		56.5		33.4		40.4	9.6	

Note:
The above calculation is based on "Calculation Standard for Building Carbon Emissions" GB/T 51366-2019. Annual power consumption per square meter of conventional non-energy-efficiency building is 90kWh/m²a (in areas with hot summers and cold winters). Assuming that 1kWh emits 1kg carbon dioxide and 1 tree absorbs 18.3kg CO_2 emissions yearly, one household of 135m² in the Holon Building will reduce CO_2 emissions by 11t yearly, the equivalent of planting 600 trees.

4. Building Structure Carbon Emission Comparisons

Calculated by 3000m² building

Item	The Holon Building	Reinforced Concrete Building
Material Manufacturing	992t	945t × 20 times=18900t
On-site installation	6.6t	50t × 20 times=1000t
Total in 1000 years	999t	995t × 20 times=19900t
Reduced Carbon emission of the Holon Building: 18901t		Reduced Carbon emission rate: 95%

Calculation basis:
1. Life span of the Holon Building is 1000 years, and that of concrete building is about 50 years. Waste and material recycling is not included in the above table. Recycling rate of stainless steel reaches more than 98% while concrete can hardly be recycled
2. 80Kg stainless steel/m² Holon Building (CO_2 emission 3.5Kg/Kg), in which 30kg for B-CORE slab manufacturing (CO_2 emission 1.69kg/kg). Material production for a 3000m² Holon Building emits 992t CO_2 in total
3. 50Kg stainless steel/m² Concrete Building (CO_2 emission 2.05Kg/Kg) and 1380kg concrete (CO_2 emission 0.154kg/kg). Material production for 3000m² concrete building emits 945t CO_2 in total
4. One tree absorbs 18.3kg CO_2 / year. A 135m² household of Holon Building reduces CO_2 as much as CO_2 absorbed by planting 46 trees annually in 1000-year time

5. Adopted Standards for the Holon Building (China national standards)

No	Name of the standard	Code of the standard
1	Technical standard of stainless steel core plate building structure	T/CSUS 14-2021
2	Technical specification for stainless steel structures	CECS 410:2015
3	Load code for the design of buildings	GB 50009-2012
4	Code for seismic design of buildings	GB 50011-2010
5	Technical standard for assembled buildings with steel-structure	GB/T 51232-2016
6	Code for welding of steel structures	GB 50661-2011
7	Mechanical properties of fasteners-stainless steel bolts, screws & studs	GB/T 3098.6-2014
8	High strength stainless structural steel for constructions	GB/T 37430-2019
9	Code for fire safety of steel structures in buildings	GB 51249-2017
10	Code of design on building fire protection and prevention	GB 50016-2014(2018 version)
11	Uniform standard for design of civil buildings	GB 50352-2019
12	Standard for electrical design of civil buildings	GB 51348-2019
13	Design code for heating ventilation and air conditioning of civil buildings	GB 50736-2012
14	Standard for design of building water supply and drainage	GB 50015-2019
15	Technical standard for nearly zero energy buildings	GB/T 51350-2019
16	Design standard for energy efficiency of residential buildings in severe cold and cold zones	JGJ 26-2018
17	Double skin metal faced insulating panels for building	GB/T 23932-2009
18	Standard for acceptance of construction quality of steel structures	GB 50205-2020
19	Container inspection code	2021 version

6. Project Documentation List

No	Name	Submission Deadline	Holon	Client	No	Name	Submission Deadline	Holon	Client
1	Purchase Contract	The signing day	▲	▲	19	Building Modules Stacking Site Plan	30 days before shipment	○	▲
2	Architectural Drawing	The signing day	▲		20	Installation Plan and Nontice Board	30 days before shipment	▲	○
3	Technical Parameters list	The signing day	▲		21	Foundation Acceptance Report	30 days before installation	○	▲
4	Building Standard	The signing day	▲		22	Acceptance Report of Exterior Roads, Water, and Electricity Supply	30 days before installation	○	▲
5	Comfort Standard	The signing day	▲		23	Installation Condition Confirmation Table	30 days before installation	○	▲
6	BBA Specifications	The signing day	▲		24	Production Inspection Report	1 day before shipment	▲	
7	Scope of After-Sale Responsibilities	The signing day	▲		25	Modules Stowage List	The day of shipment	▲	
8	Main Materials List	20 days after the contract takes effect	▲		26	Packing List	The day of shipment	▲	
9	Decoration list	20 days after the contract takes effect	▲		27	Delivery Checklist	2 days after arrival	○	▲
10	MEP Devices List	20 days after the contract takes effect	▲	○	28	Installation Inspection Report	7 days after installation	▲	
11	Structural Calculation Workbook	20 days after the contract takes effect		○	29	Indoor Air Quality Detection Report	7 days after installation	▲	○
12	Building Appearance	20 days after the contract takes effect	▲	○	30	Construction Supervision Report	7 days after installation		▲
13	Foundation Plan	20 days after the contract takes effect	▲	○	31	As-Built Drawing	7 days after installation	▲	○
14	Building exterior Water and Electricity Supply Plan	20 days after the contract takes effect	▲	○	32	Completion Acceptance Report	7 days after installation	▲	▲
15	Foundation Construction Drawing	60 days after the contract takes effect	○	▲	33	Building Operation Guide	7 days after installation	▲	
16	Construction Drawing of Exterior Roads, Water, and Electricity Supply	60 days after the contract takes effect	○	▲	34	Technical manual for building maintenance	7 days after installation	▲	
17	Construction Permit (official)	60 days before installation	○	▲	35	Supporting Equipment Maintenance Documents	7 days after installation	▲	
18	Transportation Plan	30 days before installation	▲	○	36	Official Approval Documents	30 days after installation	○	▲

Note:
▲ refers to the drafter, ○ refers to the cooperating party. Translation time for languages other than Chinese and English is not calculated

7. Residence Level List

No	Item	Standard	Upscale	Luxury
1	Interior finish	Standard equipment	Standard equipment	Per client's request
2	Kitchen set	None	Cupboard, range hood, electric cooker, reverse osmosis water	Per client's request
3	Sanitary fittings	Standard equipment	Standard equipment	Luxury hardware, intelligent toilet, large bathroom
4	Lighting	Standard equipment	Standard equipment	Per client's request, brightness and color can be adjusted
5	Switch	Standard equipment	Dual control switch: entrance of each room, bedside and sofa	Dual control switch: entrance of each room, bedside, sofa and over the table
6	Socket	Standard equipment	It is added based on the needs	It is added based on the needs
7	Sound insulation	Standard equipment	Ceiling is added with sound-absorptive slab	Sound-absorptive slabs are added to ceiling and walls, adhesive tapes are affixed to doors and walls
8	Control	Standard equipment	BBA system	BBA system
9	Detection	Standard equipment	Indoor and outdoor air quality detection at any time	Indoor and outdoor air quality detection any time
10	Security & prevention	Standard equipment	Surveillance in public areas, access control, visitor's video	Per client's request
11	exterior finish	Standard equipment	Standard equipment	Per client's request
12	Fixtures	None	None	Per client's request
13	Furniture	None	None	Per client's request
14	Price	Low (1)	Middle (1.6-2)	High (3-5)

8. Material Parameters

CAT	No	Item	Main Material	SPECS	Remarks
Structure	1	column	S32001	C360x180x8、12、16、20、24	Wall thickness of columns and beams is determined by structure calculation
	2	cross beam	S32001	Wall THK: 4、6、8、10、12	BXG1000 applies for super high-rise
	3	corner fittings	QN1701	454x266x230	Flange to connect the upper and lower, left and right columns and beams
	4	floor slab	panel:304DL, core tube 304L filler:rock wool 120kg/m³	A1.5 L:11640 W: 2 m / 2.6 m	BROAD B-CORE slab δ 1.5\ core tube Φ 51 x 0.3
	5	hoisting frame	QN1701	U30x30x2.5	/
	6	balcony	floor slab: 304DL,core tube 304L handrail:304 Laminated tempered glass	B 1.5-80 Φ 42 x 1、□ 20 x 1、 5 + 0.76 PVB + 5	BROAD B-CORE slab δ 1.5\ core tube Φ 51 x 0.3 Glossy /
Wall	7	firewall	reinforced calcium silicate slab rock wool 120kg / m³	δ25 δ50	wrapping columns and beams
	8	exterior wall	zinc galvanized steel slab and rock wool 120kg/m³	exδ0.7 inδ0.4 δ220	Fluorocarbon paint (UV resistant) Hydrophobic structure rock wool
	9	interior wall	zinc galvanized steel slab and rock wool 120kg/m³	δ0.4 δ60	PE Paint Water repelling structure rock wool
Door & Window	10	balcony window	Frame: QN1701 Glass: 4-layer tempered hollow glass	□100x60x3 2-6+16Ar+6	interior: filling with polyurethane; exterior: extruded board for insulation, δ 15 Ultra clear glass (2420 x2290)
	11	bay window	top and bottom panel:SUS304 Frame: QN1701 Glass: 3-layer tempered hollow glass	δ0.8 L63x4、L40x4 6+9Ar+6+9Ar+6	/ Ultra clear glass (1710 x2290)
	12	square window	Frame: aluminum alloy of DuanQiao type Glass: 3-layer tempered hollow glass	70 series 5+9Ar+5+9Ar+5	Fluorocarbon powder Ultra clear glass
	13	window casing	bamboo wood slab	δ9	Grade E/0 / E/1
	14	sunshade	blinds:aluminum alloy	W of exterior part:50 W of hollow curtain:16 THK:50	Wireless switch Intelligent and energy-saving control Motor noise<30dB
	15	thermal insulation shade	Electric fiber honeycomb-type blinds with aluminum foil No light getting through with aluminum foil on back side.		
	16	entrance door	steel, PE paint	1050x2330	fireproof rating:B
	17	interior door	bamboo wood slab, varnish	800x2330	Grade E_0 / E_1
	18	staircase door	steel and fireproof	1050x2330	fireproof rating:B
Pipe&tube	19	ventilation	EPP	δ15	combustion retardant grade:B1
	20	water supply	304	ϕ8×0.6,ϕ16×0.8,ϕ20×0.8,ϕ25×0.8 ϕ40×1.0,ϕ50.8×1.0,ϕ76×1.5,ϕ101×1.5	hydraulic test:4Mpa
	21	drainage	UPVC	dn20,dn32,dn50,dn75, dn110,dn160	hydraulic test:0.1Mpa (sewage, waste water and rain included)
Electric related	22	electric wire	plastic wrapped copper	RV0.5~RV6、YJV BVR10	fire protection cables are fire-resistant.
	23	telecom line	plastic wrapped copper	RVS、AWG24×4、AWG24×2	
	24	internet cable	plastic wrapped copper	CAT5e	
	25	optical fiber	fiberglass	Butterfly-type, double core	Low-smoke halogen-free flame retardant sheath
	26	switch	PVC shell	wireless	Self-powered (battery free)
	27	luminaire	LED	color TEMP.:3100~100k	luminous efficiency ≥ 1501m/W
	28	socket	PVC shell	10A、16A	Five-hole, three-hole, two-hole
Electro-mechanical	29	elevator	steel, aluminum	load:1050KG	Kone or other top brands
	30	fresh air system	aluminum,carbon steel,EPP	260 m³/h	BROAD
	31	air conditioner	steel,copper, aluminum	5kW	top brands
	32	water heater	steel, EPP	60L/70℃	top brands
	33	kitchen ventilator	stainless steel	900×500	top brands
	34	RO water purifier	multiple	50 gallon	top brands
Finishing	35	room floor	bamboo materials	δ15	Grade E_0 / E_1
	36	washroom floor	PVC glue	δ2	slip protection grade:Ad,Bw (same for staircase floor)
	37	skirting line	aluminium alloy	60×12	washable
	38	interior roof	PVC patterned wallpaper	δ1.2	washable
	39	ceiling	fire-resistant plasterboard (indoor side) with rock wool above.	δ9.5 δ50	fire resistant for 1.5h
Sanitary ware	40	wash basin	basin facet: rock sheet basin: ceramics faucet: 304 basin cabinet: bamboo board mirror: ultra clear glass with silver plating mirror cabinet: paint-free board	δ15 520×390 155×150 785×260×380 600×900 460×760	No scratches on the surface if by hard objects dirt resistant / grade E_0,E_1 tempered grade E_0,E_1
	41	toilet	ceramics, PP board	720x370x700	3L / 4.5L 2 gears
	42	bathtub	acrylic	1600x750x570	wearproof, dirt-resistant
	43	shower basin	acrylic	850x1150x270	wearproof, dirt-resistant
	44	shower head	abs,chroming	ϕ80	/
	45	faucet	304	with drainage downwards	/
	46	towel rack	304	/	same for tissue rack
	47	mirror	ultra clear glass with silver plating	δ5	tempered
Kitchen ware	48	cabinet	damp proof slab	900x570x740	Grade E_0 / E_1
	49	table slab	quartzite	δ15	wearproof, dirt-resistant
	50	S basin	304	680x450x220	Nano protection film
	51	faucet	stainless steel	pulling type	2-level control
Public section	52	stair treaded side	B-CORE slab:304DL filling rock wool	A1.5	BROAD B-CORE : panel δ 1.5, core tube Φ 51 x 0.3
	53	stair rise side	QN1701	δ4	/
	54	stair handrail	frame:304 glass:laminated	Φ42x1、□20x1 5+0.76PVB+5	glossy /
	55	roof slab	B-CORE slab:304DL filling rock wool	A1.5	BROAD B-CORE:panel δ 1.5,core tube Φ 16 x 0.12
	56	guardrail	304	Φ76x3、ϕ42x1、ϕ20×1	roof guardrail:glossy
	57	short column pier	S32001	600×420×522	multiple options

