

An aerial photograph of a dense, lush green forest. The trees are tightly packed, creating a vibrant, textured canopy of various shades of green. The lighting is bright, suggesting a sunny day, with some areas appearing slightly more yellowish-green due to the sun's angle. The overall scene is a natural, undisturbed woodland.

**Affordable and sustainable housing:  
a question of resources**

**Michael Eliason, RA**



# Servus!



- + Architect
- + Mass Timber
- + Passivhaus
- + Eco districts
- + Baugruppen/Social Housing
- + Car free dad w/ 2 kids

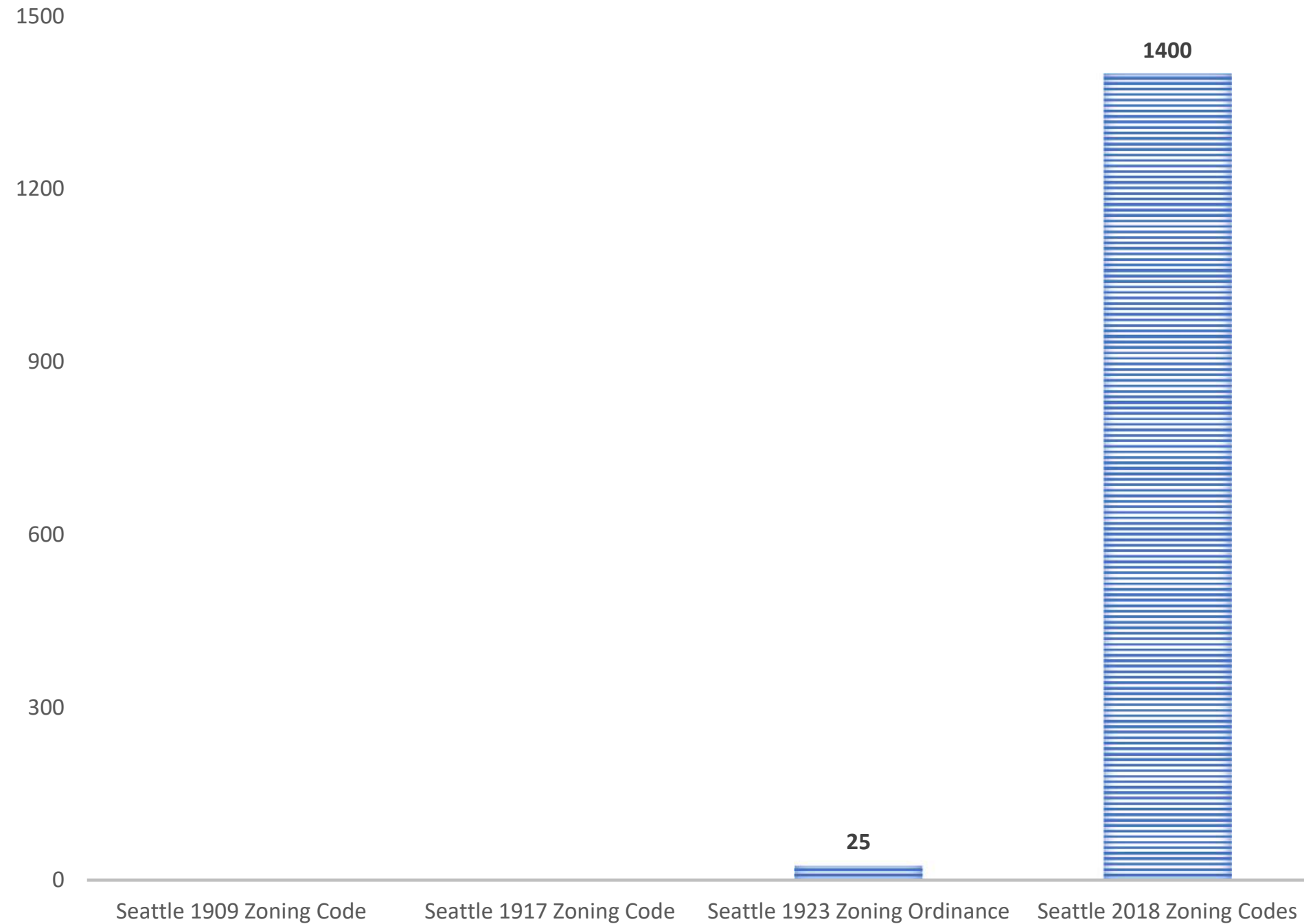


# Activist Architect



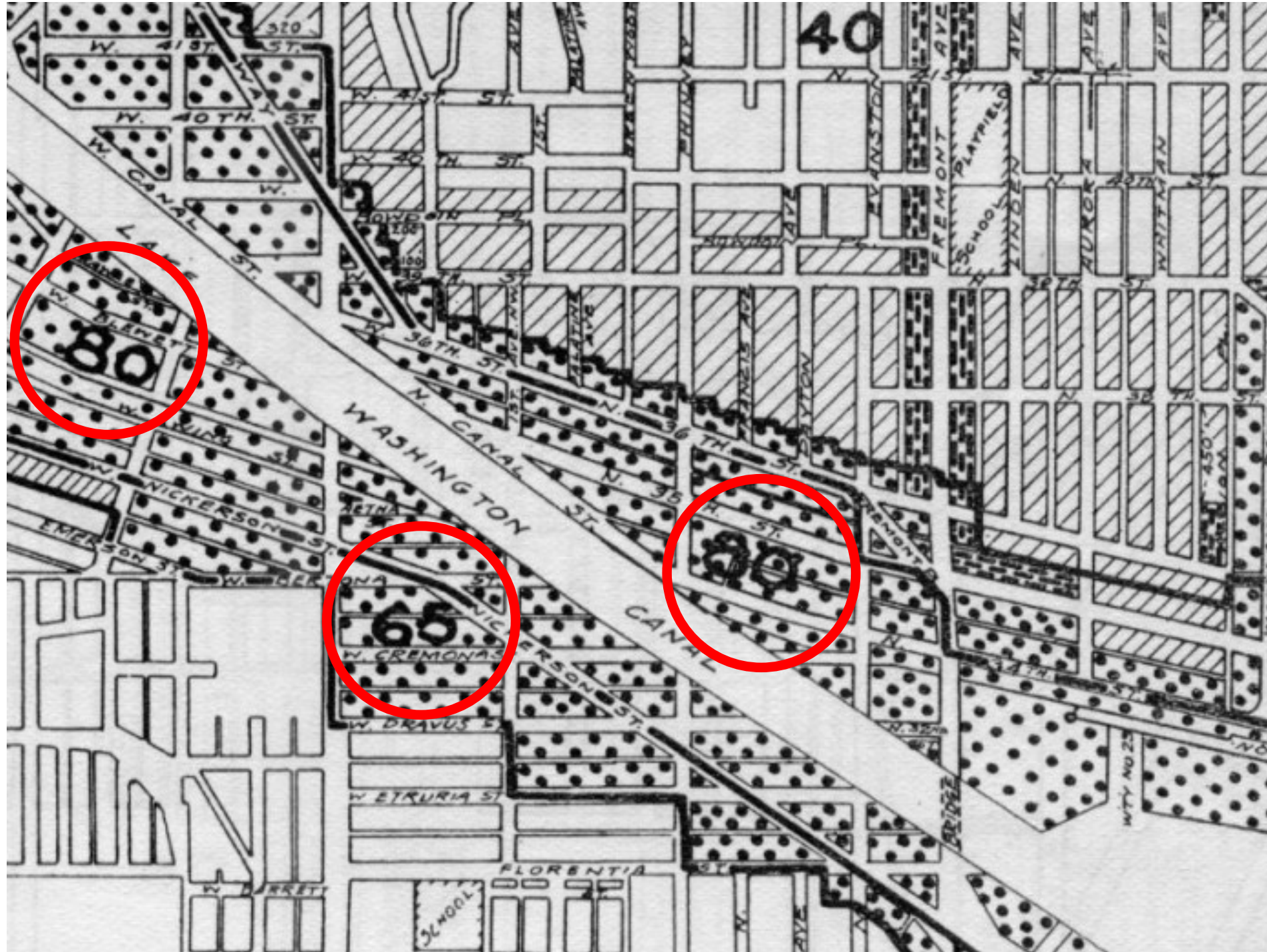
- + Land Use
- + Building Technology
- + Passivhaus
- + Mass Timber
- + Low Carbon Construction
- + Circular Construction
- + Safe Streets

# Seattle Zoning Codes (pages, by year)





# Seattle 1923 Zoning Map (Fremont)

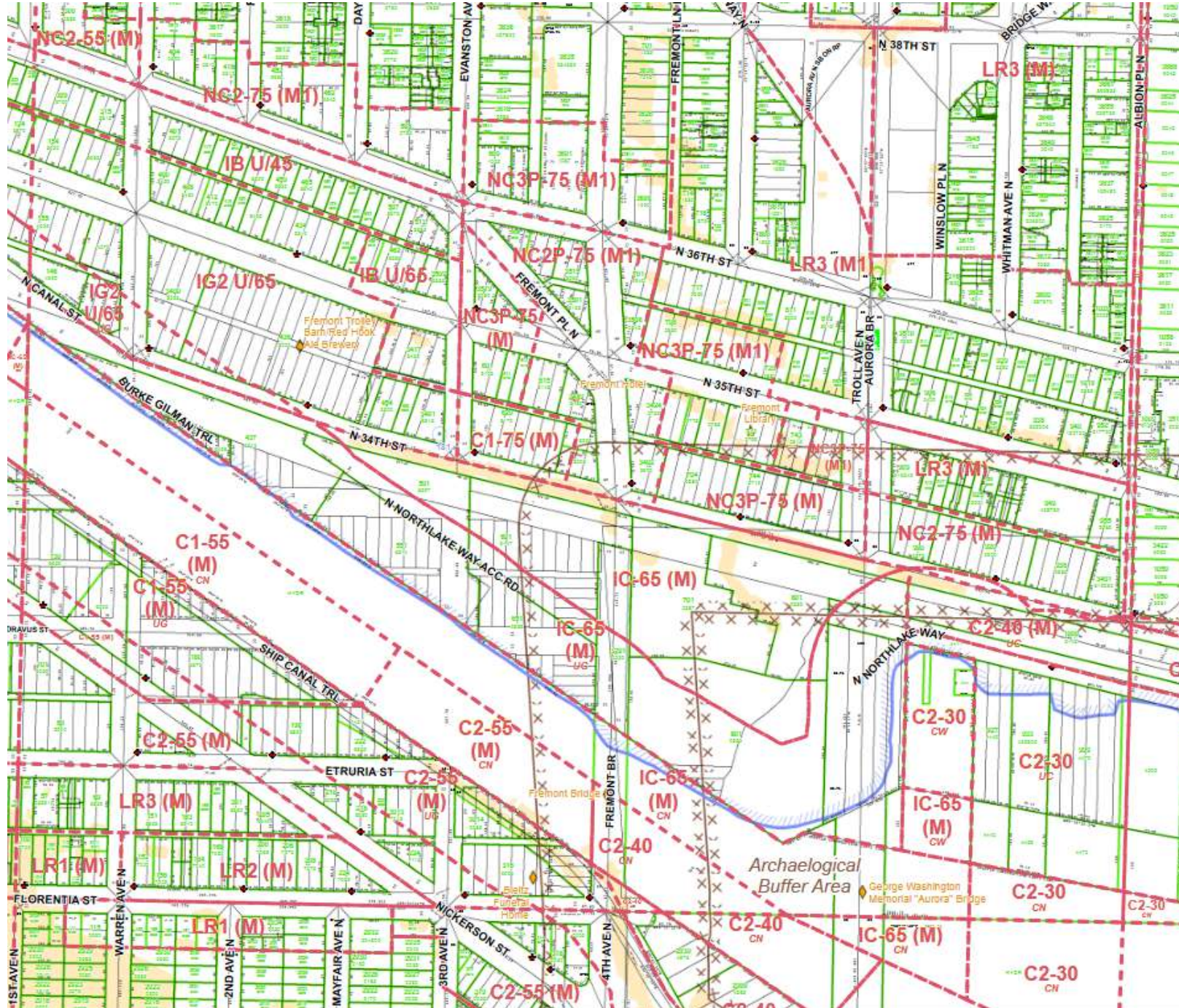


- + 1922: Multifamily legal everywhere
- + 1923: 1<sup>st</sup> Zoning Ordinance
- + 1957: Downzones
- + 1994: Urban Villages
- + 1994: Design Review
- + Rezone existing Multifamily
- + Industrial Lands