Appendix 1: Adhesive Paint Parameters

No	Item		Material	FORMALD CONT g / kg	VOC CONT g / L	Yielding strength
1	weather-proof sealant	exterior window interior door gap filler	neutral silicone	solvent type:≤0.25 waterbase type:≤0.5	solvent type:≤300 water-base type:≤100	HM,23℃ >0.4 Mpa
2	structure sealant	exterior window gap filler	neutral silicone	solvent type:≤0.25 waterbase type:≤0.5	solvent type:≤300 water-base type:≤100	23℃: ≥ 0.6 Mpa
3	Mildew-proof sealant	washroom and bamboo floor gap filler	neutral silicone	solvent type:≤0.25 waterbase type:≤0.5	solvent type:≤300 water-base type:≤100	HM,23℃ >0.4Mpa
4	rock wool sealant	to stick with steel panel	PU adhesive	0	solvent type:≤300 water-base type:≤100	25℃,25000 -35000 cps
5	paint		wall(ex): FC wall(in): PE	≤ 0.025		higher than grade 1
6	sealant strip	door & window and water pipes	EPDM	/	/	/

Note: formaldehyde & voc: 50% lower than China standard

Appendix 2: Stainless Steel Parameter

No	Item	Material No.	Corrosion rate g/(m²·h) (neutral salt spray test)	Tensile strength (M pa)	Yield strength (M pa)	Elongation rate %
1	duplex stainless steel	S32001	0.0042	≥ 620	≥450	≥25
2	high strength stainless steel	BXG1000	0.0096	≥ 1200	≥1000	≥20
3	austenitic stainless steel	QN1701	0.0063	≥ 650	≥355	≥40
4	austenitic stainless steel	304DL	0.0047	≥ 650	≥355	≥40
5	austenitic stainless steel	304	0.0046	≥ 515	≥205	≥40

Note: Corrosion rate of carbon steel is 0.916. On this basis, corrosion resistance of stainless steel in Holon building is 95 times higher

9. Comfort Quality Standards

(Achieving the highest global standards in almost all aspects)

No	Subject	Standards and Experiences
1	Space Comfort	1) Maximum size of room without columns and walls can reach 11.7m x 4.8m, which can be separated into several rooms flexibly 2) Clear height of room is 2.77m. Clear height of bath is 2.33m 3) Net usage rate of the Holon Building is 3-6% higher than conventional concrete buildings
2	View Comfort	1) The size of flat windows and bay windows is 2.4mx2.4m. Bay window offers a 180°panoramic view 2) Ultra-clear glass is used. 4-paned colorless window has better transparency than single paned, with super clear outdoor view 3) Argon filling rate of the insulating glass ≥99%, no fogging
3	Sunlight Comfort	1) Ultra-clear glass preserved the color and intensity of sunlight 2) Sun shines into triangular bay window from sunrise to sunset. In winter, the building can absorb a lot of sunlight to save energy 3) Automatic exterior sunshade is set for every window. Angles of blinds are adjustable to change illumination intensity 4) Interior thermal shade blocks sunlight by more than 99.5%. It feels like night time inside even when sleeping during daytime
4	Lamplight Comfort	1) All light is slightly warm with the color temperature in the range of 3100~100k, making a sweet and warm room environment 2) 3-5 lightingswitches for option, which are convenient to adjust room brightness 3) The bath is equipped with lower night light
5	Air Cleaness	1) BROAD Fresh Air Machine filters PM2.5 by 99.9% (1000 times) to ensure: a.Indoor air 100 times cleaner than air outside, improving health significantly b.Desks are dust-free, no need to clean for 1 month. Walls and ceiling finish stay new for 40 years. c.Fresh Air Machine filters PM2.5 by 1000 times, air tubes of A/C and fresh air machine do not collect dust or breed bacteria. 2) Electrostatic cleaner in Fresh Air Machine sterilizes air to keep virus and pollen outside the house, while ensuring that indoor ozone concentration is lower than outside. 3) Fresh air is sent into the room and exhaust air is expelled from the bath and kitchen. Negative pressure is always maintained in the bath and kitchen. Moisture and unpleasant odor will not float into the room by no means. 4) All drains in bath and kitchen are equipped with water seals≥ 80mm, ensuring no air return, no unpleasant odor and no contagious virus. 5) Bamboo flooring seams are filled with mildew-proof sealant, ensuring zero dirt build-up or bacteria. 6) The super insulation performance of the external walls and windows guarantee no condensation and no mildew breeding 7) Water and electricity pipe holes between floors and households are 100% sealed to keep out rats, cockroaches and ants 8) Range hood is equipped with a glass cover, which expels more than 90% oil fume 9) PM2.5 detector is equipped in every household. Indoor and outdoor PM2.5 can be detected in 30 seconds.
6	Air Freshness	1) Fresh Air Machine brings in 100% outdoor air, no mixed return air. The air is fresh, eliminating odor cross infection and prohibiting virus spreading. 2) Fresh air volume ≥3m³/m²·h, ensuring indoor CO_2 concentration ≤1000 ppm 3) CO_2 sensor is an optional configuration to monitor real-time air oxygen content 4) Positive pressure is always maintained inside the room. Dirty air from the aisle and outdoor can not enter the room through the gap, thus isolating mosquitoes outside 5) After a period of residence, residents realize the beauty of life without opening windows. In most cases, compared with opening windows, the air would be fresher when windows are closed, as the fresh air machine blows in fresh air 24h constantly guaranteeing sufficient ventilation volume than opening windows
7	Thermal Comfort	1) High insulation (22cm rock wool in exterior wall equals concrete wall of 9m). Multi-layered vacuum glass windows: 4-paned large window and 3-paned small window. Exterior wall and windows are thoroughly insulated with broken bridge structure, guaranteeing no thermal radiation and unwanted sunshine from west side in summer and no cold radiation in winter 2) Sunshades descend automatically when sun shines into the room in summer. When the room is empty or residents are sleeping, thermal shades descend automatically (insulating heat as much as a concrete wall of 2m) 3) Fresh air machine is equipped with high efficiency heat exchanger, which recovers 80% of the exhaust heat. Temperature difference between incoming fresh air and indoor temperature is only 2℃ 4) A/C is equipped independently in every household to keep a constant temperature
8	Wind Comfort	1) The vents of A/C and Fresh Air Machine are positioned away from main living spaces 2) Due to Holon Building's super energy efficiency, A/C load are reduced by 5~10 times and A/C air flow volume reduced by 5~10 times

No	Subject	Standards and Experiences
9	Humidity Comfort	1) The function of dehumidification keeps the indoor humidity <60% 2) No condensation on the inner side of the external wall and windows. Proper indoor humidity is maintained in winter Notes: To maintain a humidity ≥30% in dry areas all year round, choose a humidifier (installed inside the Fresh Air Machine or A/C)
10	Quiet Comfort	1) Completely cut off outdoor noise (much better than National standards of China) a.external walls: Double steel plate and 22cm rock wool with sound reduction index of 50dB b.4-paned large windows and 3-paned small windows. 3 layers of sealing strips in windows, balcony doors and entry door. Sound reduction index is 40dB when thermal insulation shades lowered and45dB when it is closed c.Ventilation is guaranteed by the Fresh air system. No need to open windows, thus isolating outdoor noise (Side effect: residents inside may become extremely sensitive to indoor noise) 2) Interior walls: Double steel plate and 7.5cm rock wool with sound reduction index of 35dB in rooms and 45dB between households (qualified with National Standard of China) 3) Floor plates are made of double steel plate, 1 layer of fireproof plate and 20cm rock wool. Sound reduction index is 55dB(qualified with National Standard of China) 4) All blocks, windows and joints in floor plates are sealed by continuous gluing at both sides. Photos of the field installed ceiling decoration strips, undetectable glued parts in baseboards are saved and archived, which guarantees good quality and standardized installation 5) Air Conditioner and Fresh Air Machine are installed outside the bedrooms. Sleeping will not be interrupted anyway 6) Extreme low A/C Load, only 10%-20% of that in traditional buildings. Extremely low noise. 7) Drain pipes are separated with double steel plates and 7.5cm rock wool. Bedrooms are free of noise 8) Mute door lock tongue and door spring of low elasticity , with extremely quiet opening and closing sound
11	Bath Comfort	1) Individual hot water system is set in every household unit, with hot water supply 24 hours a day 2) Hot water comes in 5 seconds after the faucet turned on. 3) Hot and cold water share the same water pressure. Water temperature don't fluctuate when the faucet is opened suddenly in the neighboring room
12	Electrical Outlets	1) All wireless switches for lighting and sunshade can be located at anywhere the residents want 2) Lighting, A/C and fresh air machine will be closed automatically 1 hour after people leave 3) Inductive switches are applicable for lights in stairwell, entrance, and baths 4) If the window and balcony door opens, A/C and Fresh Air system will be closed automatically in 30 minutes. 5) Every household has Wifi and stable internet signal. TV can be set anywhere 6) Every household is equipped with BBA (BROAD Building Artificial) intelligent control system, enabling residents to have visual control to read any information about comfort parameters and energy efficiency
13	Sufficient Power Sockets	1) Every room has 2-5 sockets that are enough for charging lamp, TV and kitchen appliances 2) Extra sockets can be set flexibly by taking wire from baseboard if room layout changes
14	Touch Comfort	1) All switches, buttons and handles are easily operated 2) Smooth touching, no scratch 3) Doors and windows are easy to open and shut with proper weight
15	Furnishing cleanliness	1) All fixtures and adhesives meet European E1 standard, China E0 standard. No formaldehyde and other hazardous materials 2) Fixture surface are stain resistant and can be cleaned simply by water 3) Flooring, doors and windows frame and door pages are made of raw bamboo, which is beautiful and strong
16	Finely crafted Interior	1) Uneven surfaces and color differences are invisible 2) Closing gaps of every corner and border are unified, and precision deviation < 1mm 3) All joints are glued with width of 4 ± 1mm, with delicate outlook
17	Vibration insulation Comfort	1) Floor plate's vibration acceleration < 0.05m/s². Residents feel no vibration from walking. Each floor is an independent module, conducting no vibration 2) Wind vibration acceleration is below 0.2m/s². Residents inside cannot feel the building swaying in strong wind