Source: City of Seattle Municipal Archives



# Seattle 1923 Zoning map (Fremont)

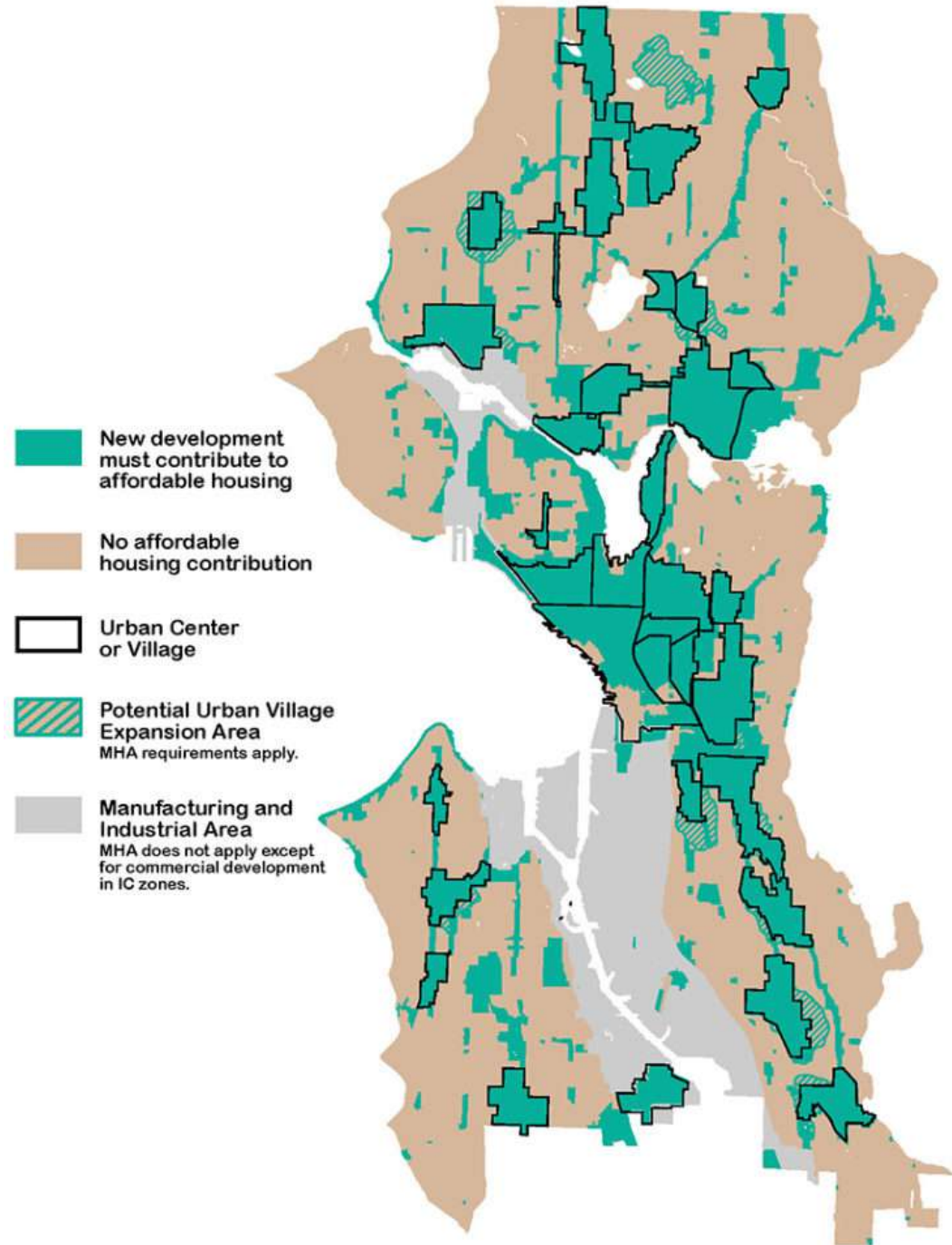


- + 1923: 1<sup>st</sup> Zoning Ordinance
- + 1957: Downzones
- + 1994: Urban Villages
- + 1994: Design Review
- + Rezone existing Multifamily
- + Industrial Lands

Source: City of Seattle Zoning Map



# Seattle's Present Multifamily Zoning



- + Urban Villages
- + On Arterials
- + Limited access to Parks
- + Parking Reform
- + “Yellow Belt”
- + Average Home Value CA\$1,25M



# Frankfurt Zoning Summary, 1935

ÜBERSICHT ZUR Vordergebäude					ORTSBAUSATZUNG			Hintergebäude		
Baustaffel (Baugebiet)	Flächenausnutzungsziffer	Gebäudetiefe, seilt. Abstände g - geschlossen h - halboffen o - offen	Stockwerkszahl Gebäudehöhe	Rückwärtige Abstände, Grenze u. Anbauten	Mindestabstand von Grenze und von andern Gebäuden	Winkelabstand	Stockwerkszahl Gebäudehöhe	Baustaffel		
§1(3-7)	§§ 2, 63	§§ 31, 34, 43, 37, 58	§§ 9, 11, 14, 47-49, 52, 54, 58	§ 56	§§ 43, 38, 40, 56	§§ 38, 40, 56	§§ 11, 14, 50			
1 2 3 4 5 6 7 8 9 10 GEMISCHTES-GEBIET GEBIET FÜR LANDWIRTSCHAFTLICHE GEMEINSCHAFTEN UND BETRIEBE WOHN-GEBIET LANDHAUS-G. KLEINHAUS-G.	60/100		5 20m	75°			4 15m	1		
	50/100		4 15m	60°			3 12m	2		
	40/100		3 12m	60°			3 12m	3		
	40/100		2 8m	60°			1 4,50m	4		
	35/100		3 12m	60°			2 8m (1) (4,50m)	5		
	30/100		2 8m	60°			2 8m (1) (4,50m)	6		
	25/100		2 8m	60°			2 8m (1) (4,50m)			
	25/100		2 8m (1) (4,50m)	60°			2 8m (1) (4,50m)	7		
	20/100		2 8m (1) (4,50m)	60°			2 8m (1) (4,50m)	8		
	10/100		2 8m (1) (4,50m)	60°			2 8m (1) (4,50m)	9		
20/100		2 8m (1) (4,50m)	60°			2 8m (1) (4,50m)	10			



# Basel Zoning Summary

## Kurzfassung (gemäss Bau- und Planungsgesetz, BPG) zu den Bauzonen

Zoneneinteilung	2a	2	3	4	5a	5	6	7
Bauweise	offene	geschlossene				vollflächig bebaubar		
Bebauungspläne (BP)	gemäss Bebauungspläne							
Lärmempfindlichkeitsstufe (LESP)	gemäss Lärmempfindlichkeitsstufenpläne							
Wohnanteil (WAP) / Nutzungsart	gemäss Wohnanteilplan und Bebauungspläne						§ 34	

### BGF-Berechnung mit AZ

zulässige BGF	gemäss Vergleichsprojekt § 6				
Ausnützungsziffer (AZ)	0.6	0.7	1	1.5	1.8

§ 36	§ 36	-
-	-	-

### Gebäudeprofile im Blockrandbereich

Vollgeschosse (§ 10)	2	2	3	4	5
Wandhöhe (§§ 22, 35, 36)	8 m	8 m	11 m	14 m	18 m
Gebäudehöhe (§§ 26, 35, 36)	12.5 m		17 m	20 m	24 m
Gebäudetiefe (§ 14)	12 m		15 m		
Dachprofilneigung (§ 25)	45°				
Lichteinfallswinkel (§§ 23, 35, 64)	45°				
Freifläche (§§ 15, 52)	50 %				
Nutzung der Freifläche (§ 52)	2/3 als Grünfläche				

### Gebäudeprofile

5	6	-
18 m	20 m	40 m
24 m	25 m	40 m
-	-	-
45°		-
60°/ Nachbar		§ 35
-	-	-
-	-	-

Source: Basel-Stadt Planungsamt



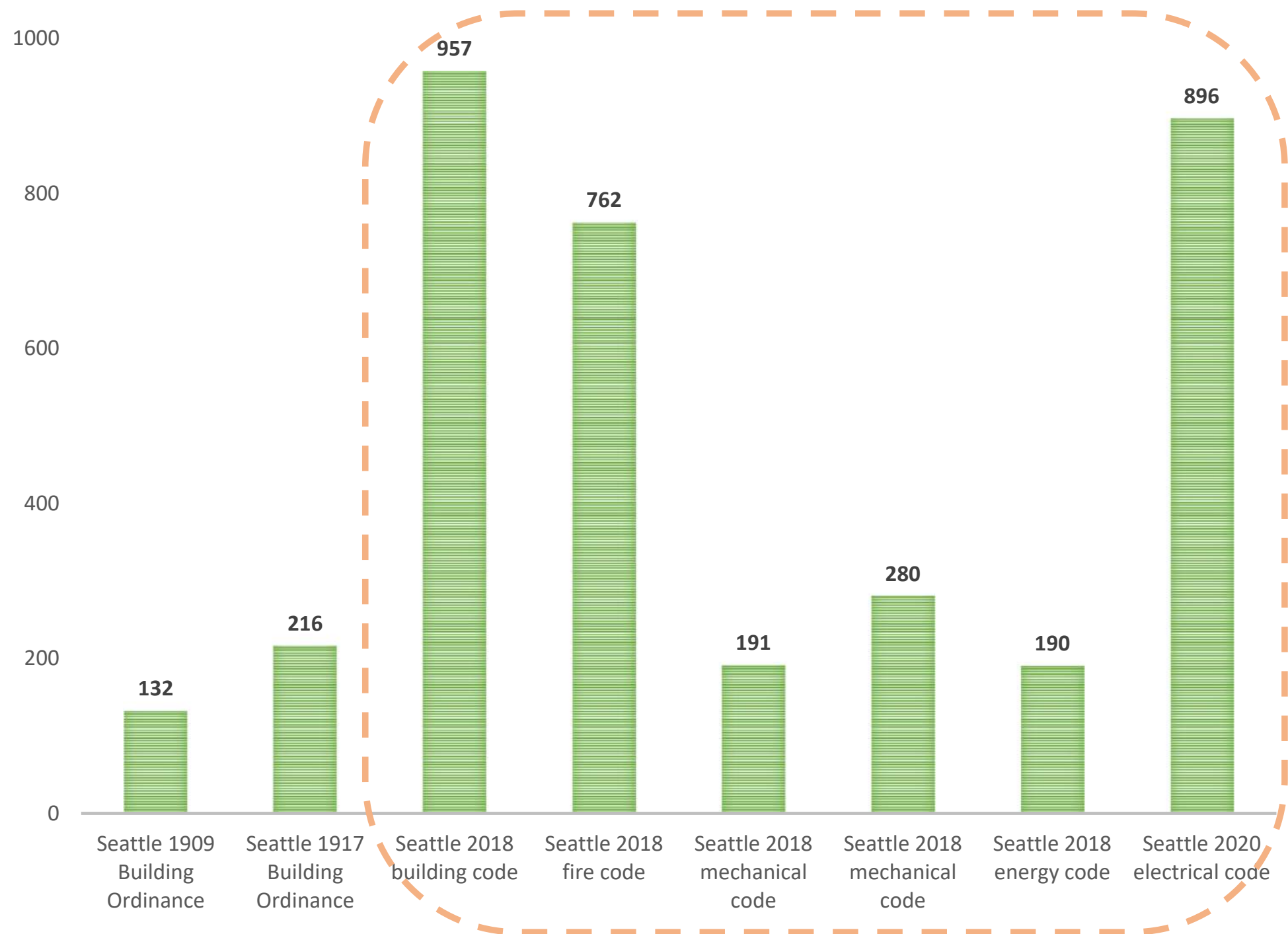
# Prenzlauerberg, Berlin



- + 22m Traufhoehe (wall height)
- + Amazing street walls
- + 22m was width of street
- + Seattle 1907 Building Code similar
- + Nearly all single stair buildings
- + Vorderhaus/Hinterhaus
- + 39,000 residents/ sq mi



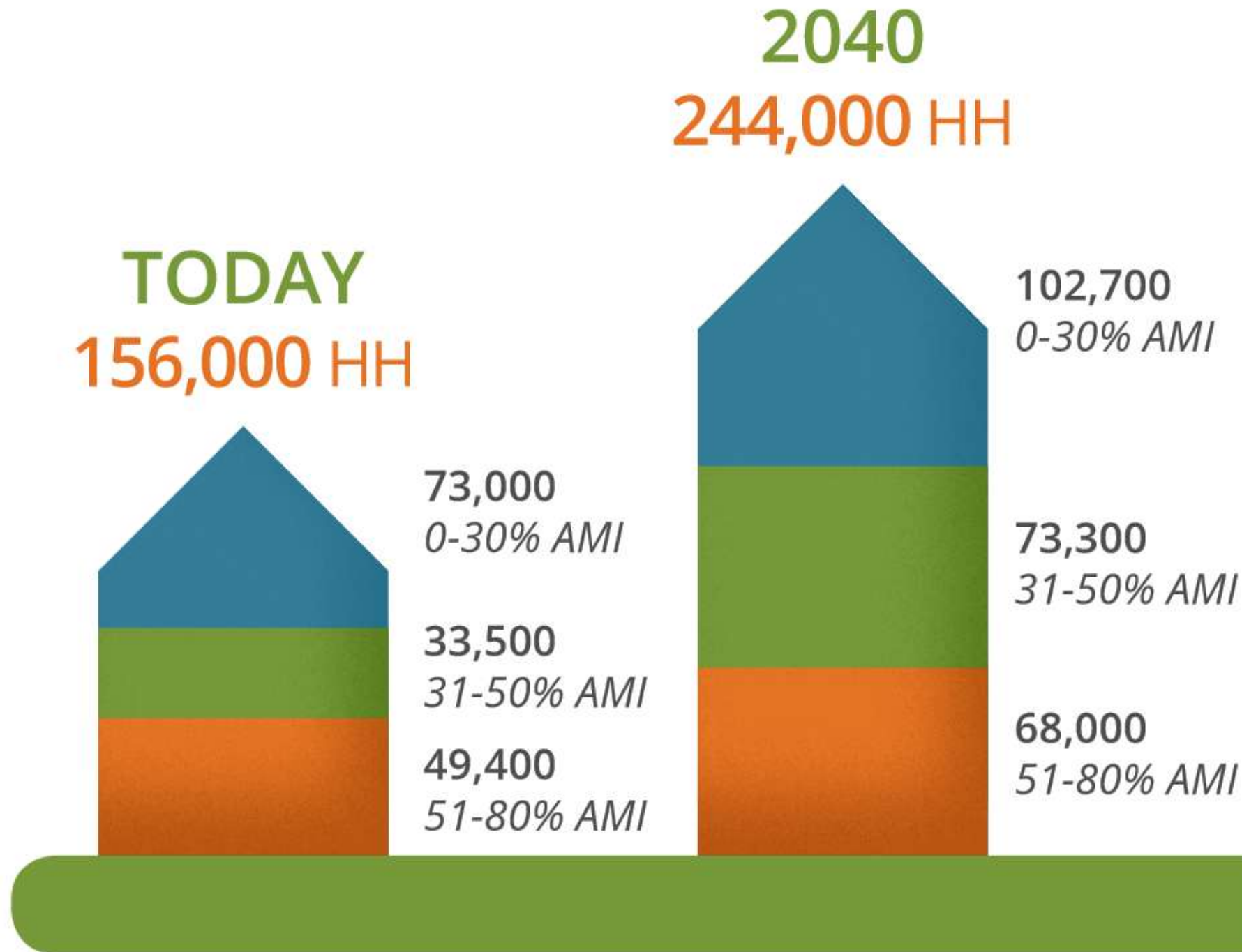
# Seattle Building Codes (pages, by year)



- + Seattle Codes: 3,276 pages
- + Increasing specialization
- + Design Review
- + Setbacks
  
- + National Code of Canada: 2,292
  
- + BayBO: 250
- + BayTB: 358



# Puget Sound's Housing Crisis – Affordable Housing Needs



- + Microsoft Study: 194k home deficit
- + PSRC: +1.8M people in 2050
- + Household Size declining
- + 12k homeless, half unsheltered



# Climate Crisis

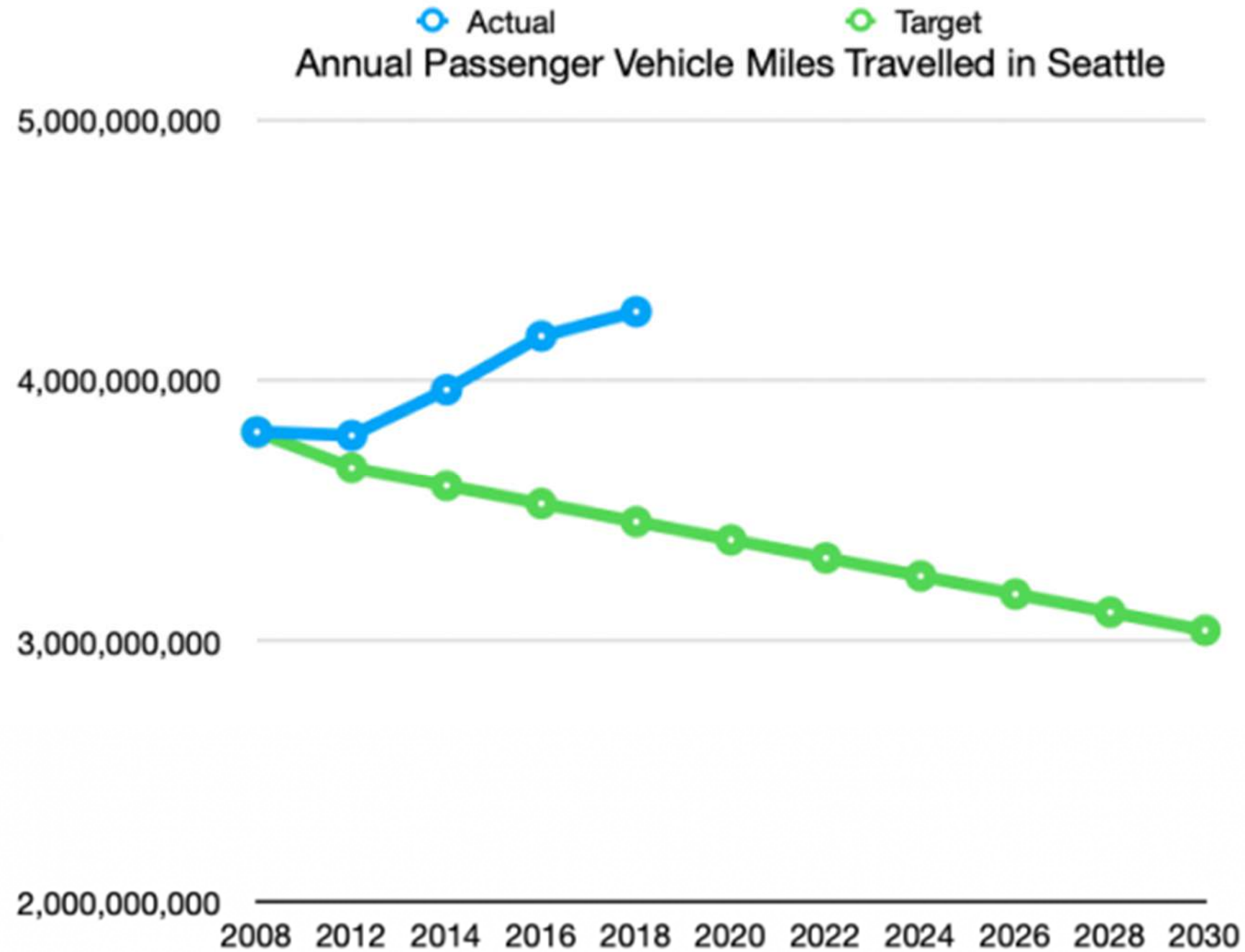


Foto: James Taylor

- + Wildfire smoke season
- + Heat Dome
- + Flooding
- + US industry unprepared
- + No Passivhaus mandates
- + Few cooling centers



# Climate Goals



Source: City of Seattle 2018 GHG Emissions report

- + VMTs increasing
- + Low EV adoption
- + Poor Bike Network
- + No Pedestrian Zones
- + But... Transit is great



# Northgate Light Rail Station Area Planning



Massing Diagram: GGLO



# Roosevelt Light Rail Station



- + 30 DU/acre
- + Low Rise & Single Family Zoning
- + No Pedestrian Zone
- + School 'View Cone'
- + No Open Space Added



# Is a better/more affordable/greener world possible?

3 Themes...

Density  
Open Space  
Livability



# Seestadt Aspern, Vienna



Foto: Tovatt Architects and Planners/SWECO

- + 593 Acres
- + Two Stage Planning Competition
- + Tovatt Architects + Planners
- + 11,5k homes for 25k residents
- + 20k jobs
- + (2) U-bahn Stations (phased)
- + ample open space
- + school campuses
- + integrated daycare
- + Cafes/Gastro



# Bautraeger Wettbewerbe (Developer Competitions)



- + Design Competition
- + One or Two Stages
- + High Quality Architecture
- + Ecology of the project
- + Affordability
- + Social Sustainability
- + Winner receives land/funds
- + Co-creation w/ residents



# Bautraeger Wettbewerbe (Developer Competitions)



- + Winner receives planning contract
- + Querkraft Architekten
- + Prioritizes innovation/quality
- + Young/new firms
- + WYSIWYG
- + Drawbacks...





# Bautraeger Wettbewerbe (Developer Competitions)



- + J5A Lakeside
- + Almost Passivhaus: 23,5kWh/m2a
- + Primary energy: 45,5kWh/m2a
- + Market rate project
- + 5,4m ceiling height
- + 131 units
- + Thermally Broken Balconies
- + \$700 (1BR) - \$1900 (4 BR)

Foto: Lukas Schaller



# Sonnwendviertel, Vienna



- + 77 Acre Development
- + Two-stage competition
- + 13k residents in 5k homes
- + 20k jobs
- + Schools
- + Integrated daycare
- + Grocers
- + Café/Gastro
- + Shops
- + 17 acre Helmut-Zilk-Park
- + Tram, 250m walk to U-bahn

Foto: City of Vienna/ Christian Fürthner



# Sonnwendviertel, Vienna



- + Traffic calmed streets
- + Buildings reduce noise
- + Pedestrianized spine

Foto: KABE Architekten



# Baugruppe Gleis 21

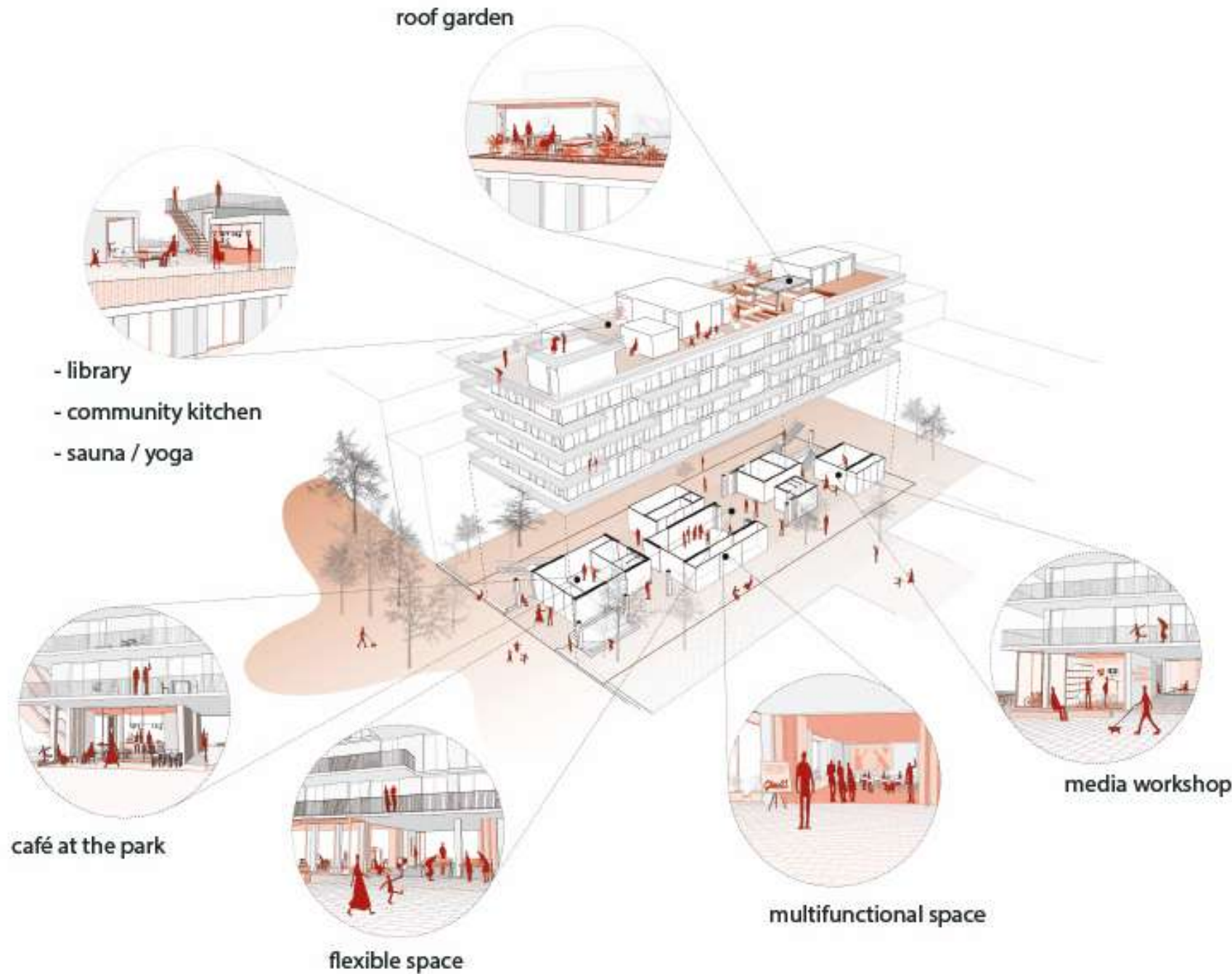


- + Mass Timber/Conc. Hybrid
- + Amenity-laden cohousing
- + Car-free
- + Social Housing
- + Cooperatively planned
- + Developer Competition

Foto: Hertha Hurnaus



# Baugruppe Gleis 21



- + Massive Bike Room
- + Covered plaza
- + Cafe
- + Multifunctional room/theater
- + Library
- + Community Kitchen
- + Sauna
- + Roof deck w/ Garden

Amenities Diagram: einzueins architekten



# Stadtelefant



Foto: Andreas Buchberger

- + Commercial Baugruppe
- + Design Competition
- + Franz&Sue Architekten
- + Self-developed
- + Quality over profit (high ceilings)
- + Flexible floor plan
- + Single Stair configuration
- + Prefabricated facade



# Prinz-Eugen-Park, Munich



Foto: Andreas Buchberger

- + 74 Acres
- + 29 acres open/green space
- + Design Competitions
- + 1,800 homes
- + Passivhaus
- + Baugruppen/Coops
- + 588 homes built w/ wood
- + Muenchner Mischung
  - 1/3 subsidized rentals
  - 1/3 freely financed rents
  - 1/3 condos
- + Mostly social housing developers



# Merwedekanaal, Utrecht

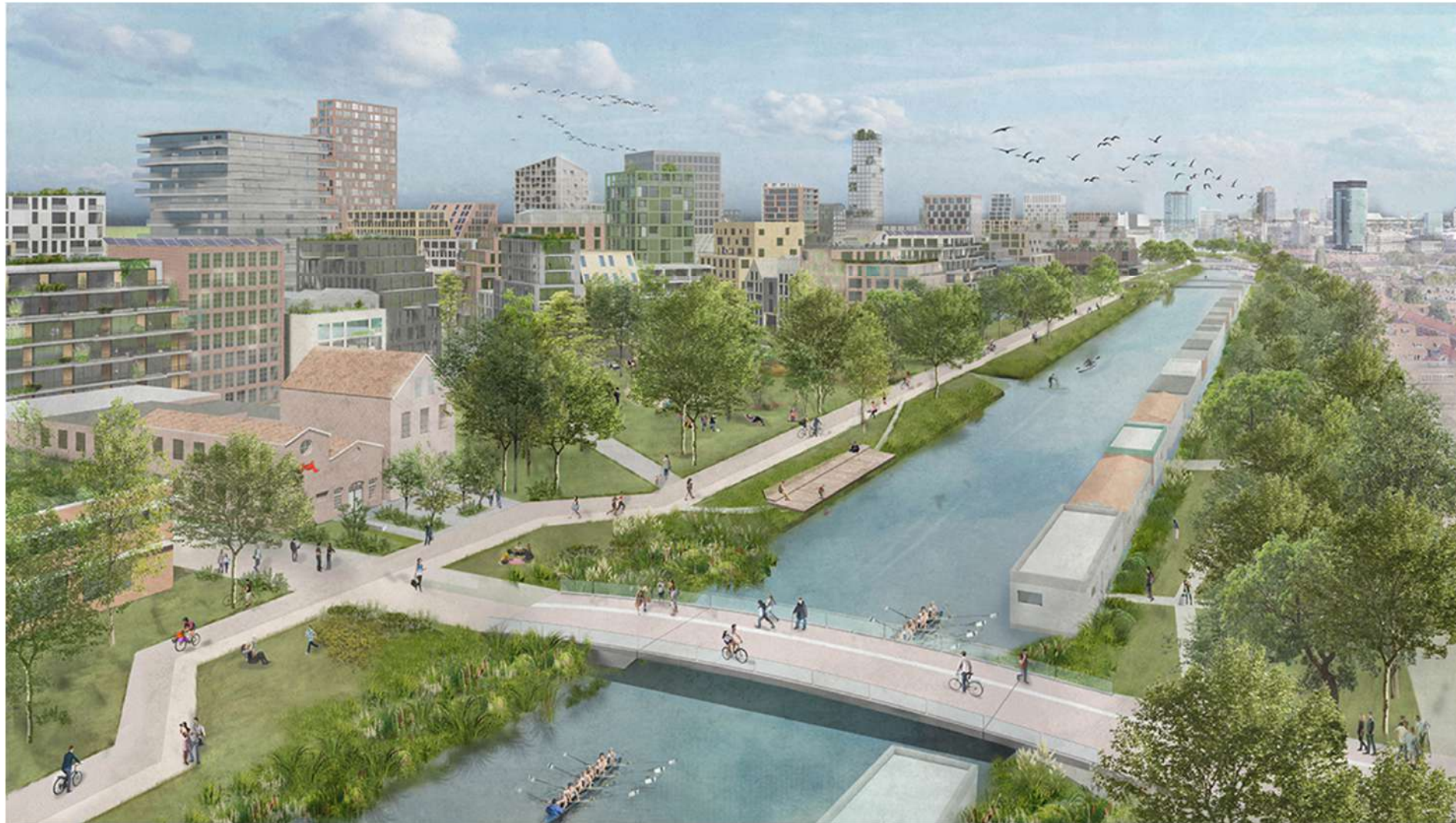


- + 54 acres
- + 6,000 homes
- + Jobs, cafes, gastro
- + Urban Planning competition
- + Ample open space, Parks
- + Blue streets and Green Spine