10. Five Features of Holon Building (The most basic key features)

No	Subject	Features
1	Safety	1) Complete stainless steel structure with high ductility. Reinforced concrete elongation nears zero, whereas stainless steel ≥ 20%. No matter how strong the earthquake can be, Holon will only be deformed in the worst case, and will never collapse 2) An additional escape system is set on the balcony in case of fire emergency, guaranteeing absolute safety 3) Anti-slippery PVC floor is adopted for the bath, protecting against falling down 4) Balcony, stairs handrail and windows are designed to prevent children from climbing 5) Stainless steel is a good conductor. If a direct hit lightning strike happens, it goes directly from the column to the ground without hurting people 6) Leakage protector is set for the electric power to prevent electric shock 7) Double-layer steel slab is used for exterior wall, isolating electromagnetic radiation from the outside 8) Automatic alarm rings if water overflows in the bath or windows are left open on rainy days 9) All edges of window and door frames, window hinges, sanitary fittings and mirrors are smooth, preventing scrapes
2	Endurance	1) Stainless steel building structure, no need for maintenance, provides a 1000-year life span 2) Stainless steel roof, which can be used for a range of activities. The roof is resistant to abrasion and retains no water build up or leakage 3) Exterior wall uses zinc galvanized slab and fluorocarbon paint and wall gaps are glued with silicon weather-resistant sealant, which will prevent deterioration. interior wall is made of zinc galvanized slab and PE paint, which can be washed simply by water 4) Stainless steel drainage pipes are extremely durable
3	Economical	1) The whole building is composed of stainless steel structures, including column, beam, slab, balcony, window frame, stairs, roof and handrail, retaining a 1000-year life span. The depreciation cost of Holon is extremely low, due to the material longevity and the fact that the construction materials can be 100% recycled for future use even if the building is scrapped ahead of schedule. Therefore, Holon Building leaves a precious legacy for our future generations 2) The non-structural parts of the building are also made of durable materials, which is prefabricated in the factory with high quality. The maintenance cost of the building will be extremely low 3) Highly insulated walls, 3 or 4 paned windows, exterior sunshade, interior thermal shade and fresh air heat recovery makes A/C consumption in Holon Building 80~90% lower than that of conventional buildings, saving a lot of consumption cost for residents
4	Easy Maintenance	1) Fresh Air Machine and A/C can be easily disassembled and filters inside can be easily cleaned 2) Easy access door for electric equipment and pipeline maintenance 3) Holon Building is 100% factory-made, only bolting installation and gap gluing of the walls are required on site, eliminating maintenance caused by quality defects 4) Maintenance manual is complete, clear and simple, delineation of responsibility
5	Easy Redecoration	1) All the interior and exterior walls are non load bearing walls. After construction is completed, walls, doors and even the windows can be easily moved if necessary 2) The position and dimension of balcony and bay window can be changed after construction is completed. If necessary, rooms with depth ≤4m, large balcony, swimming pool or botanic garden can be inserted into the house. (Recalculation should be done by a structural engineer if the added load is over 20t) 3) Floor slab is made of BROAD's stainless steel B-CORE slab with no concrete at all. The slab is easy to be sliced or drilled for adding or removing kitchen and bath pipelines, stairs and elevators. If necessary, the whole floor slab can be removed for retrofitting to a duplex. (maximum dimension 11.6x4.8m. A structural engineer needs to do the stability calculation if it's a high rise) 4) Solar and wind energy generation facilities, swimming pool, water tank and vegetable planting are some of the uses for the roof space(Reserved load 0.7t/m²) 5) Exterior and interior wall uses steel slab paint with adhesion rate of 2Mpa. Finishings such as wall paper, ceramic tile and marble can be applied easily 6) Closet, TVs and finishings ≤20kg/m² and can be easily pasted or mounted(by nails) 7) Wood floor, ceramic tile and marble can applied to the floor slab 8) Containers should be stacked in 6-storey high during shipment to resist sea waves. To accommodate this requirement, any module of the Holon Building can bear the load of a 16-storey building. Thus, low-rise buildings can be easily added to 16-storey buildings in shipment 9) If needed, the whole building can be disassembled and rebuilt in another location(cost increseas by 4%-8%)

11. Typical Residence Parameters

No	Model	Floors	Building height m	Building area m²	Utilization rate %	Static load t	Foundation piers	Carriers	Installation schedule Time(d)	Worker	Crane
1	A2.5-11	11	33	1650	81	495	12	34	8	17	120t Truck crane
2	A4.5-11	11	33	2970	91.5	891	20	57	10	22	120t Truck crane
3	B9-20	20	60	10800	87	3240	30	204	12	86	240t Truck crane
4	B9-32	32	96	17280	87	5184	30	324	16	90	14t Tower crane
5	AX10.5-32	32	96	20160	85	6048	40	325	16	90	14t Tower crane
6	AXJ14.5-64	64	192	43200	85	12960	56	696	32	97	

Note:
1. The number of building floors in the table is the recommended quantity, which can be selected according to the needs of customers, or can be added after construction is completed
2. Static load shall be taken as 300kg/m² in engineering. The foundation drawing will be designed separately according to static load, geological prospecting data and structural calculation, which can be done either by BROAD or local architects entrusted by clients
3. The installation plan may be adjusted according to customer's requirements, workers' proficiency and site conditions

12. Standard Component Table

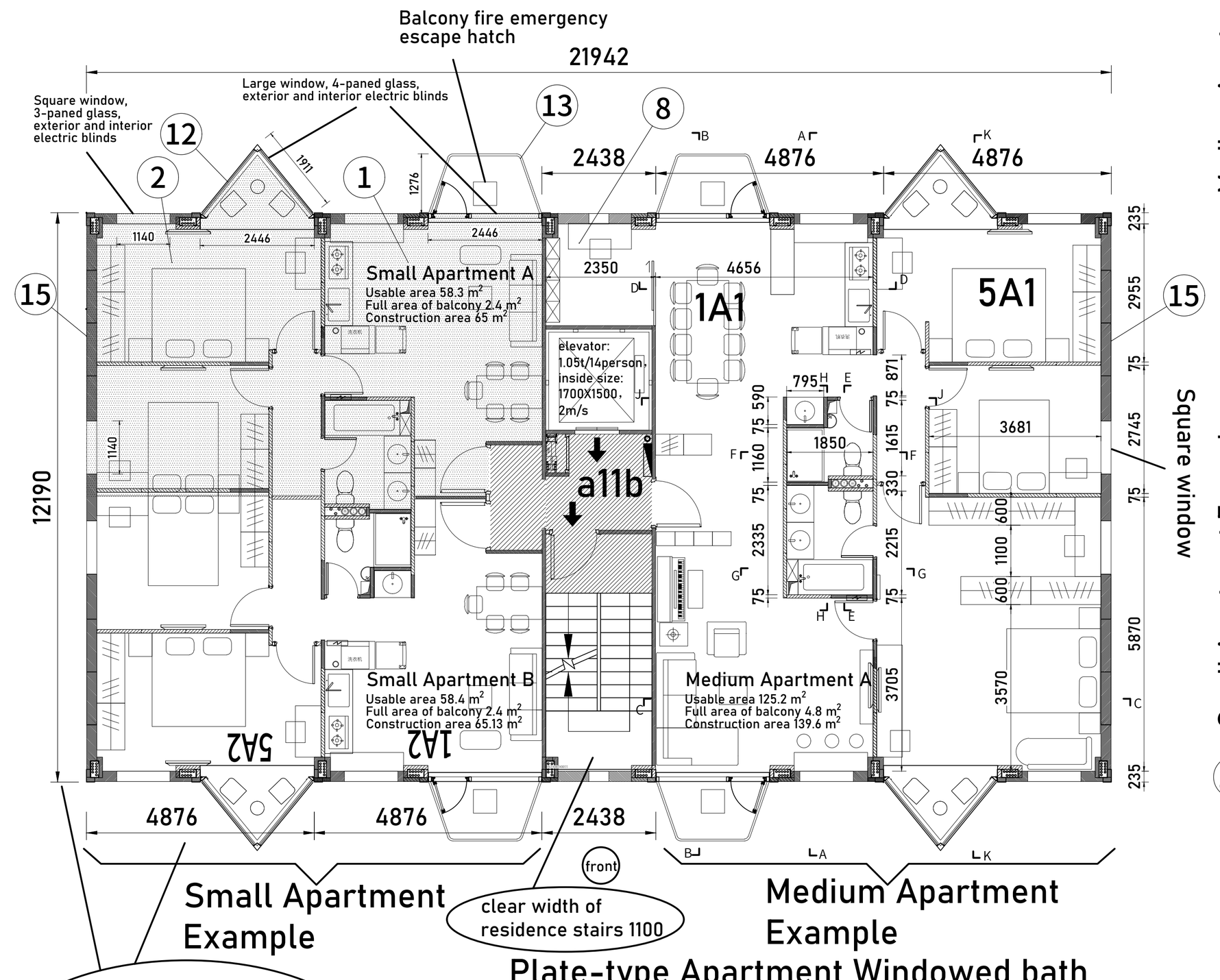
Component	No	Code	Sizes	Notes
Room module	①	1A ▲	12190X4876（H3000）	Including exterior walls and windows, interior doors, sanitary wares, fresh air system, A/C, hot water, and electrical fittings
	②	5A ▲		Including exterior walls and windows, interior doors and electrical fittings
	③ ④	3A ▲ 3B/4B ▲		Including exterior walls and windows, interior doors, sanitary wares, fresh air system, A/C, hot water and electrical fittings
	⑤	5B/6B ▲		Including exterior walls and windows, interior doors and electrical fittings
	⑥ ⑦	11A 13B/14B		Including exterior walls and windows, interior doors, sanitary wares, fresh air system, A/C, hot water and electrical fittings
Stair module	⑧	a11 ▲	12190X2438（H3000）	1 elevator and 1 stair, exterior walls and windows, interior doors and electrical fittings
	⑨	a21 ▲		2 elevators and 1 stair, exterior walls and windows, interior doors and electrical fittings
	⑩	a02		2 stairs, exterior walls and windows, interior doors and electric fittings
	⑪	a00		including interior doors and electric fitting(no stairs and lift, into a half room module)
Triangular bay window	⑫	QJP	2420X1310X2290	4-paned window with electric exterior sunshade, interior thermal shade, and roller shades. Total 5 pieces
Balcony/window	⑬	QZY	2420X2290	4-paned window with electric exterior sunshade and interior thermal shade
Three windowed wall	⑭	QCC/QCD	11980X2978X220	Thermal insulating layer 220mm, 1 casement window, 1 bay window and 1 square window
Two windowed wall	⑮	QCA	11980X2978X220	Thermal insulating layer 220mm, 2 square windows
Roof package	⑯	RA	12150X2400 Roof and top floor are of the same area after installation	Including roof, guardrail, hanger rod and rain gutter etc. Residents have access to the roof. Swimming pool, solar energy equipment and garden can be constructed
Short column pier *	⑰	GY-C	h 750	Pier height 0.522 m, including thermal insulation
High column pier *	⑱	GY-H	h 3m,4.5m,6m,9m	3/4-paned glass curtain wall can be added
Sewage system *	⑲	GY-W	mutiple SPECS	Configured per building size and function
Entrance lobby *	⑳	GY-K	9800X4000X4500	located at the entrance of G floor

Note: ▲ is the recommended module.Items marked with * are optional and can be built by clients

13. Typical Residential Unit Layout

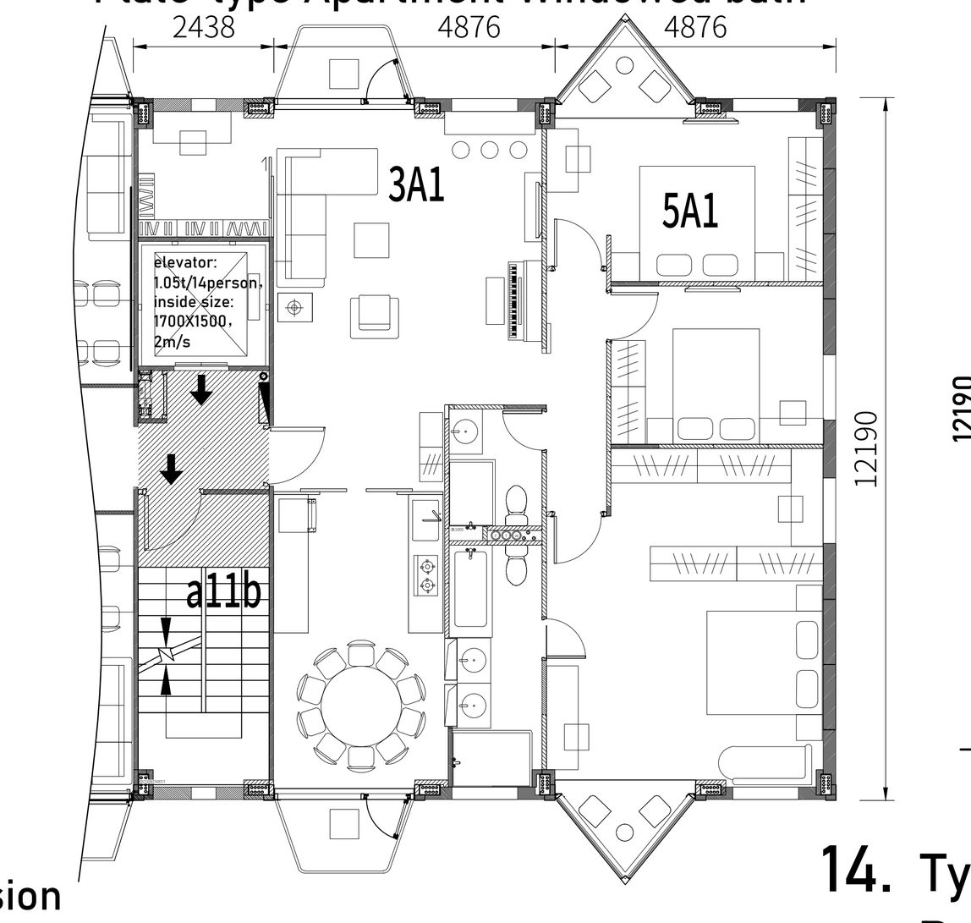
Layout instructions:
1. Please read the layout instructions carefully and understand the module combination rule. You can also have your desired layouts by different combinations
2. Design of kitchen is the key to layouts, involving pipelines, mechanical and electrical equipment, complex door design on the interior walls and doors. We recommend no changes to these parts unless it is really necessary, or it could increase cost substantially
3. All walls are non-load-bearing and can be easily changed after construction
4. Windows and balconies on the exterior wall can also be easily added or reduced after construction , and the size can also be changed
5. Duplex structure can be done according to customer requirements (Floor Height: 6m)

Plate-type Apartment A4.5 ≤16F Windowless Bath
271.9 m²/F Utilization rate 91.5%

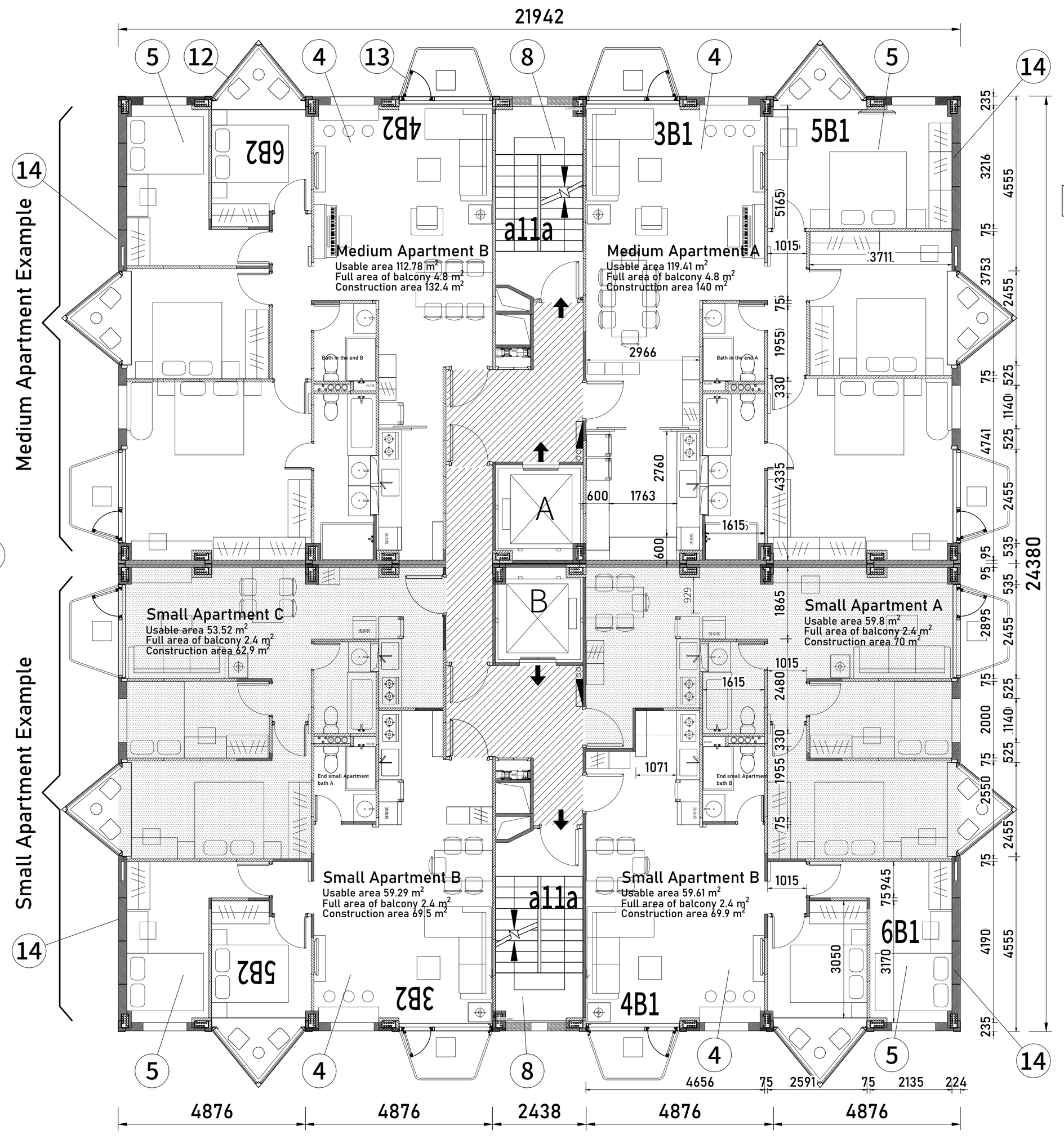


There're no bearing structure within any space of 12.19x4.876m. interior walls and doors and exterior walls and windows can be added freely (during or after construction)

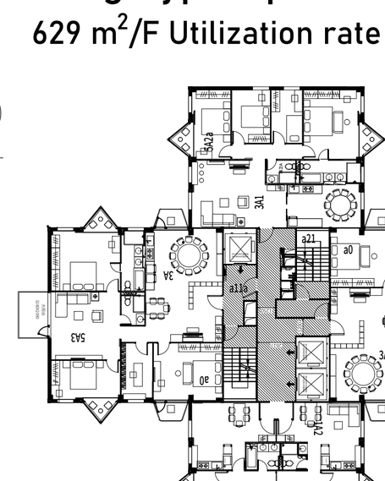
Plate-type Apartment Windowed bath



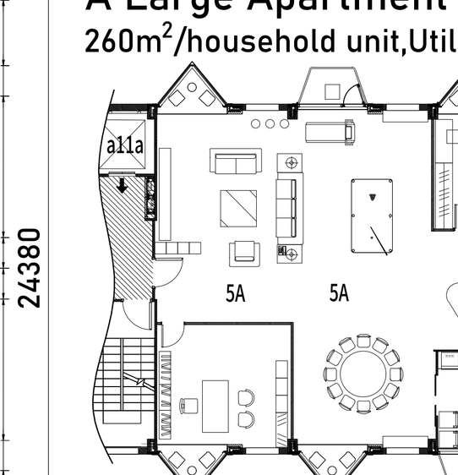
Tower-type Apartment Model: B9 ≤32F
544.6 m²/F Utilization rate 87%



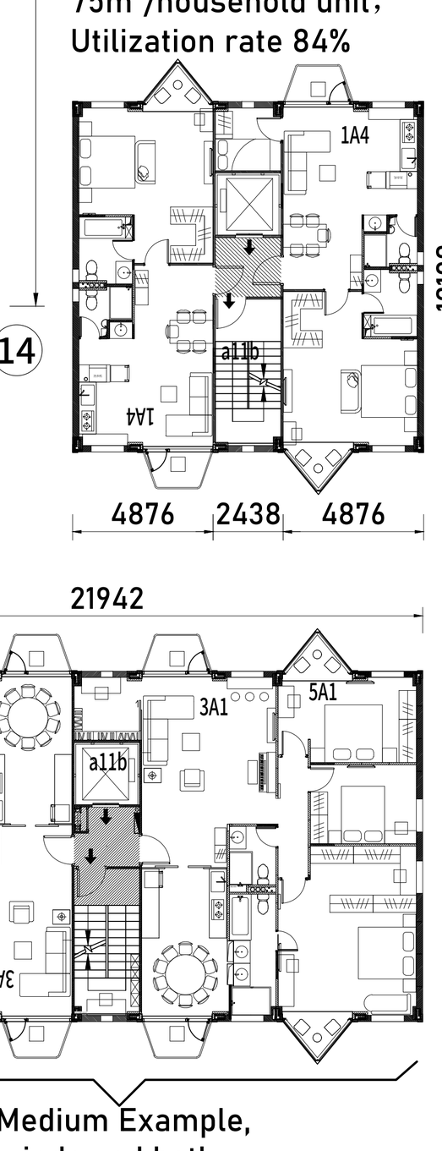
Wing-type Apartment AX10.5 ≤32F
629 m²/F Utilization rate 85.2%



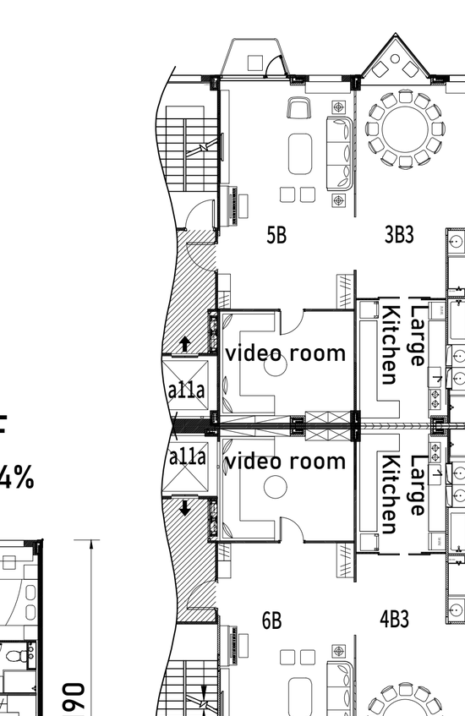
A Large Apartment A8.5 ≤16F
260m²/household unit,Utilization rate 92.4%



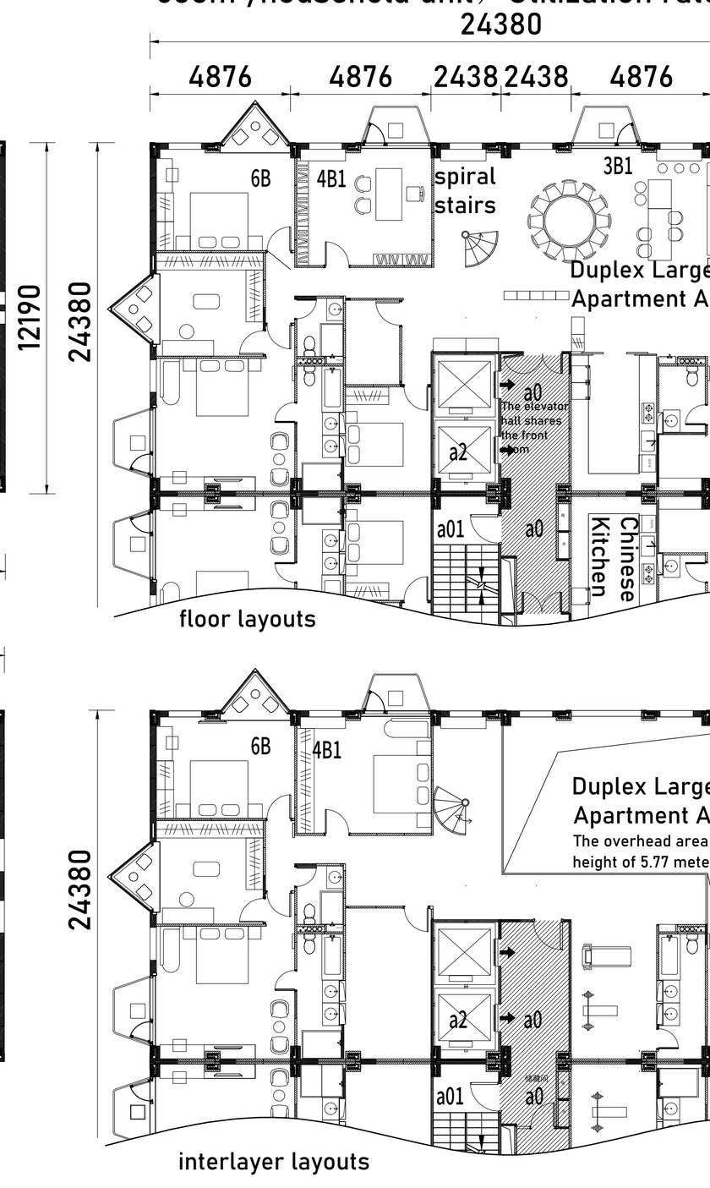
A Small Apartment A2.5 ≤16F
75m²/household unit, Utilization rate 84%