Rendering: BURA Urbanism/OKRA



# Merwedekanaal, Utrecht



Rendering: BURA Urbanism/OKRA

- + Park as flood protection
- + Preservation of historic buildings
- + bike/bus/tram connections
- + Mobility Hubs at perimeter



# Merwedekanaal, Utrecht

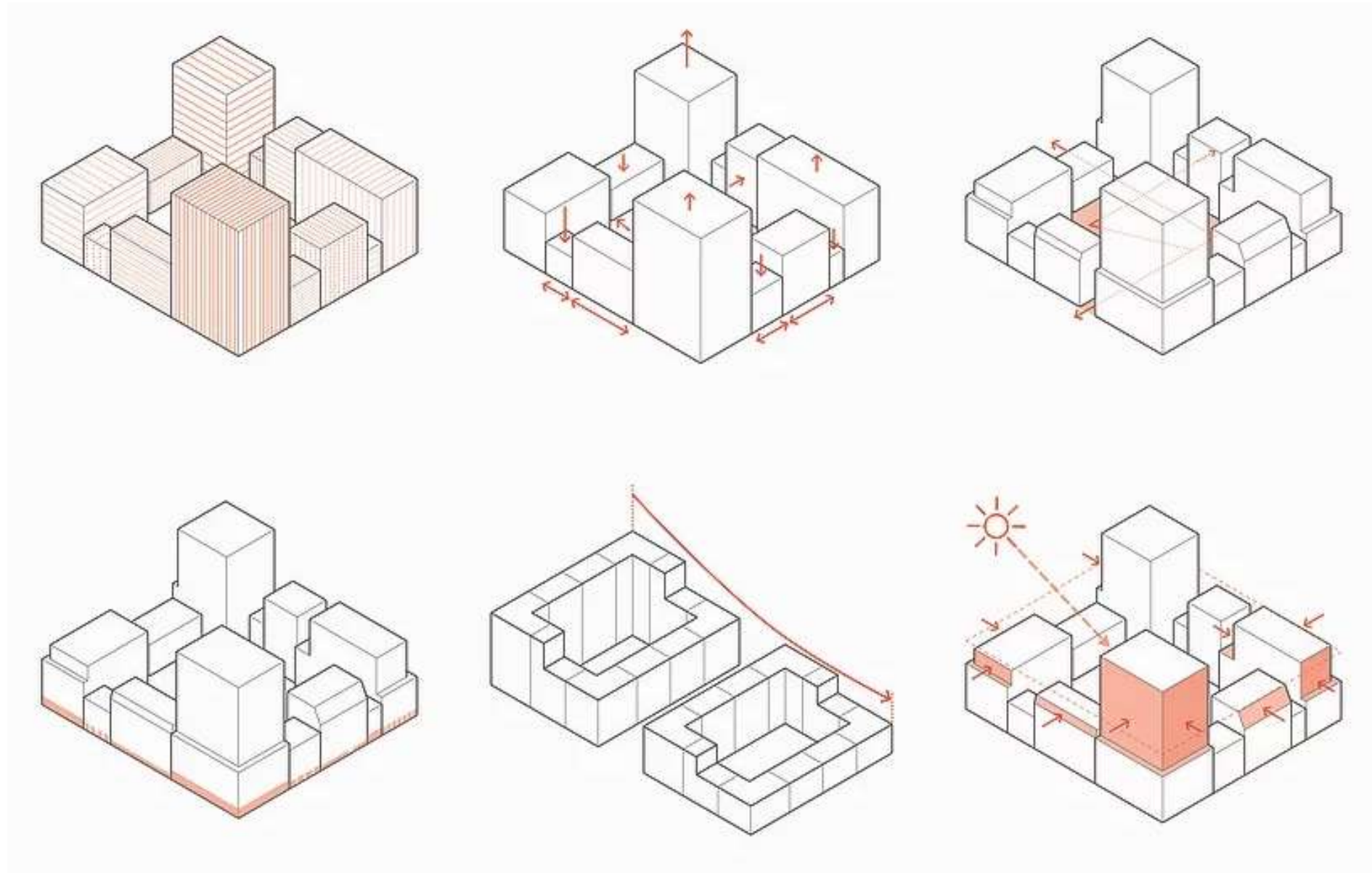


- + Carbon Neutrality goals
- + Circularity

Situation Plan: BURA Urbanism/OKRA



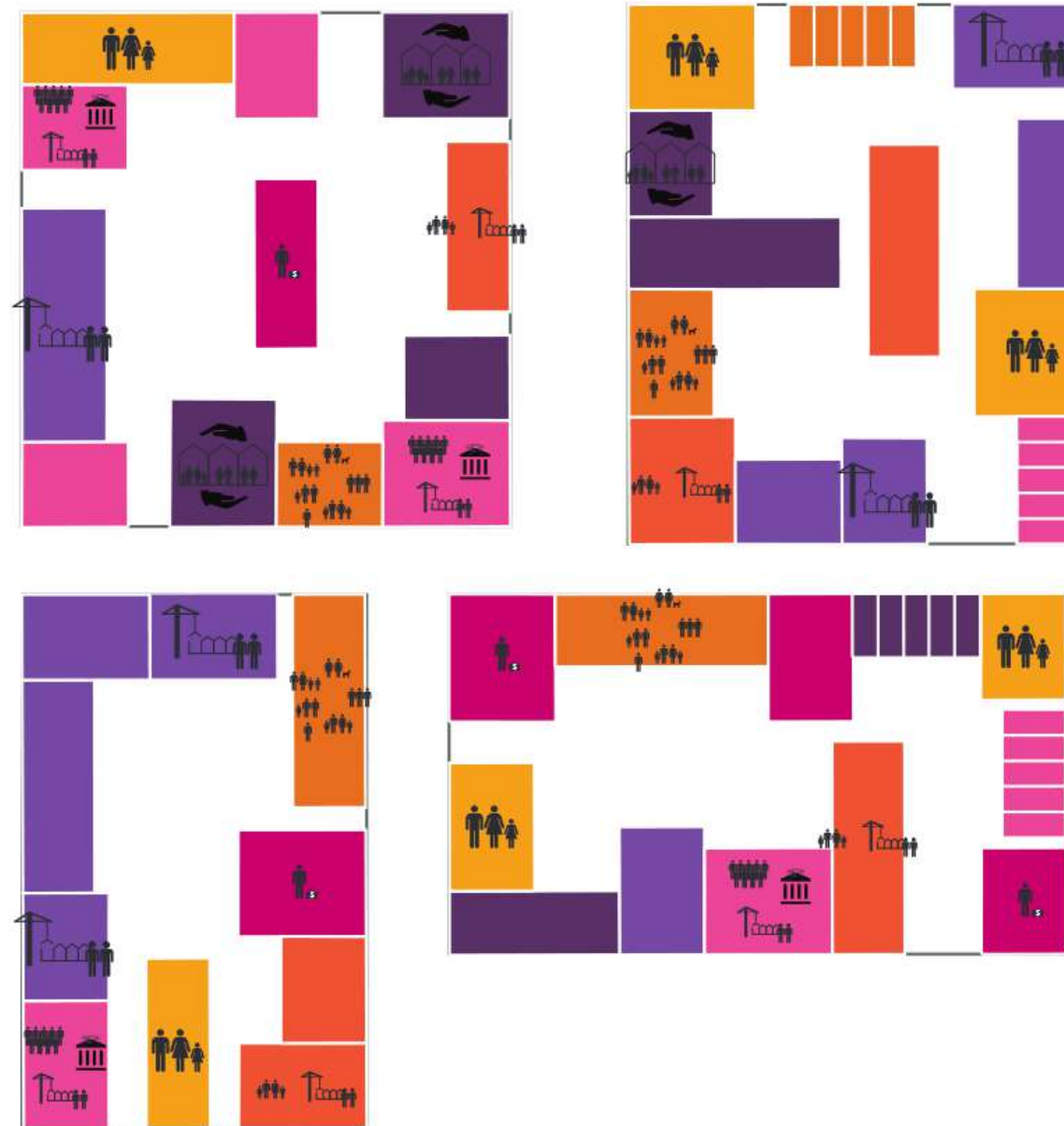
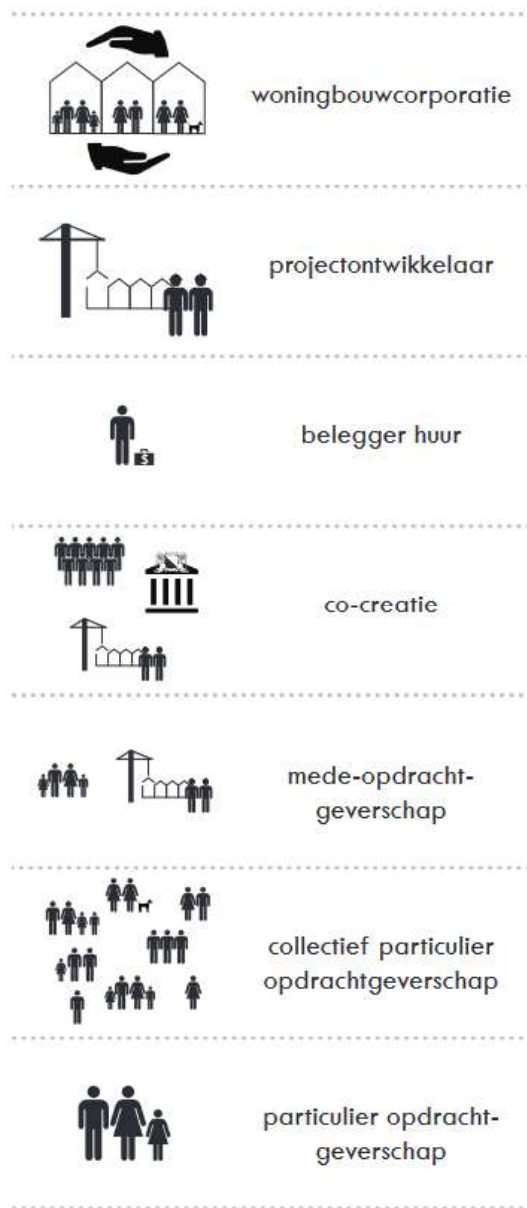
# Merwedekanaal, Utrecht



Block Massing Diagram: BURA Urbanism



# Merwedekanaal, Utrecht

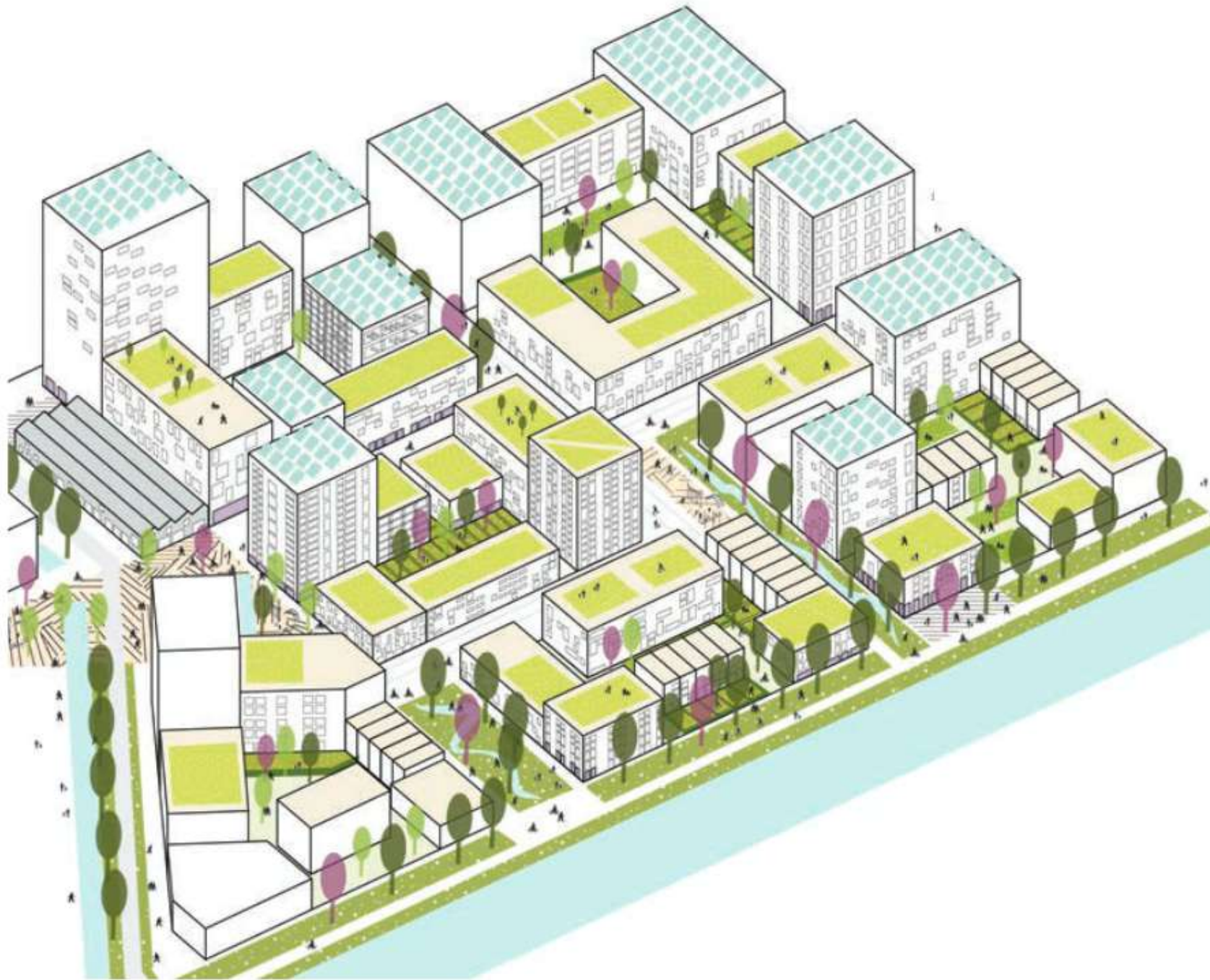


+ Varying ownership models  
 CPO  
 cohousing  
 non-profit cooperatives  
 market rate development  
 + radical mixing in block