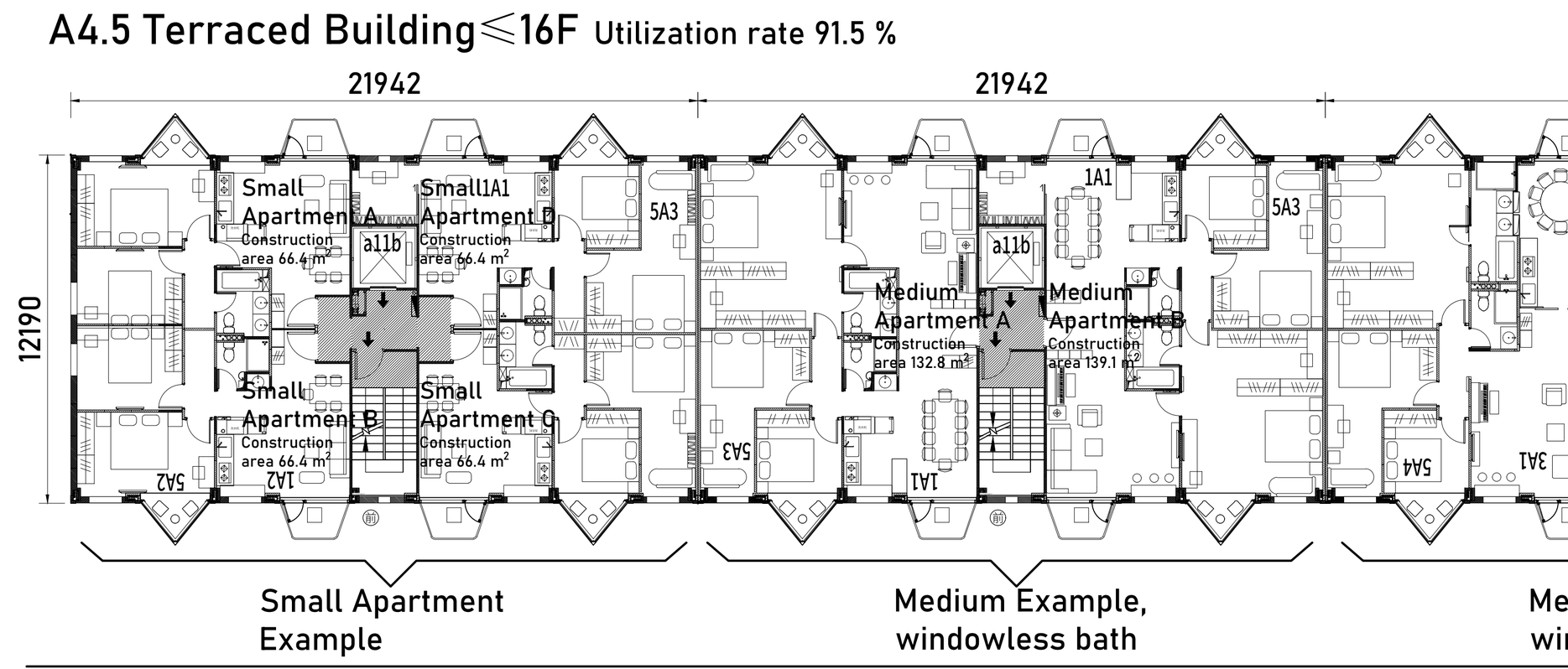
B Large Apartment B13≤32F
260m²/household unit, Utilization rate 90%



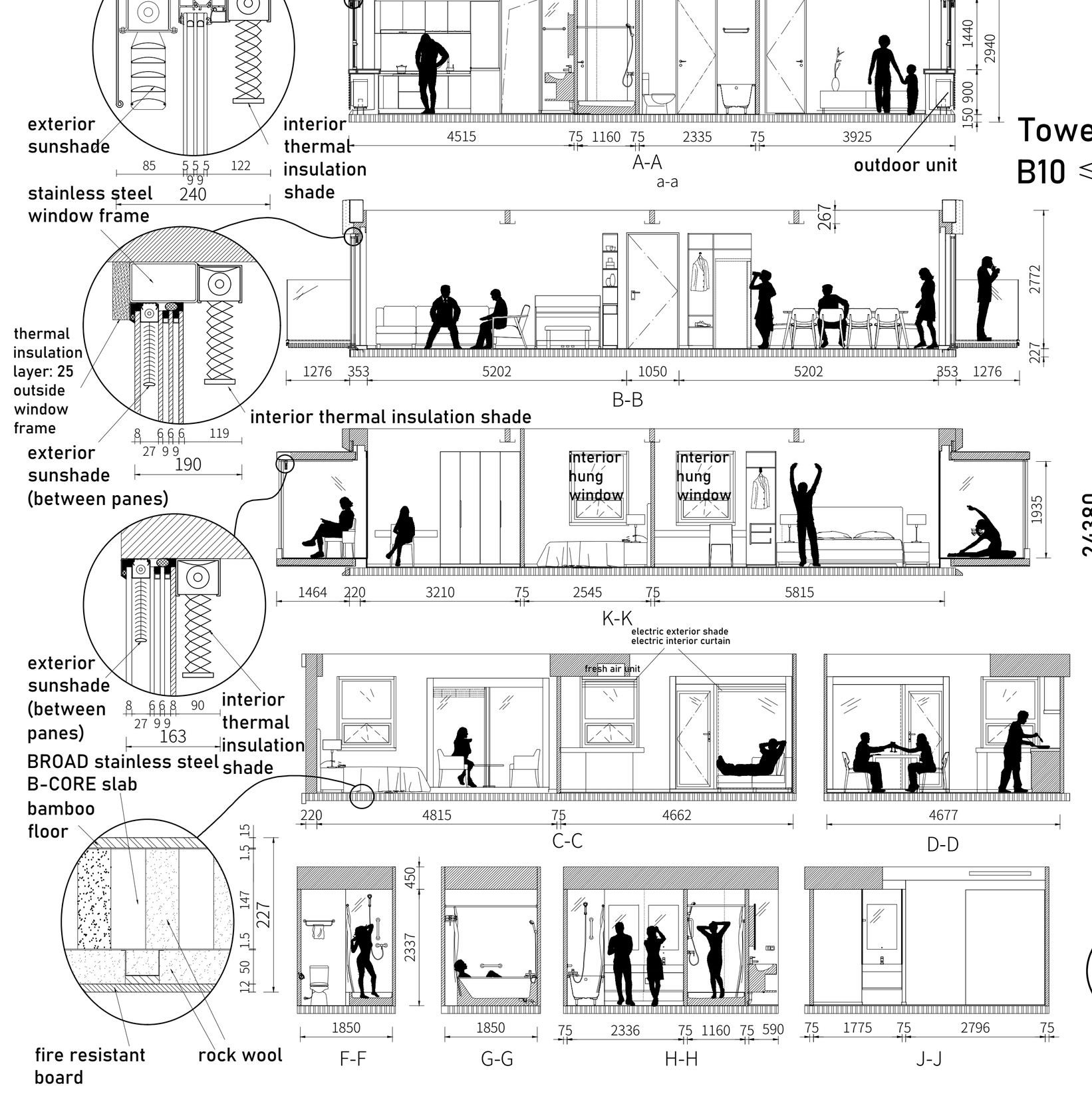
B Duplex Large Apartment B10 ≤32F
600m²/household unit, Utilization rate 94.3%



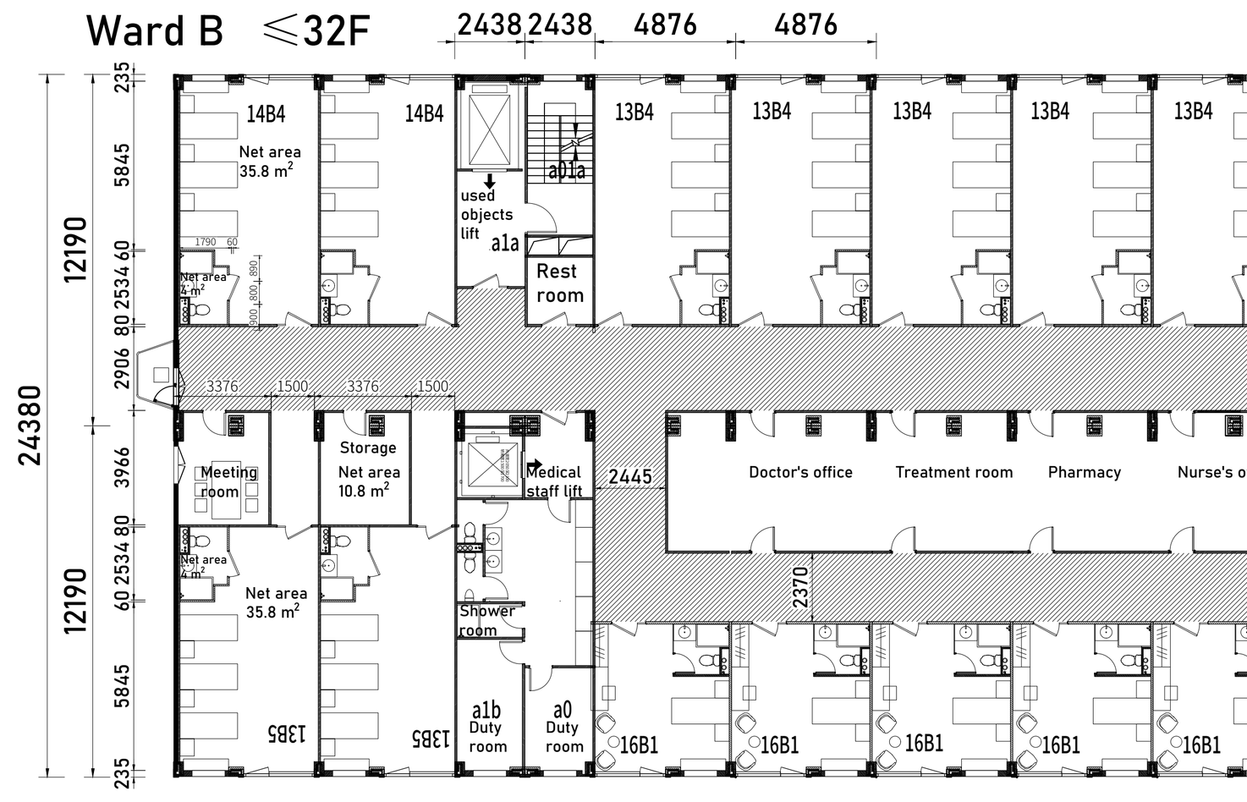
A4.5 Terraced Building≤16F Utilization rate 91.5 %



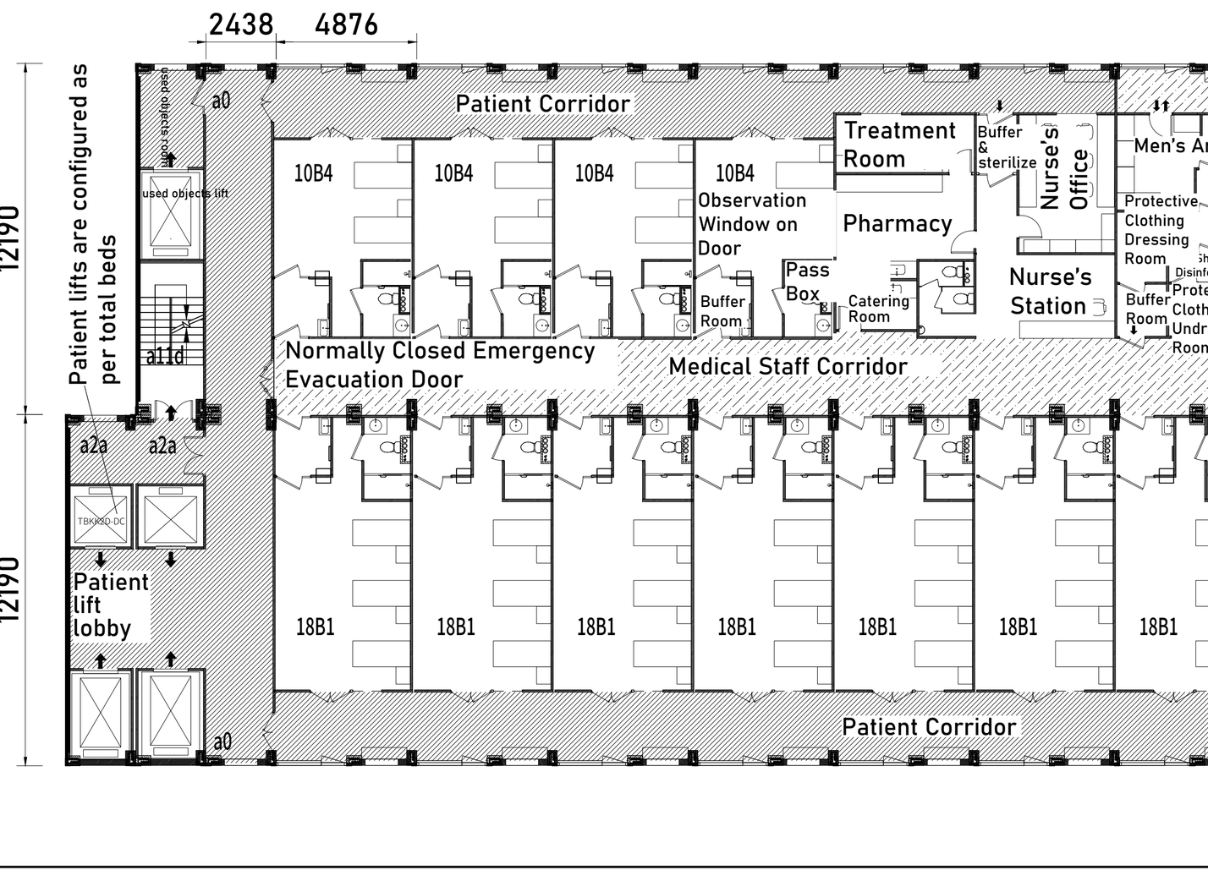
Sectional Elevation Dimension



Ward B ≤32F

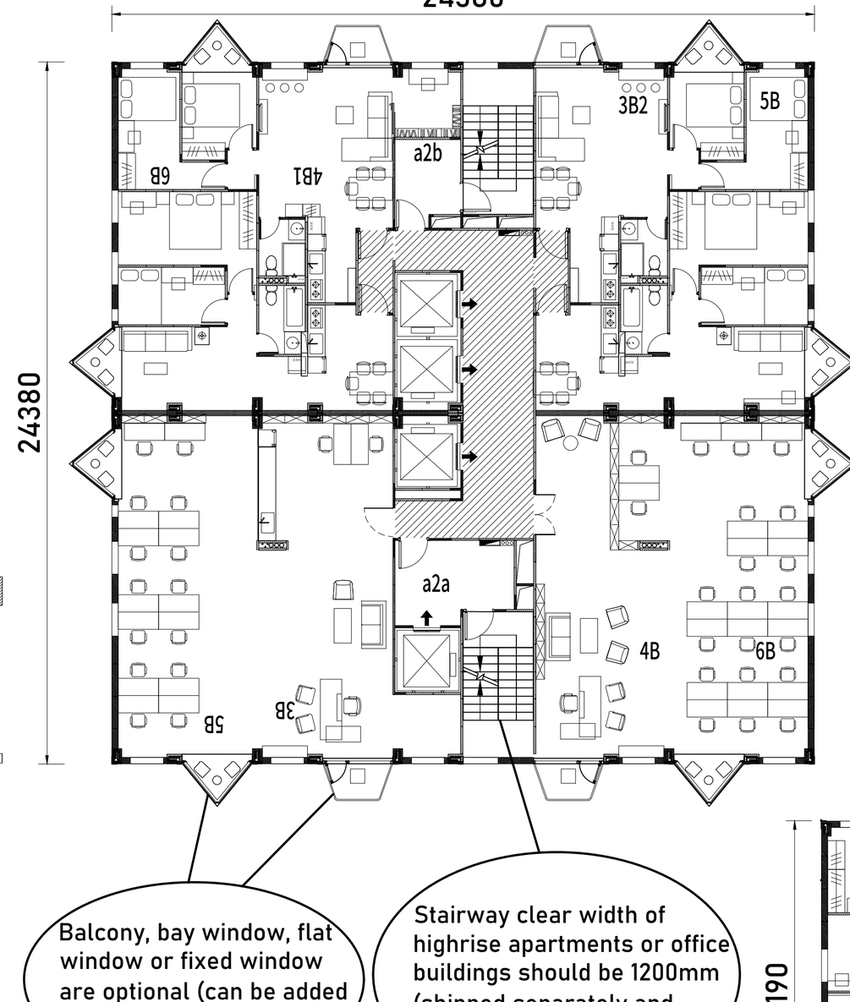


NPI (Negative pressure isolation) Ward B ≤32F



14. Typical Public Building Floor Layout

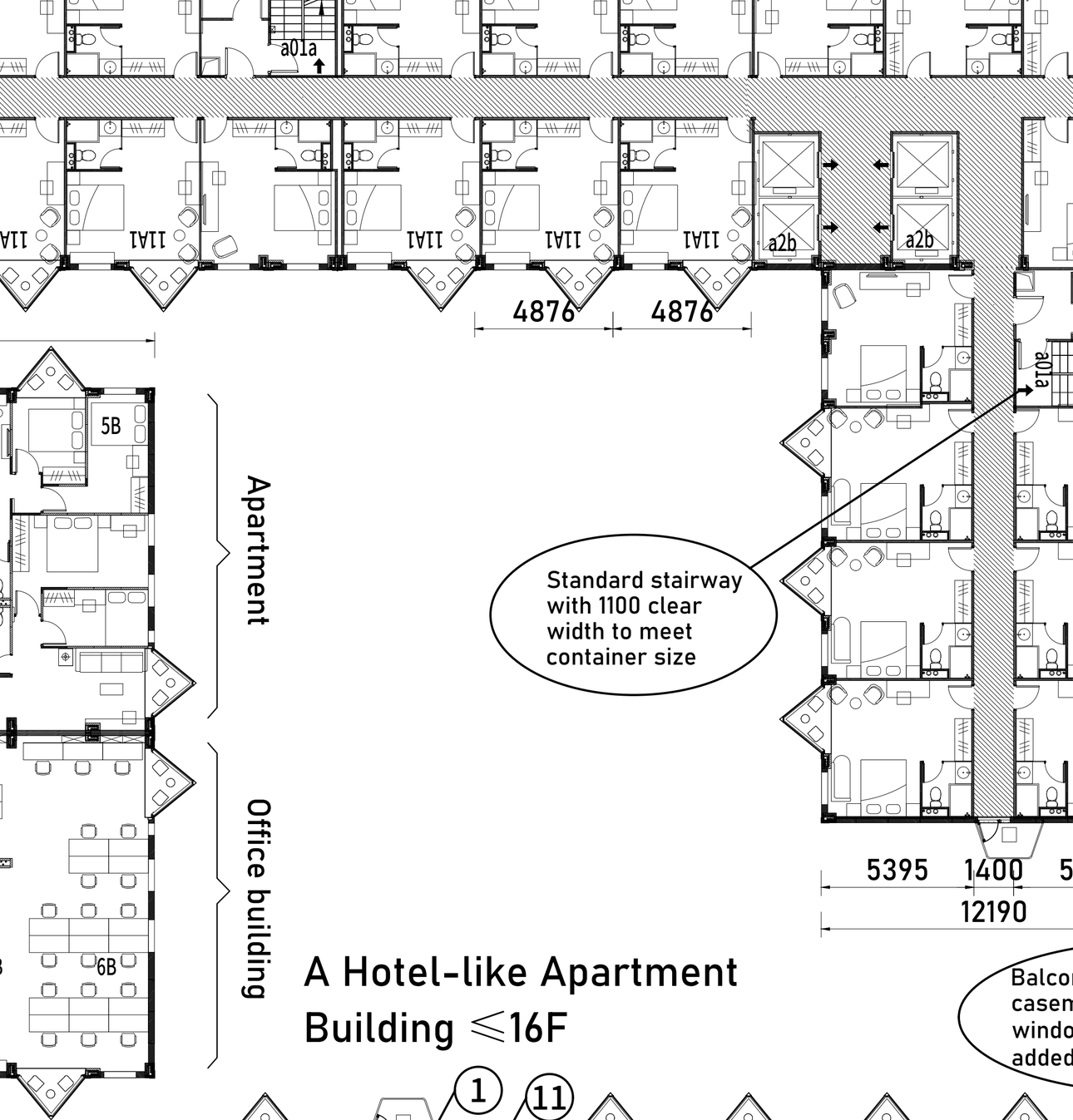
Tower-type Public Building B10 ≤32F 594m²/ F



Balcony, bay window, flat window or fixed window are optional (can be added after construction)

Stairway clear width of highrise apartments or office buildings should be 1200mm (shipped separately and on-site installation)