Tenure Diagram: BURA Urbanism



# Merwedekanaal, Utrecht



- + Productive roofscapes
- + Living with nature

Rendering: BURA Urbanism/OKRA



# Merwedekanaal, Utrecht



Rendering: BURA Urbanism/OKRA



# Merwedekanaal, Utrecht



Rendering: BURA Urbanism/OKRA



# Indigenous-Led Development - Senakw



Rendering: Revery Architecture

- + Community Benefits
- + 6,000 homes
- + Passivhaus
- + Mass Timber
- + Scalable Model?



# Building Blocks for Livable Ecodistricts...



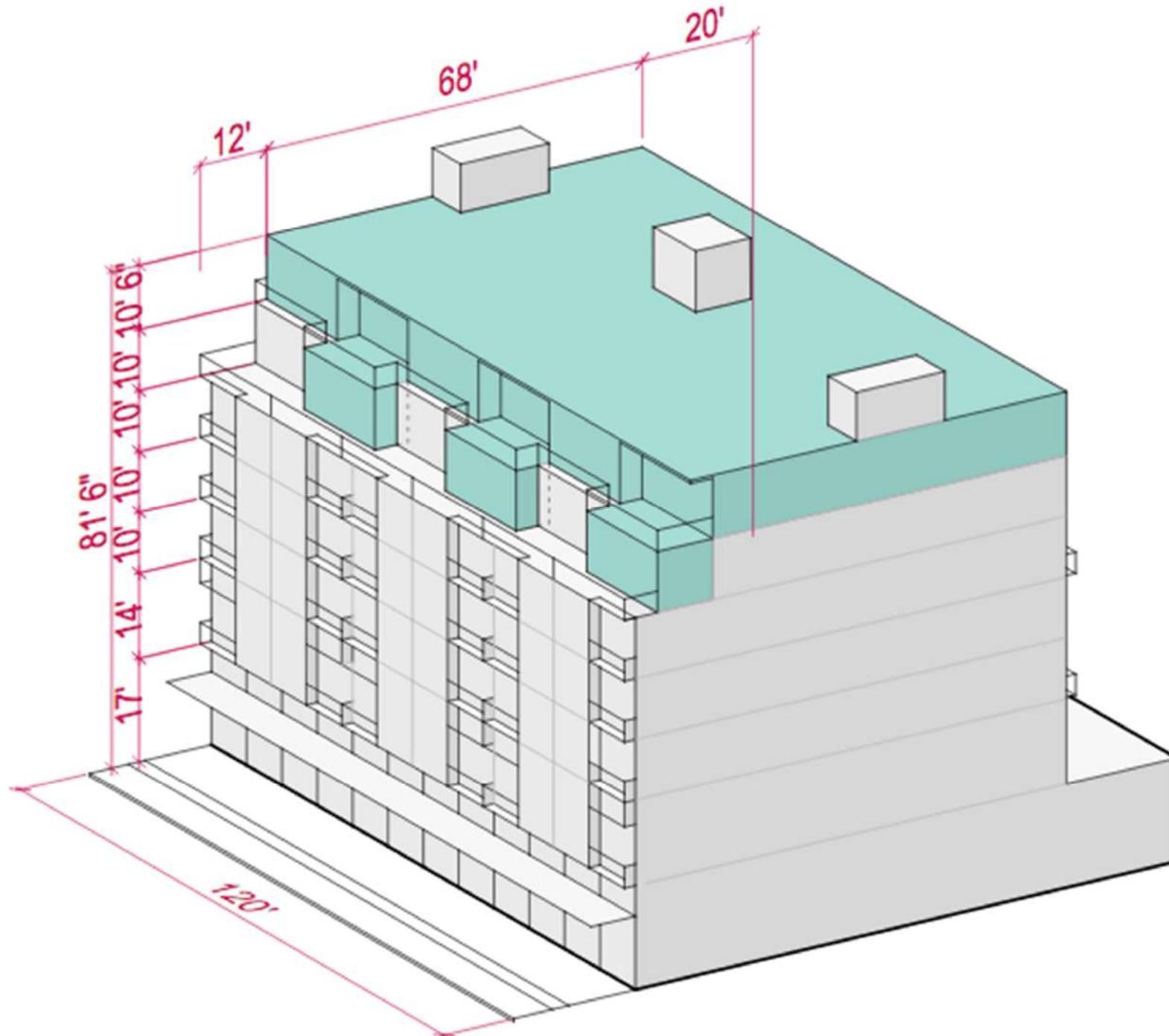
# Seattle Design Review



- + Modulation
- + Setbacks
- + Deference to Low Rise
- + Process 6 mos – 3 years
- + Massive development
- + Double loaded corridor



# Seattle's Affordable Housing Bonus



- + Height + FAR increase
- + Setbacks required
- + Structural implications
- + Maintenance implications
- + Energy Efficiency affected
- + Increased embodied carbon

Source: City of Seattle MHA Mid Rise Zoning Summary



# Elevator Rehab Planning

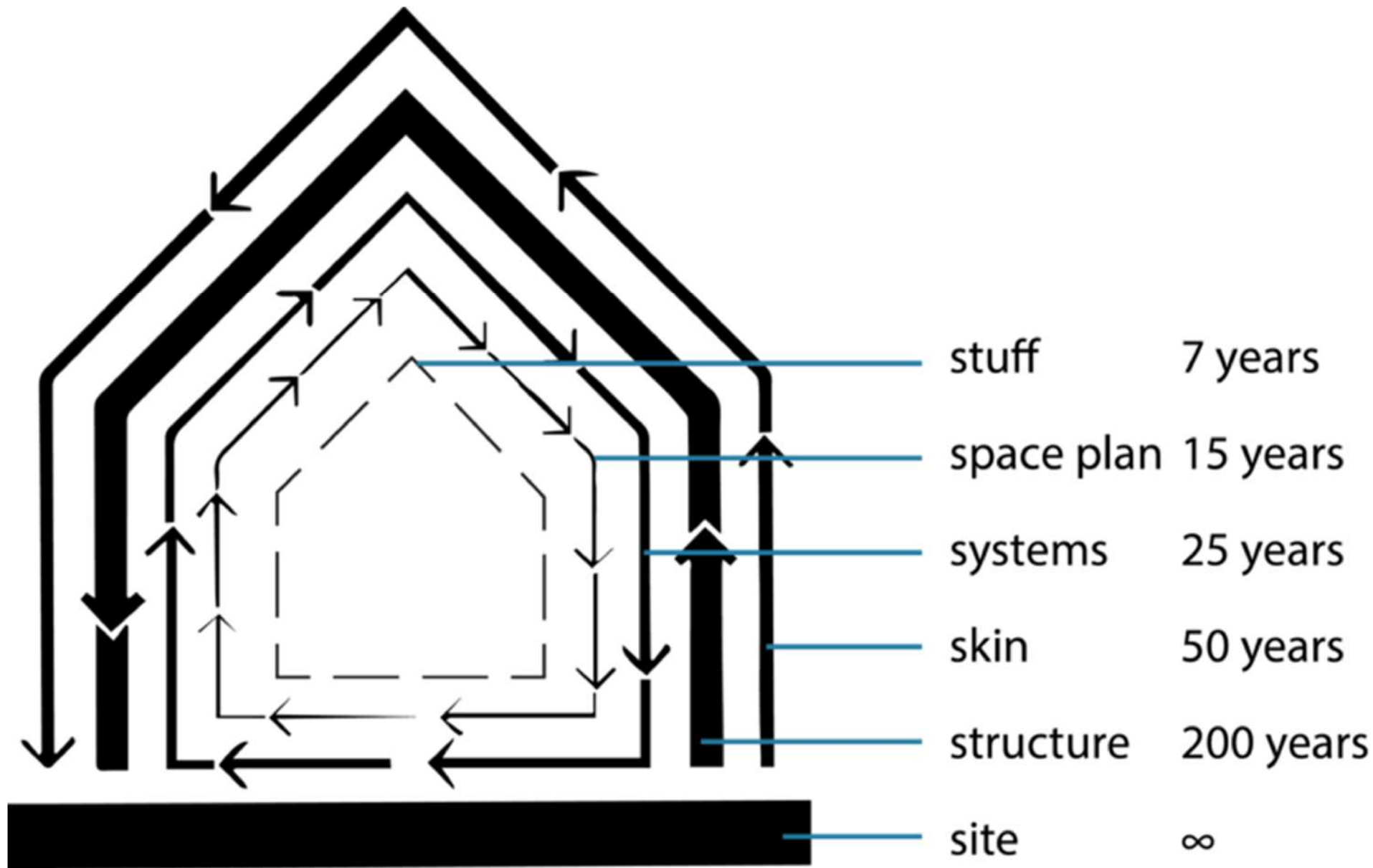


- + Where is Stair core Located?
- + Setbacks?

Foto: GEDA gmbh



# Open Buildings



## SITE

+ Tenure options?

## STRUCTURE

+ Robust, Oversized Structure  
+ Flexible Layouts  
+ Circularity/Demountable  
+ Raised Floor Systems

## SKIN

+ Demountable  
+ Adaptable

## SPACE

+ Circular  
+ Phased Build Out



# Open Buildings

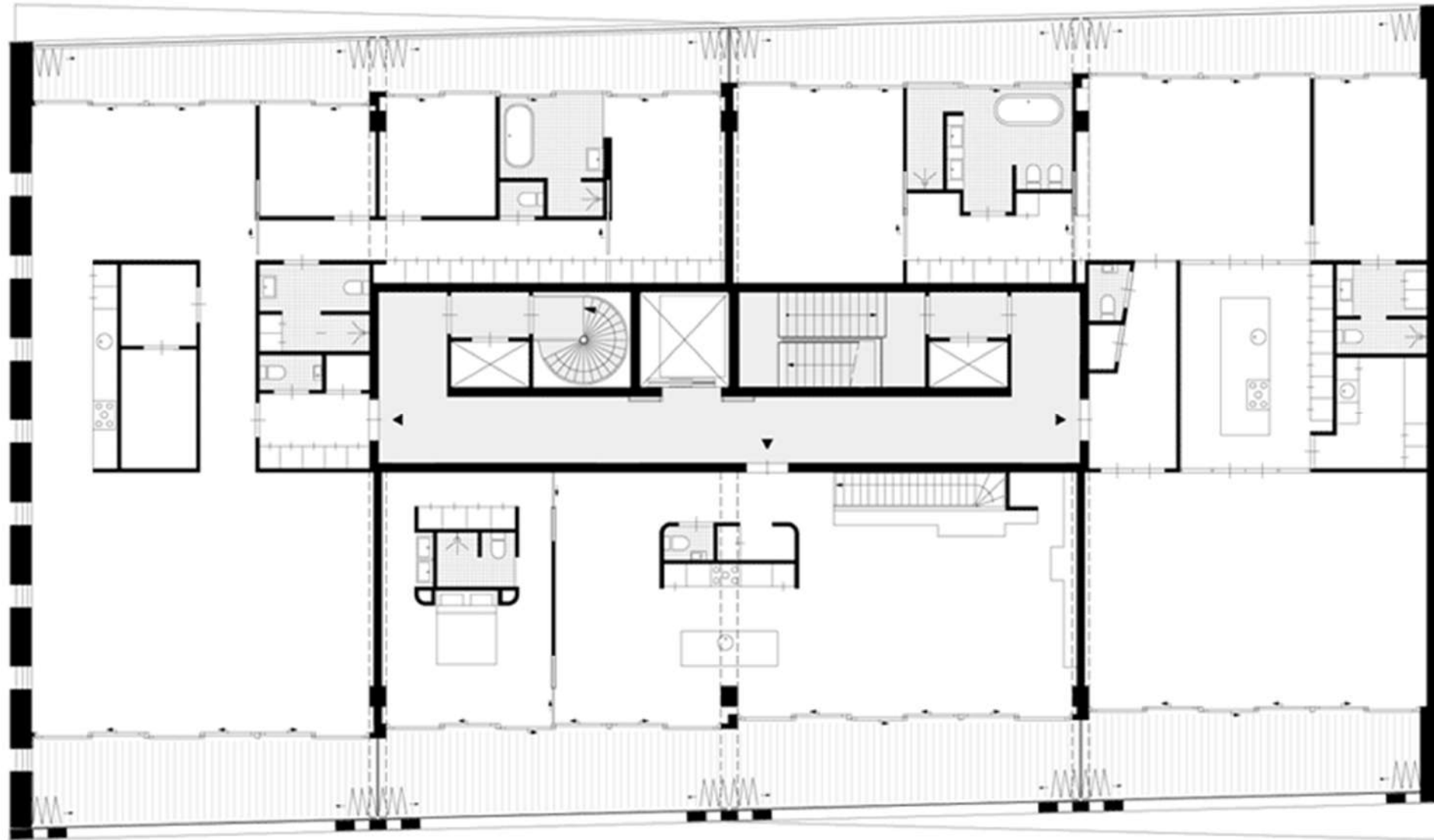


- + Patch22
- + Frantzen et al architecten
- + Flexible Planning
- + Low energy Façade
- + Mass Timber
- + Architect as Developer