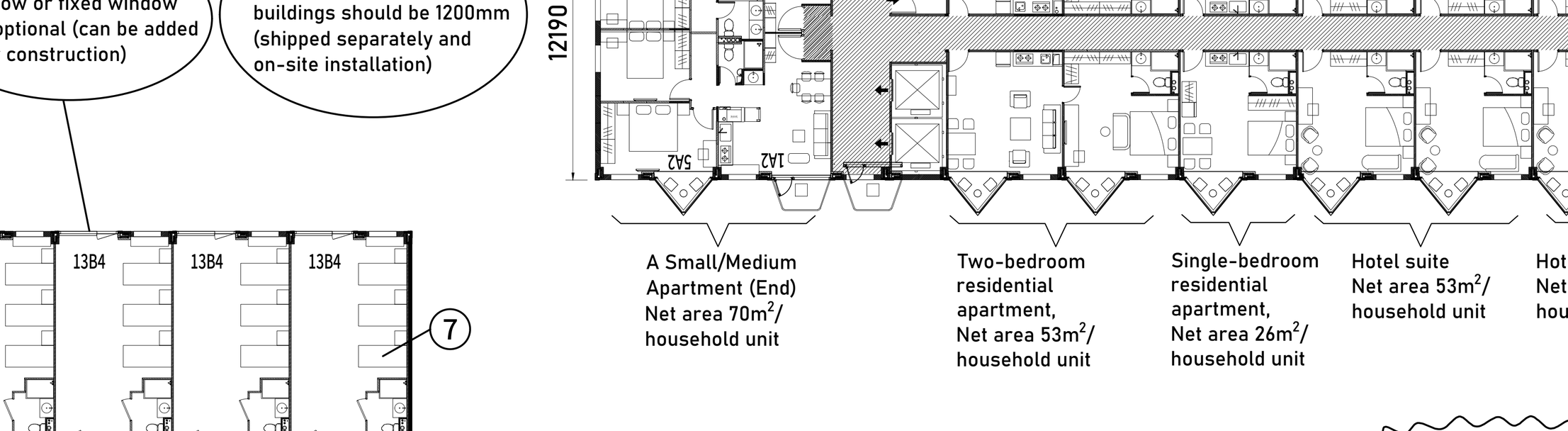
AL Hotel Apartment Building ≤16F



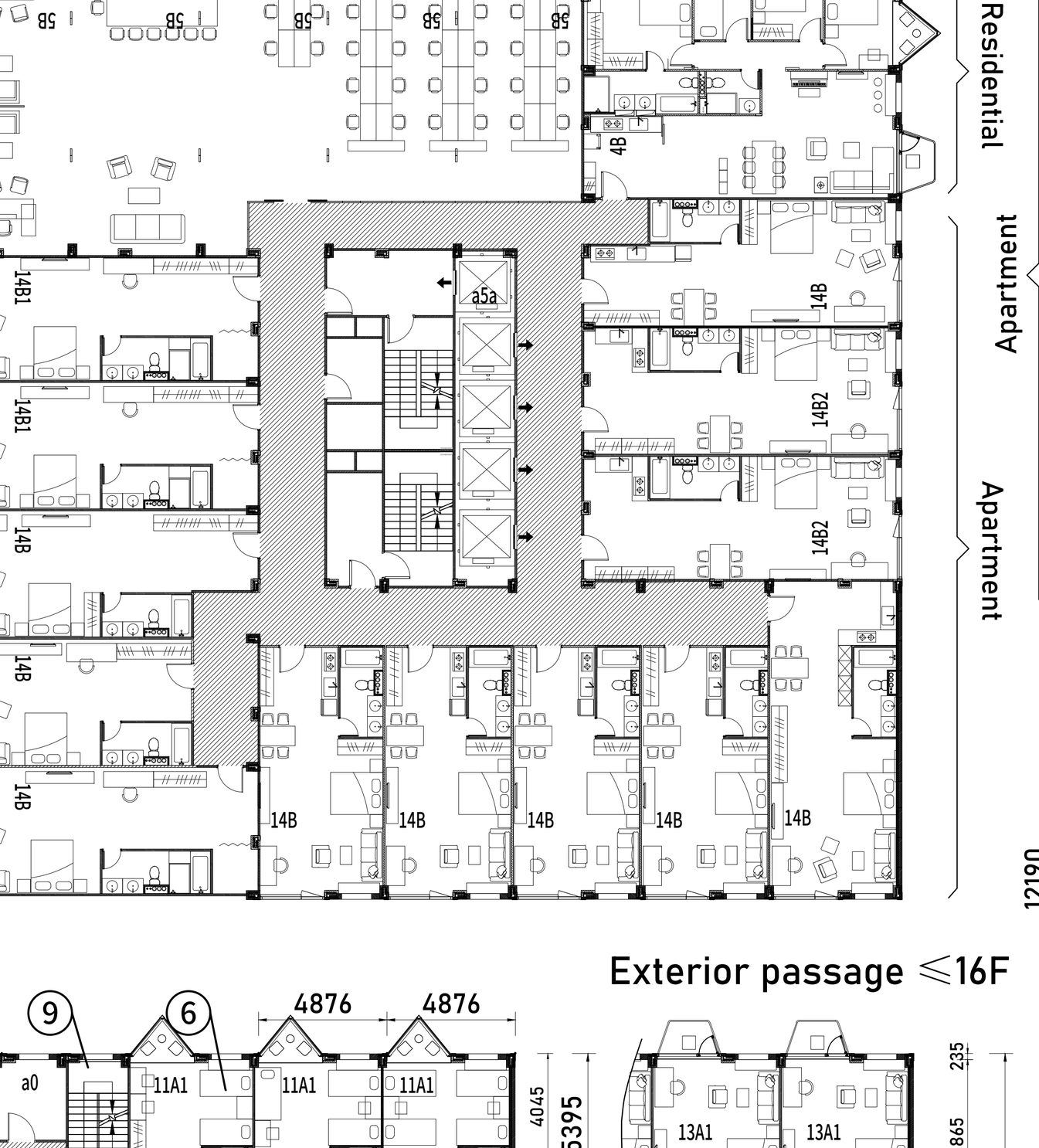
Standard stairway with 1100 clear width to meet container size

Balcony, bay window, casement window or fixed window are optional (can be added after construction)