Foto: Luuk Kramer



# Open Buildings

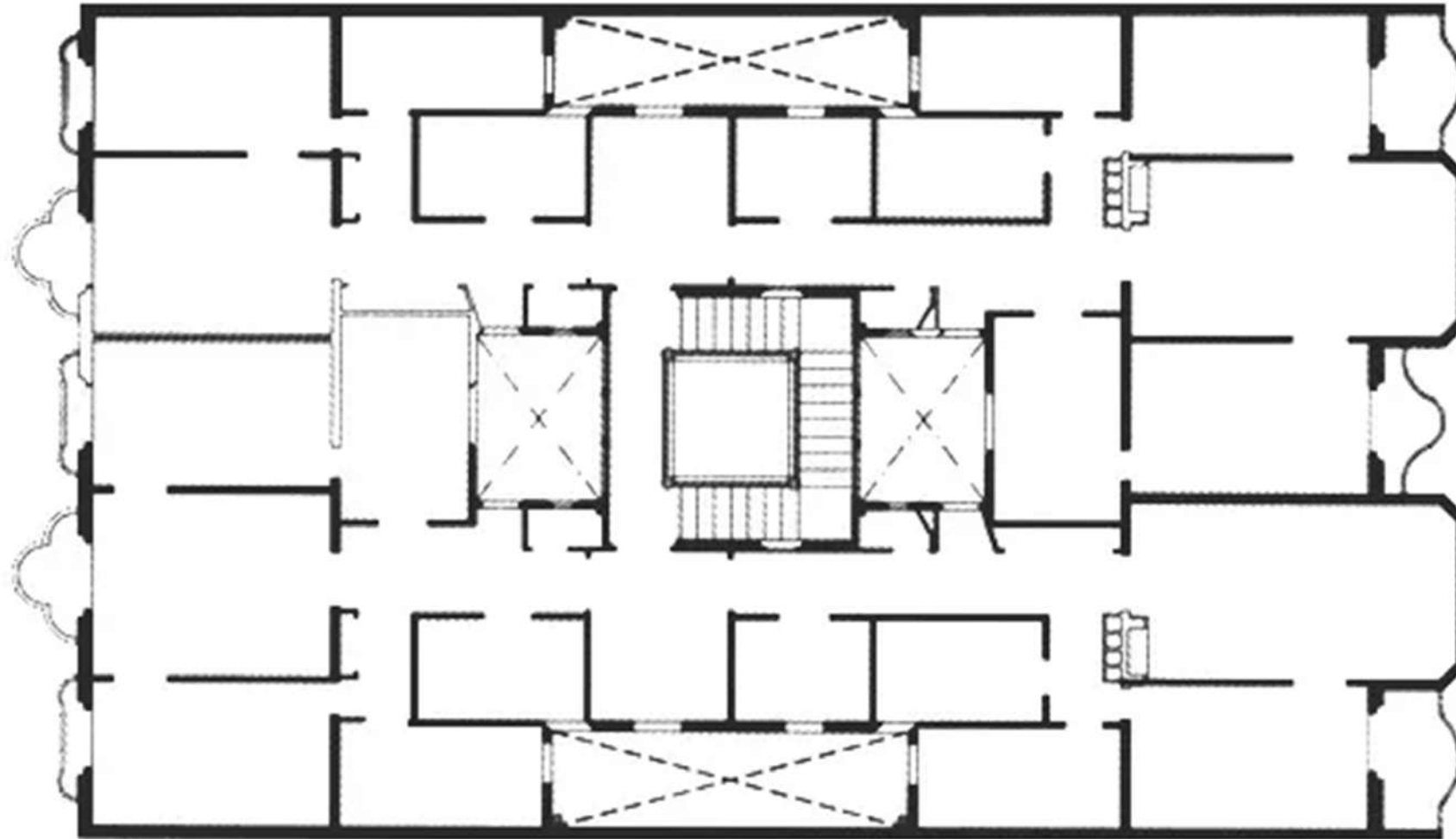


- + Flexible floor plan
- + Mix of unit types
- + Owner can finish
- + Centralized core
- + Centralized services

source: patch22.nl



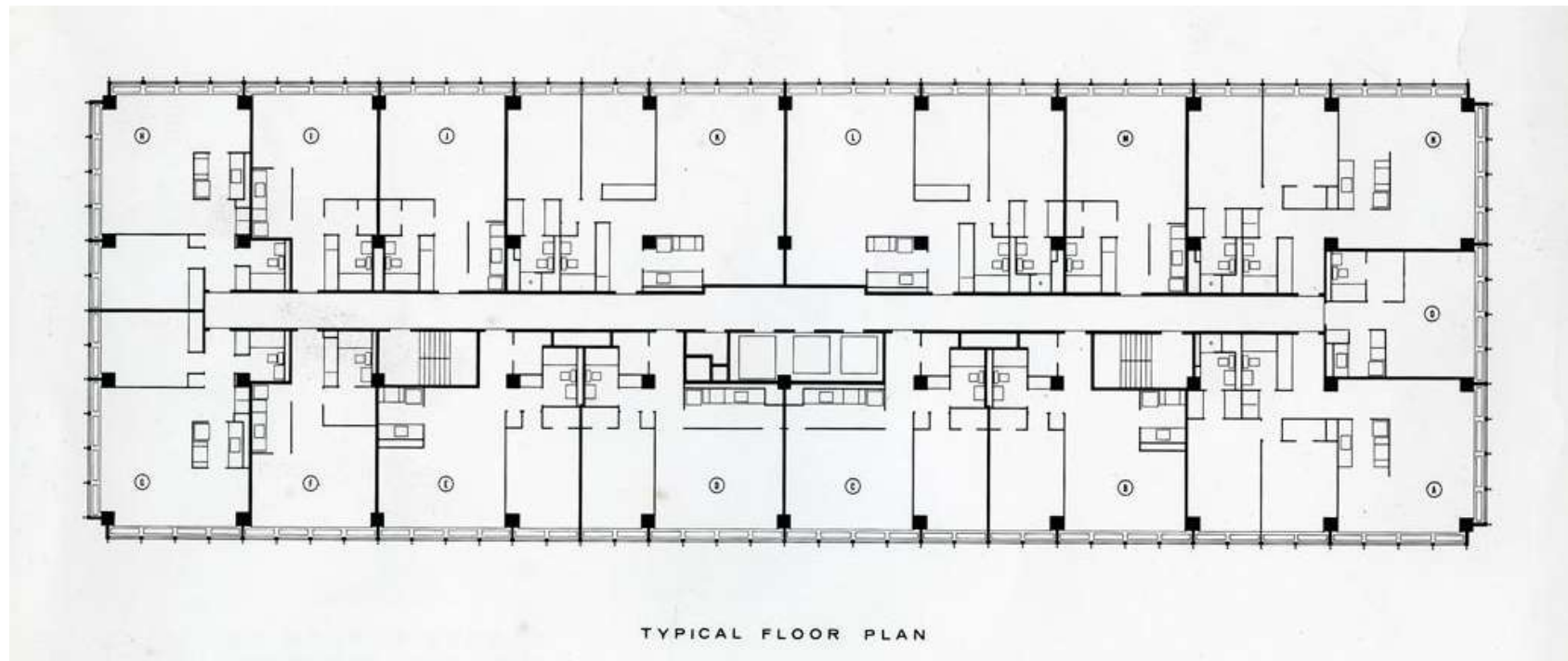
# Single Stair Buildings



Grundriss: Antoni Gaudi

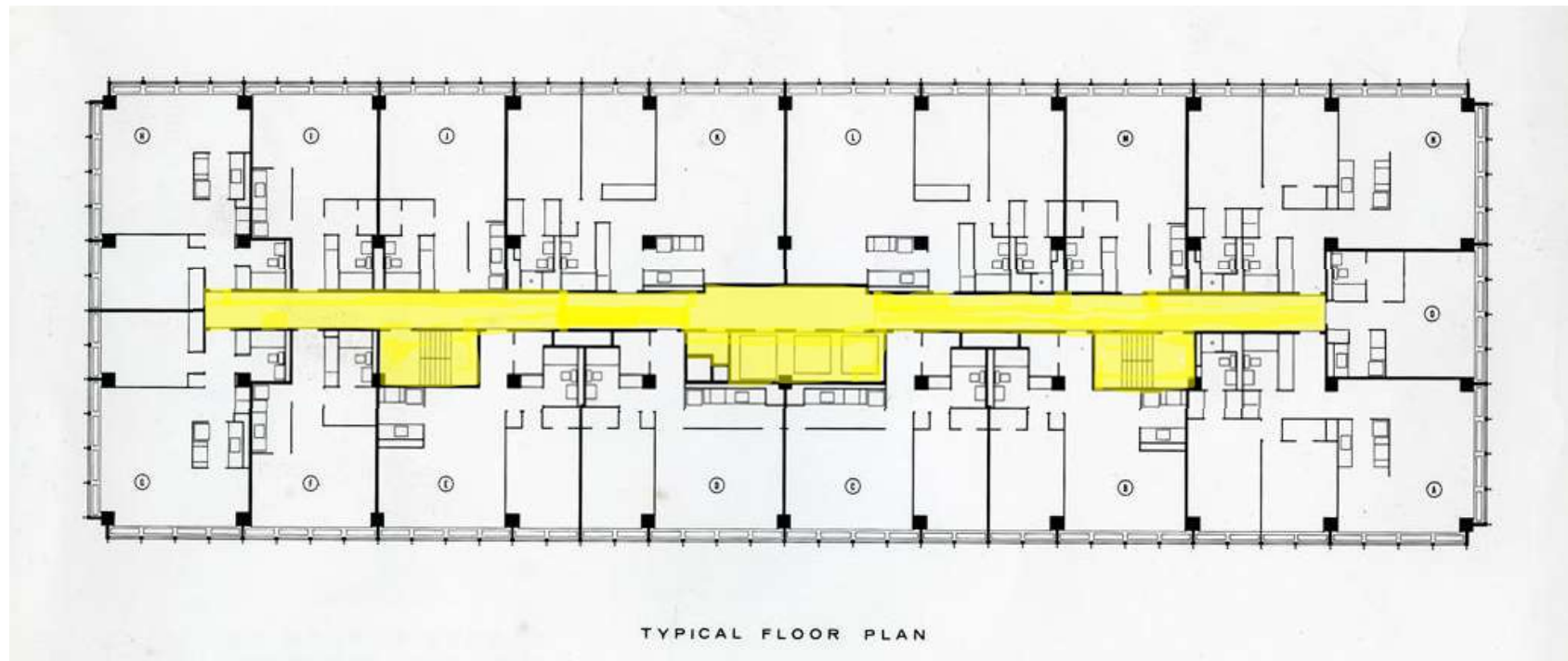
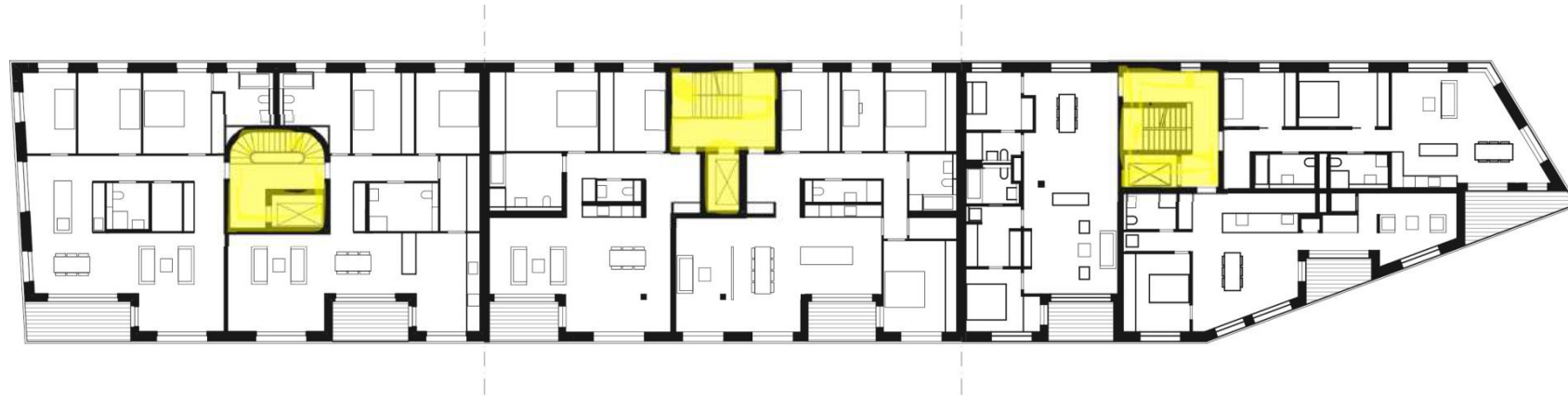