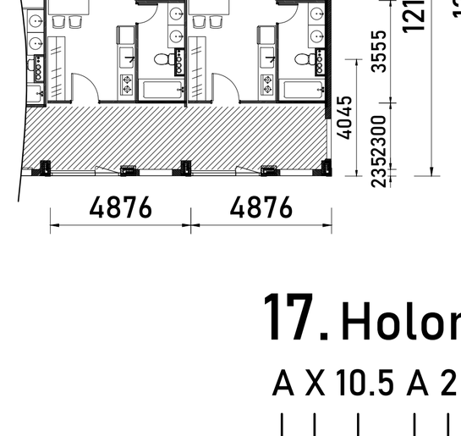
A Hotel-like Apartment Building ≤16F



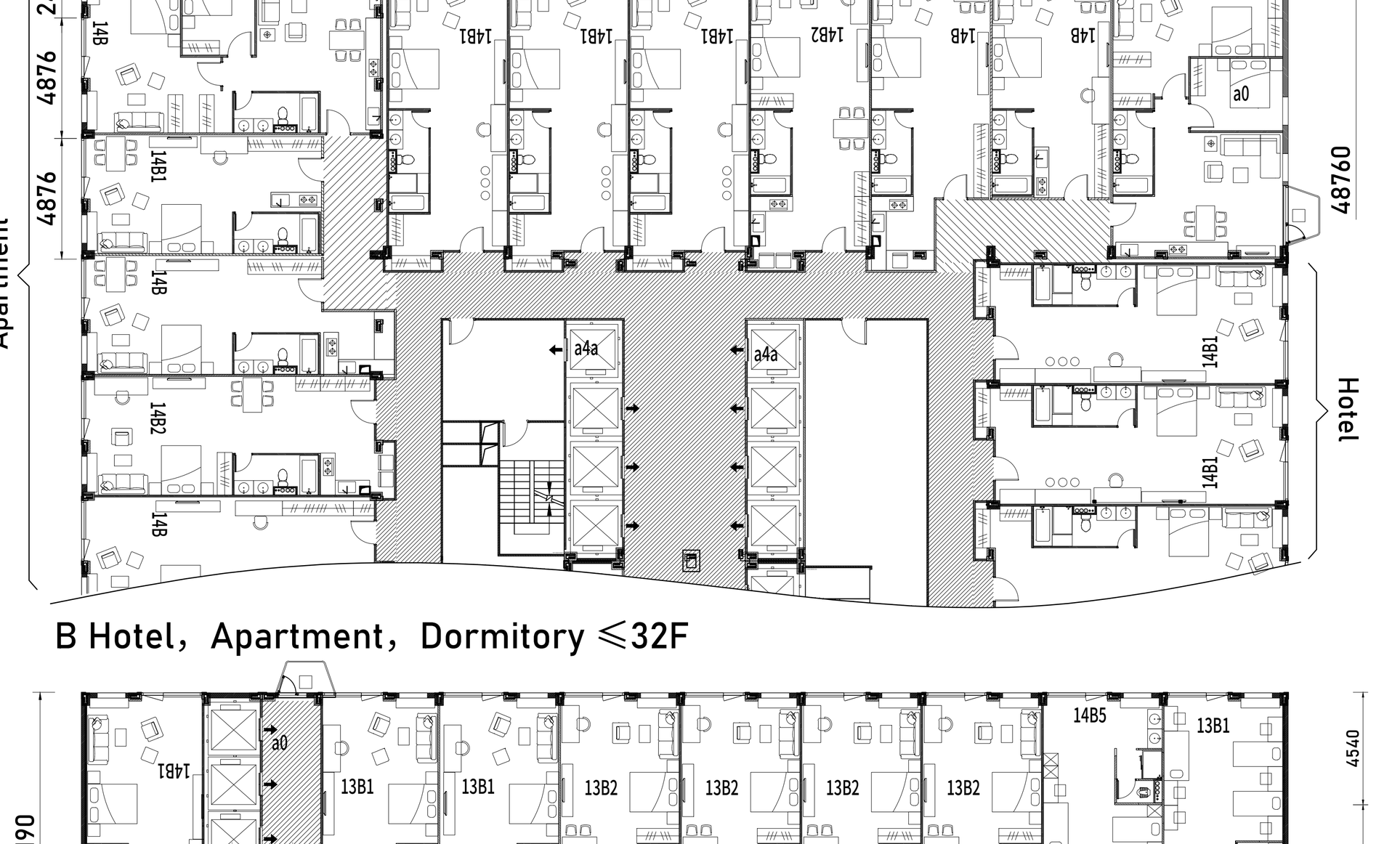
B22.5 ≤48F



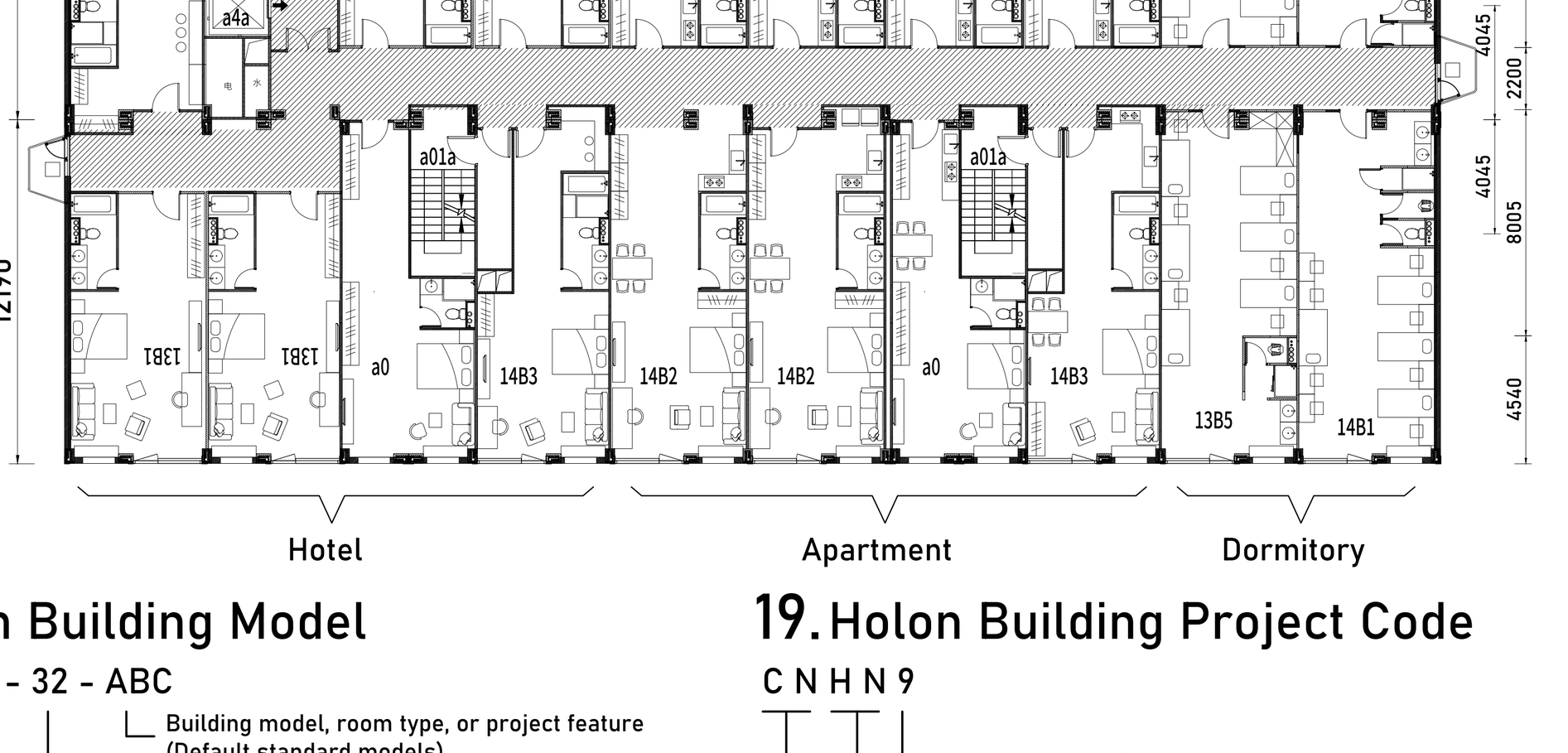
Exterior passage ≤16F



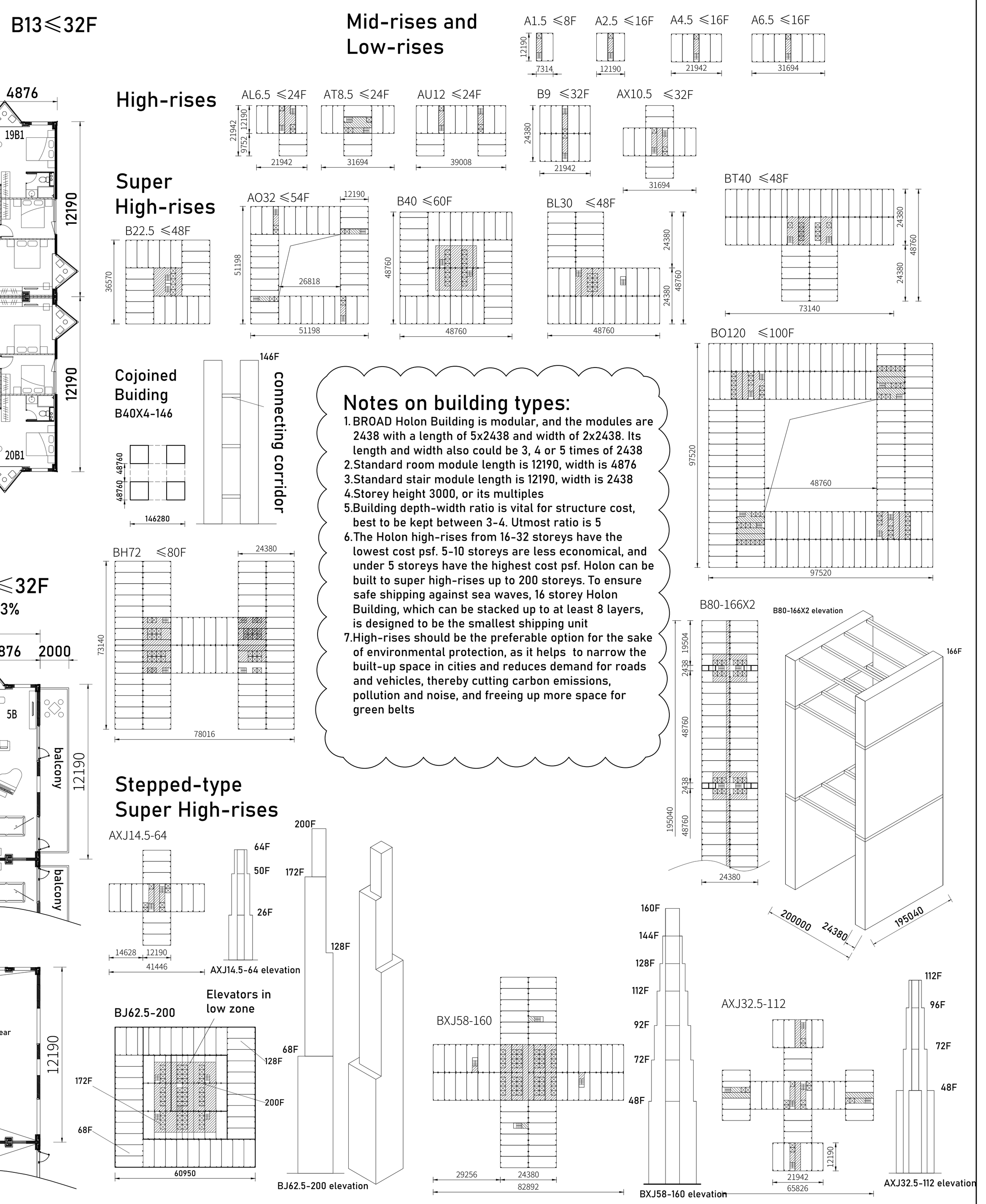
B40 Hotel, Apartment ≤60F



B Hotel，Apartment，Dormitory ≤32F

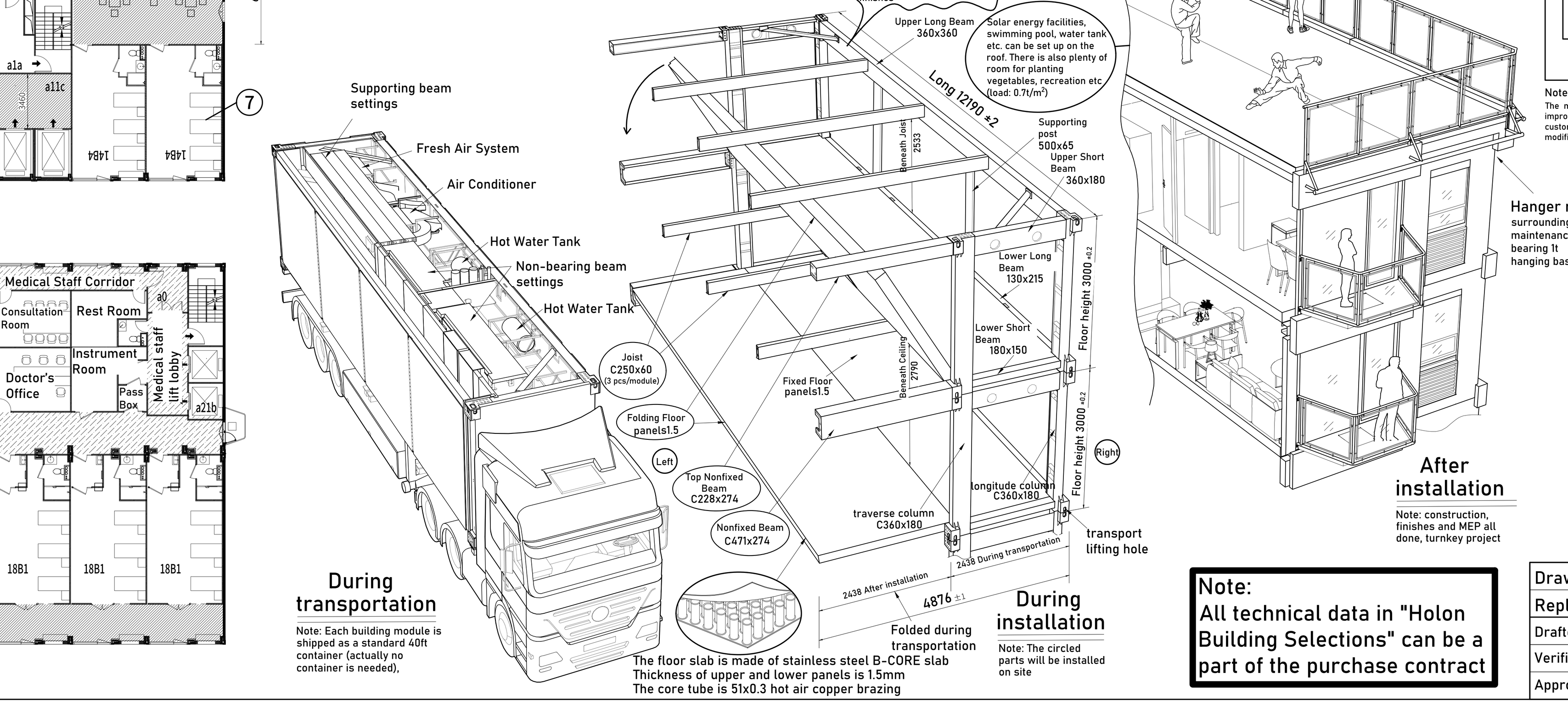


15. Typical Building Types



Notes on building types:
1. BROAD Holon Building is modular, and the modules are 2438 with a length of 5x2438 and width of 2x2438. Its length and width also could be 3, 4 or 5 times of 2438
2. Standard room module length is 12190, width is 4876
3. Standard stair module length is 12190, width is 2438
4. Storey height 3000, or its multiples
5. Building depth-width ratio is vital for structure cost, best to be kept between 3-4. Utmost ratio is 5
6. The Holon high-rises from 16-32 storeys have the lowest cost psf. 5-10 storeys are less economical, and under 5 storeys have the highest cost psf. Holon can be built to super high-rises up to 200 storeys. To ensure safe shipping against sea waves, 16 storey Holon Building, which can be stacked up to at least 8 layers, is designed to be the smallest shipping unit
7. High-rises should be the preferable option for the sake of environmental protection, as it helps to narrow the built-up space in cities and reduces demand for roads and vehicles, thereby cutting carbon emissions, pollution and noise, and freeing up more space for green belts

16. Holon Building Structure Illustrations



17. Holon Building Model

A X 10.5 A 2 - 32 - ABC

- Building model, room type, or project feature (Default standard models)
- Floors (Standard floor height 3 m . Two floors will be calculated if the floor is 6 meters high)
- Type of floor layout (can be omitted for types TBD)
- Main functions: "A" residence, "B" small apartment, "C" hotel, "U" NPI room, "V" ward, "W" dorm, "G" office, "M" others (default residence)
- Module numbers of standard floor (nominal 60 m² / module）
- Special shaped building types: H shape, L shape, T shape, C shape, O shape, X shape, etc., an extra "J" will be added for stepped type (applicable for all shapes)
- Building model: "A" for single-row module, "B" for double-row module

Notes:
The model is determined according to the specific content of the order, and can be gradually supplemented and improved. If the customer's requirements change during construction, the model can be changed accordingly. If the customer needs to increase the number of floors or make other changes after completion, the model number should be modified accordingly. As long as the building name remains unchanged, model changes will be easily understood

18. Module Code

Room module code:
1 A 2 a
- Other features
- Side wall and window, interior wall, air inlet features
- Module single and double row characteristics (A for single row, B for double row)
- Module structure features (including kitchen, bath and eletromechanics etc) Dimension 12190 x 4876mm

Stair module code:
a 1 2 a a
- Side wall and window, interior wall and other features
- Elevator position
- Stair numbers (default to 0 if unwritten)
- Elevator numbers (0 if there is no elevator)
- Stair module,Dimension 12190x2438mm

19. Holon Building Project Code

C N H N 9
- Serial number (According to the local project implementation sequence)
- State Code(Country practice in 1-2 letters. Small countries can be exempted)
- Country Code (International Domain Code Abbreviation in 2 letters)

Notes:
1. Implementation sequence refers to the order in which the contract takes effect or the order in which the project scheme drawing is issued after the contract takes effect, or the order in which the scheme drawing is confirmed
2. The number will be vacant if the project serial number has been discharged and then canceled.If the project is divided into 2 or more buildings in the later stage, the serial number will be modified, as 9-1/9-2...

20. Holon Building VS Traditional Building

No	Subject	Traditonal	Holon
1	Structure	Reinforced concrete Roughly 50-year life span, construction waste put into landfill after disposal. Brittle materials make the building easily collapse in the event of an earthquake	Stainless steel 1000-year life span, recyclable after disposal. Good ductility. Deformation but no collapse in the event of an earthquake
2	Method	Site work Hard to control quality; heavy pollution; heavy use of skilled labor, build 1 storey in 10 days	Factory made Guaranteed quality; zero pollution; small labor force and short work schedule,build 1 storeys in 3 days
3	Space	Fixed Limited no-column space, no alteration allowed after back wall and door construction	Flexible Large no-column space(12x4.8m), alteration allowed after back wall and door construction
4	Comfort & energy efficiency	Less comfort, higher consumption Low thermal insulation of exterior wall, high A/C energy consumption, huge noise	More comfort, lower consumption High thermal insulation saves 80%-90% energy consumption
5	Air quality	Worse than outdoor Air purified by primary ventilation or opening window	100 times cleaner than outdoor BROAD clean Fresh Air Machine 100% fresh air filtering PM2.5 by 99.9%
6	Noise	Transfer into house Poor sound insulation of windows allows outside noise to be heard inside the building	Radical isolation 3-4 paned windows; Fresh air machine isolates noise with window closed

Note:
All technical data in "Holon Building Selections" can be a part of the purchase contract

Drawing No: T-HLXX-211014				Application: ☑ Production ☑ Installation ☑ Business	HOLON BUILDING SELECTIONS
Replacement For: T-HLXX-210825				Corporate Security Level: ☑ Public	
Drafter	Candice	Engineer	WMN	General Floor Plan Drawings	
Verifier		Inspector			V11.2 (Finalized)
Approver		Date	Oct 14th, 2021		

HOLON 1000-YEAR BUILDING