# Single Stair v. Double Loaded Corridor



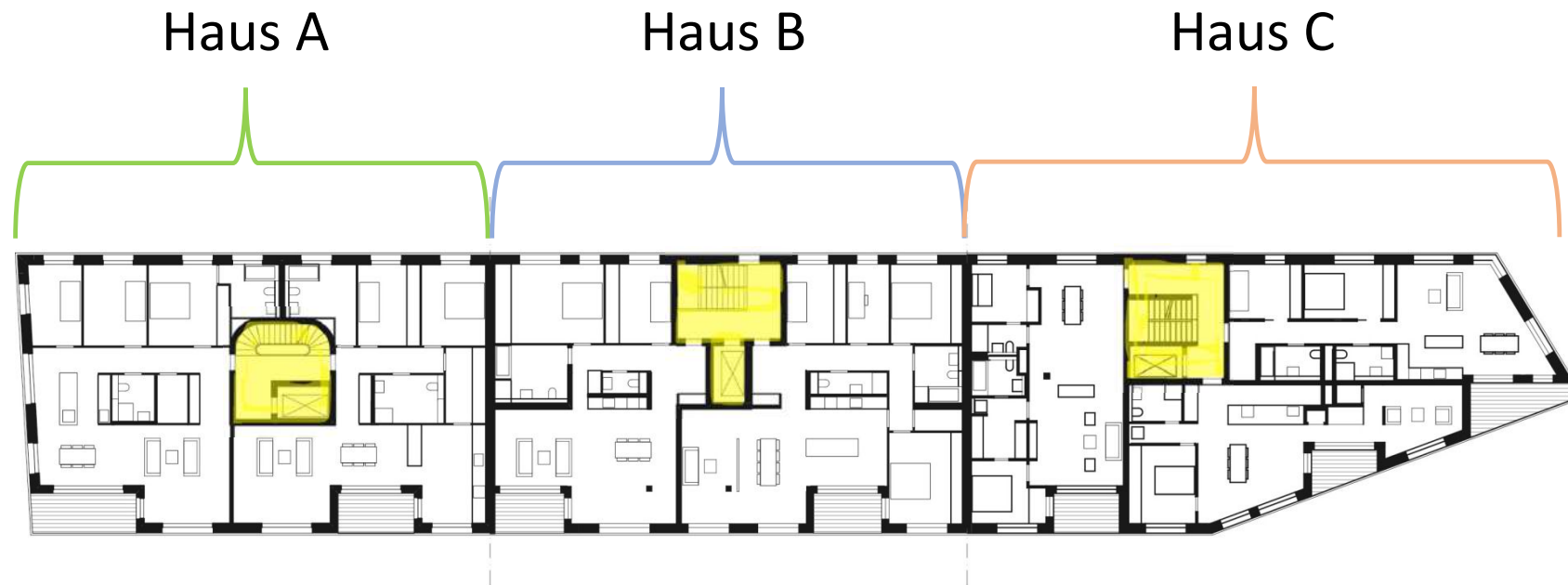


# Single Stair v. Double Loaded Corridor





# Dennewitz Eins, Berlin



- + 3 different buildings
- + 3 different architects
- + baugruppe on difficult site
- + Flexible floor plans
- + mix of unit types
- + Cross Ventilation
- + Light on multiple sides



# Dennewitz Eins, Berlin



- + roedig.schop architekten
- + dmsw architekten
- + sieglundalbert
- + controls and details

Foto: Andreas [FranzXaver] Süß



# How do our codes affect quality of life?



Foto: Allstar/Warner Bros



# Single Stair Highrise - Skaio, Heilbronn

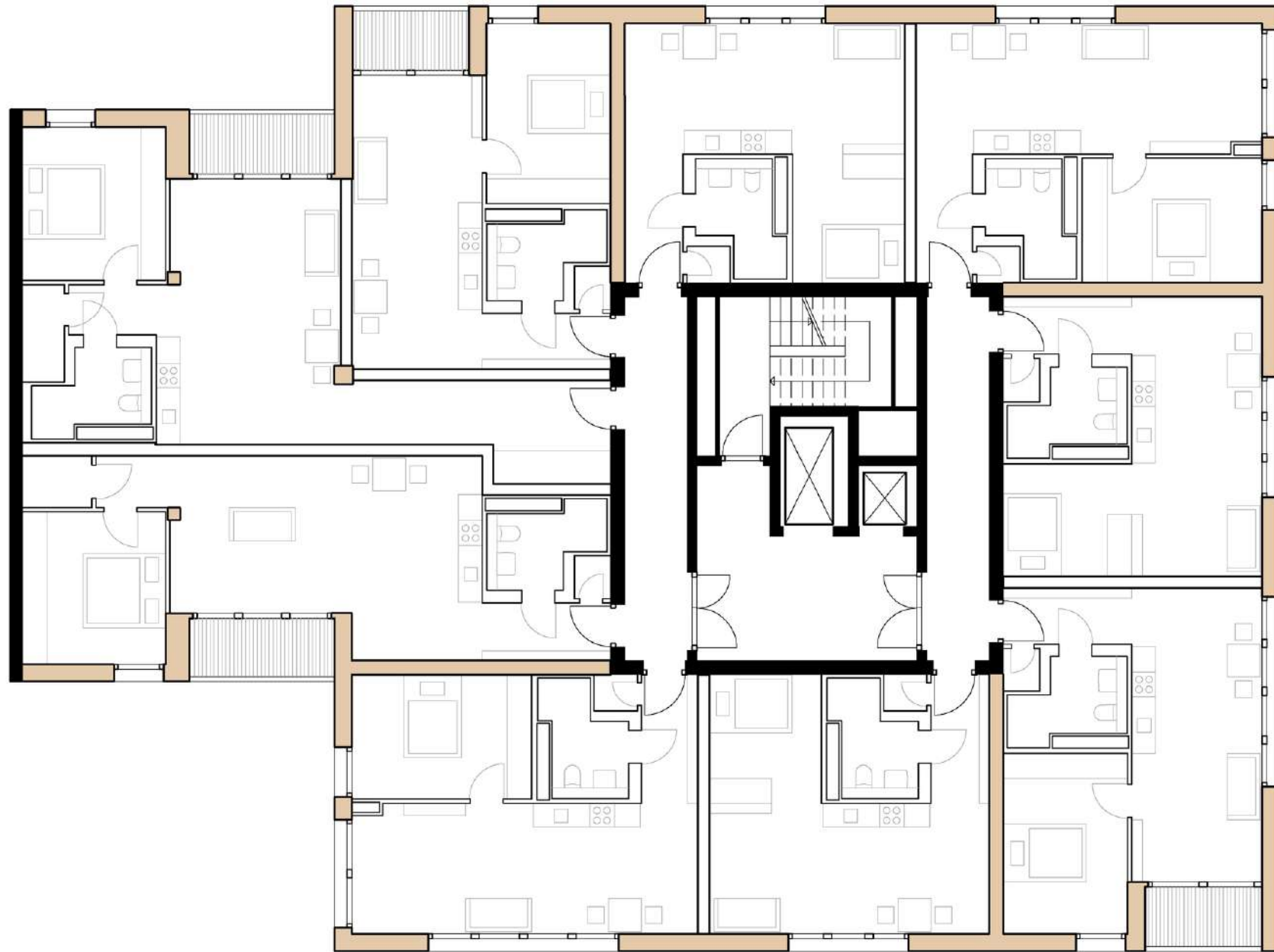


- + 10-story Mass Timber/Conc. Hybrid
- + Kaden + Lager Architekten
- + Single Stair
- + Sprinkler (rare)

Foto: Bernd Borchardt



# Single Stair Highrise - Skaio, Heilbronn



Grundriss: Kaden + Lager Architekten



# Single Stair Infill - Paris

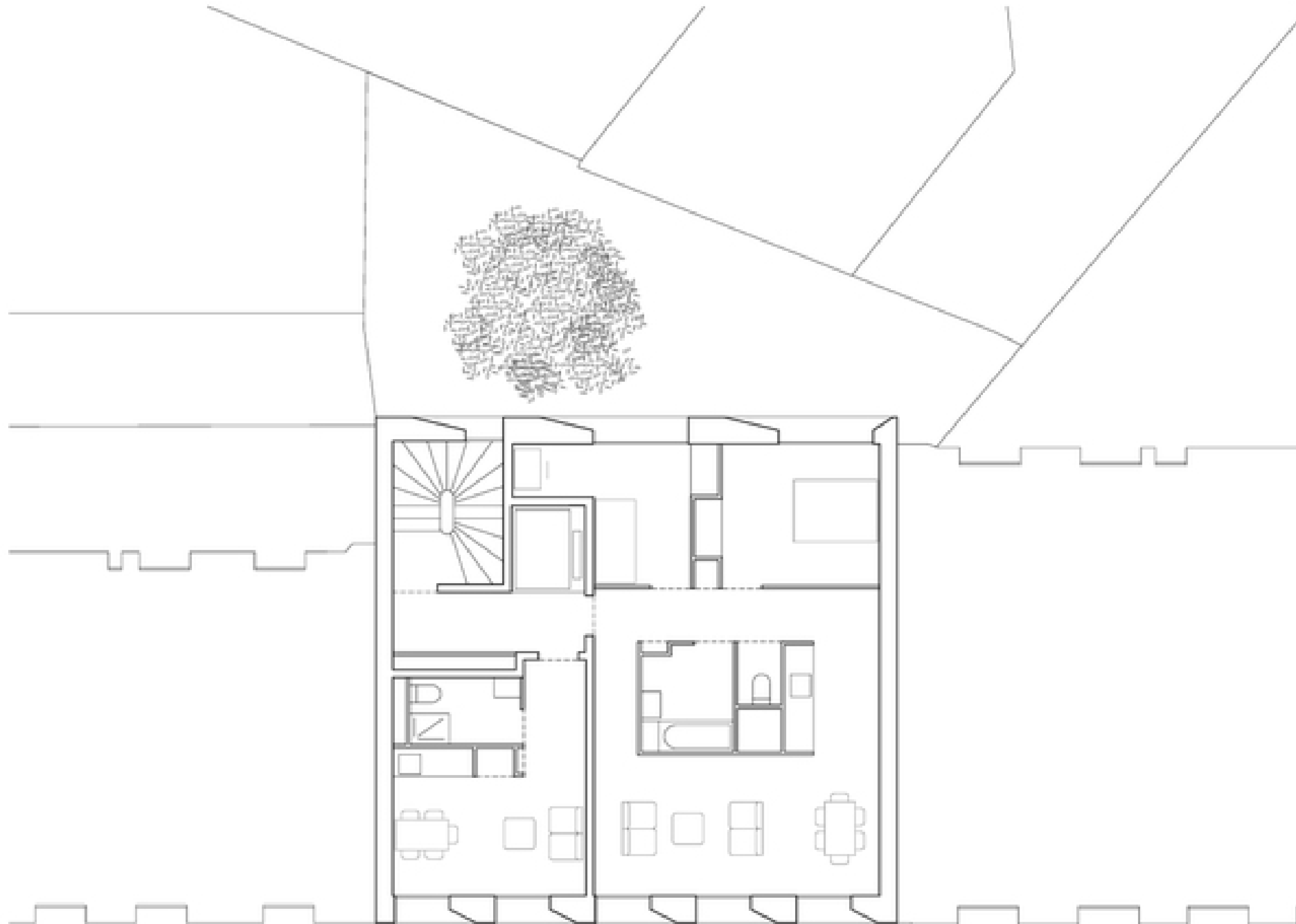


- + Social Housing
- + FRES architectes
- + Cost-effective infill
- + 2,300 sf parcel
- + FAR 2.7
- + €1,9M (CA\$300k/unit)

Foto: Philippe Ruault



# Single Stair Infill - Paris



- + 1-2 units per floor
- + Feasibility with 2<sup>nd</sup> stair?

Grundriss: FRES Architectes



# Light, Cross Ventilation, Unit Mix



- + Light on 3 sides possible
- + Cross Ventilation for most units
- + ~ 95% Floor efficiency
- + Larger units or more Amenities



Grundriss: GWJ Architektur



# Passivhaus Mandates? Import Brussels

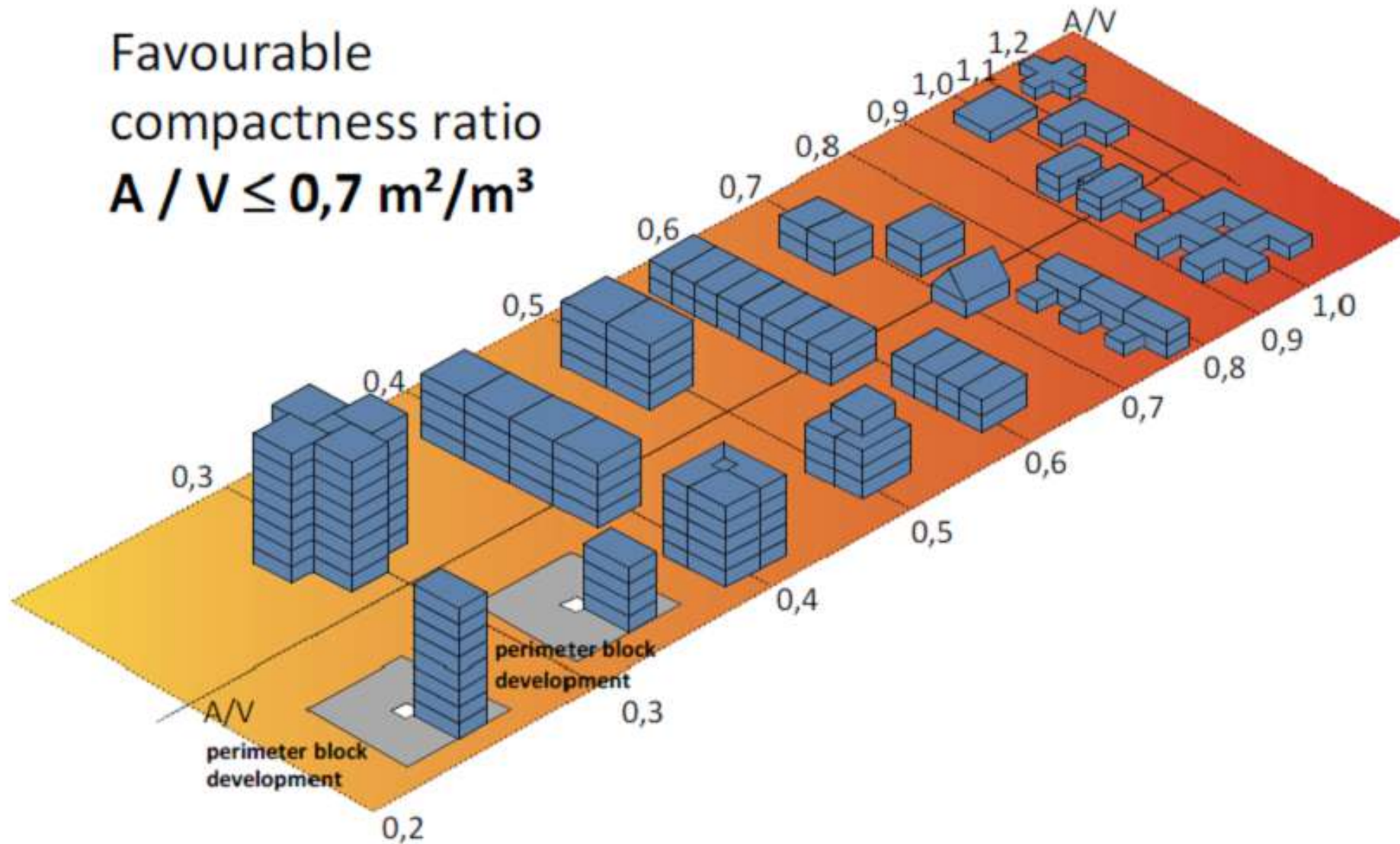


- + 2010 mandated Passivhaus
- + Trained industry
- + Promotion of projects
- + subsidy as carrot
- + worst E.U. energy code to best
- + In line with E.U.'s NZEB mandate

Foto: Stijn Bollaert

# Compactness is Critical

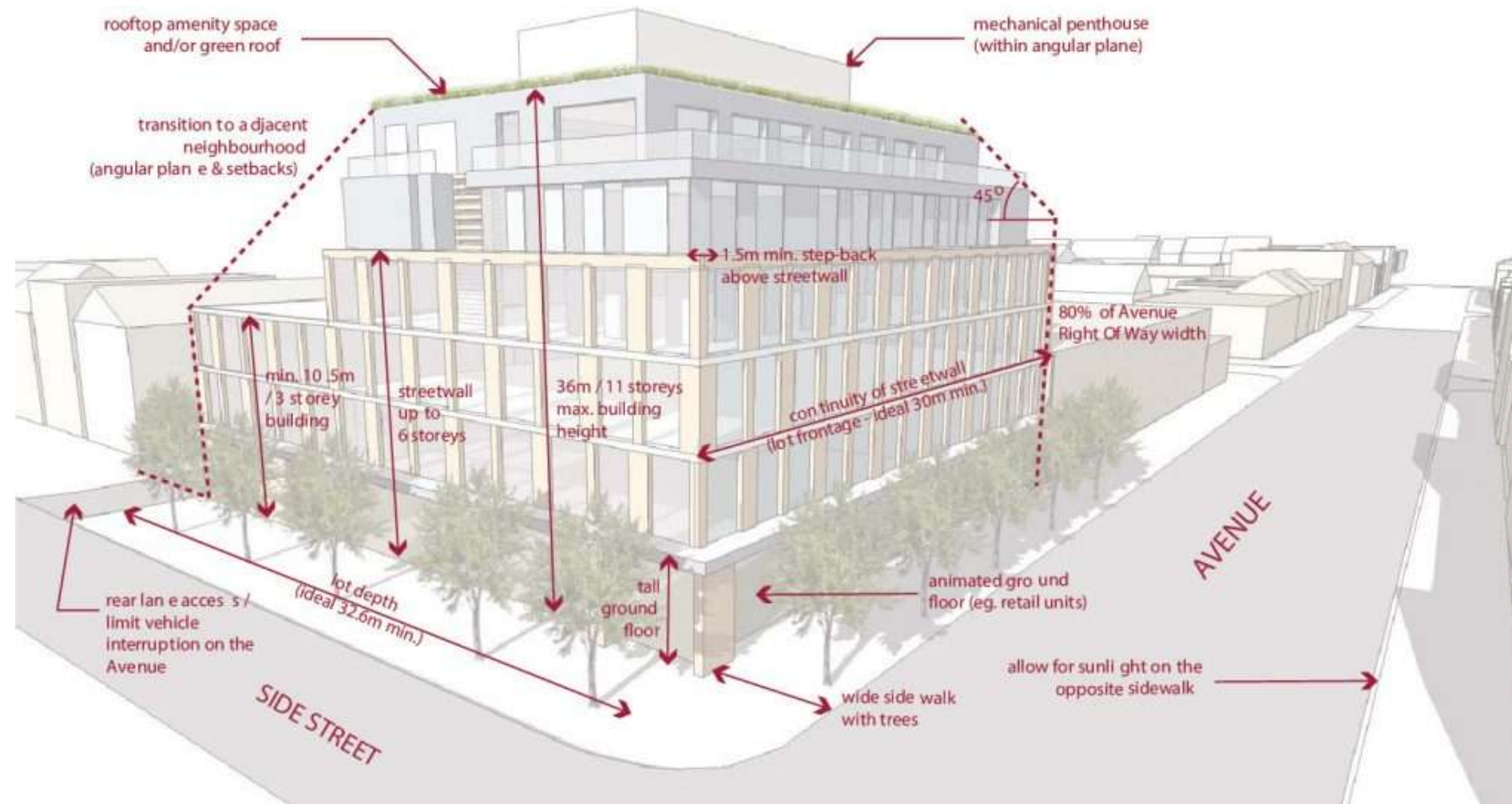
Favourable  
compactness ratio  
 $A / V \leq 0,7 \text{ m}^2/\text{m}^3$



- + Energy savings
- + Cost savings
- + Zoning code conflicts!



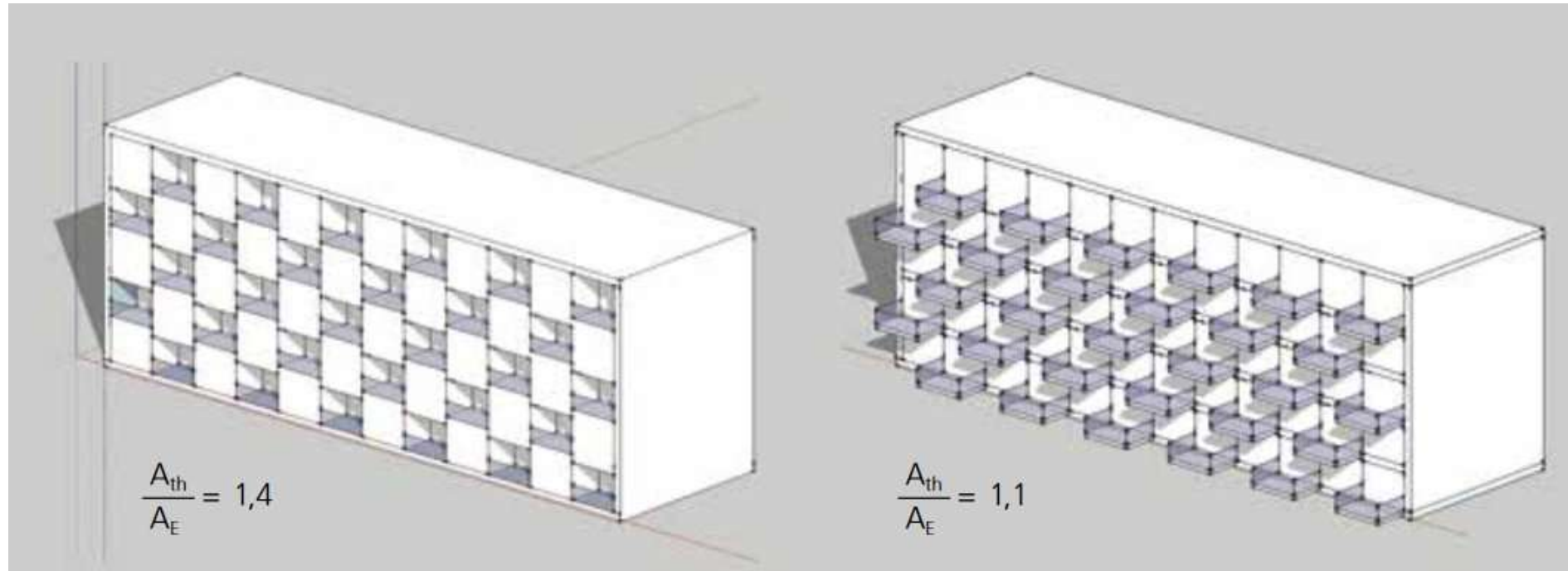
# Toronto Mid-rise Regulations



Source: Toronto Mid-Rise Guidelines

- + Modulation
- + Setbacks
- + Deference to Low Rise
- + Increased surface area
- + Increased thermal bridges
- + Funky Structure

# Surface Area matters



- + Left: 111% more surface area
- + Corners = thermal bridges
- + Loggia: Protected
- + Cantilevered Balcony = TB



# Zoning for livability?



+ Balconies can break up form

Foto: Hertha Hurnaus



# Aufstockungen (Vertical Additions)



- + Josef Weichenberger Arch.
- + Margaretenstrasse 9
- + Egress: Single stair
- + 3 floors over 4 floor Gruenderzeit
- + Energetic retrofits
- + Gentle Urban Renewal
- + Lightweight wood is good!

Foto: Erika Mayer



# Solar Protection + Overheating



- + Stress Test Energy Models
- + External Shading Industry?
- + Active Cooling likely needed
- + Passivhaus = small demand

Foto: Aryan Mirfendereski

# Mitigating Noise



- + Building block noise
- + Car-free/traffic calmed interior
- + Wohnquartier Ludlstrasse, Munich
- + 373 homes, daycare, youth center
- + Alleswirdgut

Situation Plan: Alleswirdgut



# Mitigating Noise



Rendering: Alleswirdgut

# Mitigating Noise



- + Passivhaus social housing
- + Shunting yard and U-bahn
- + Hall & amenity space as buffer

Foto: Lukas Schaller



# Mitigating Noise

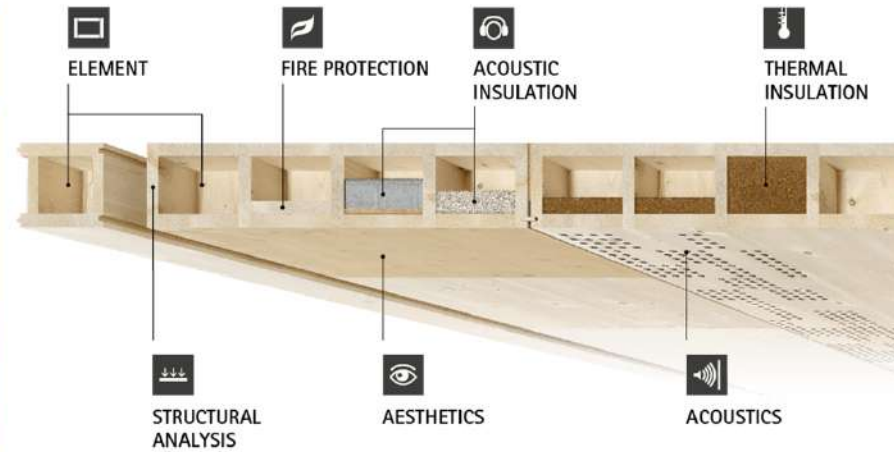


Foto: Lukas Schaller

# Mass Timber 2.0

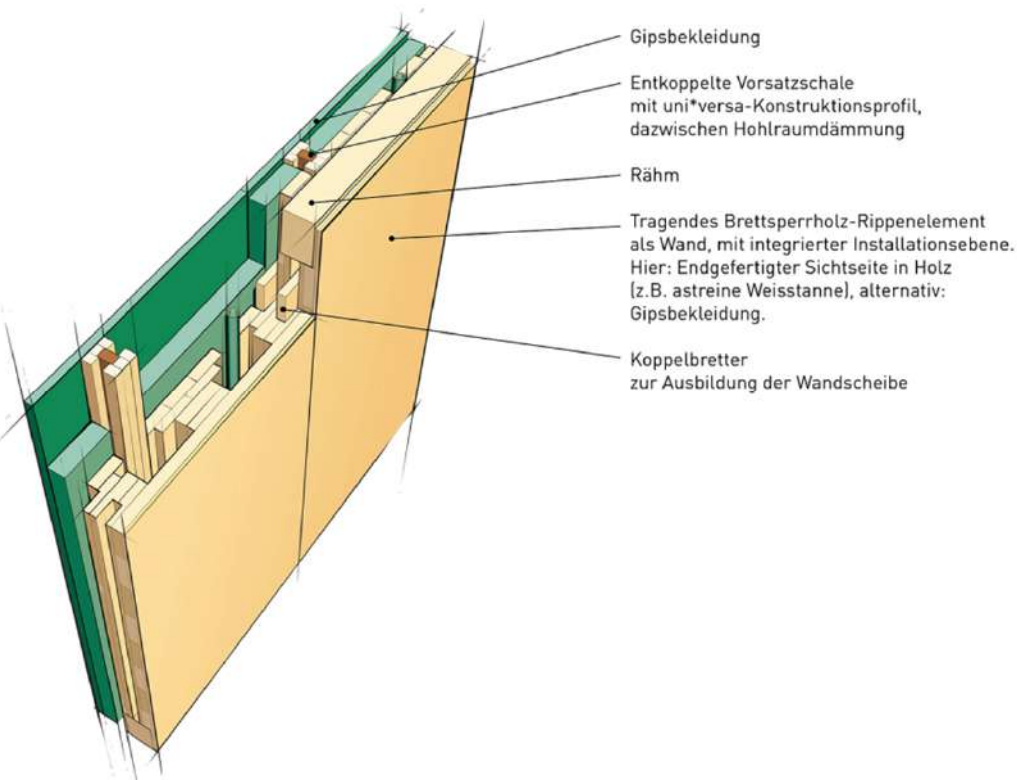


Foto: Lignotrend



- + Moving beyond CLT
- + Less Fiber
- + Better Performance
- + Are codes ready?

- + E.U.'s New European Bauhaus
- + Climate Protection Strategy





# Prefabrication



Foto: Howoge Dombrowsky



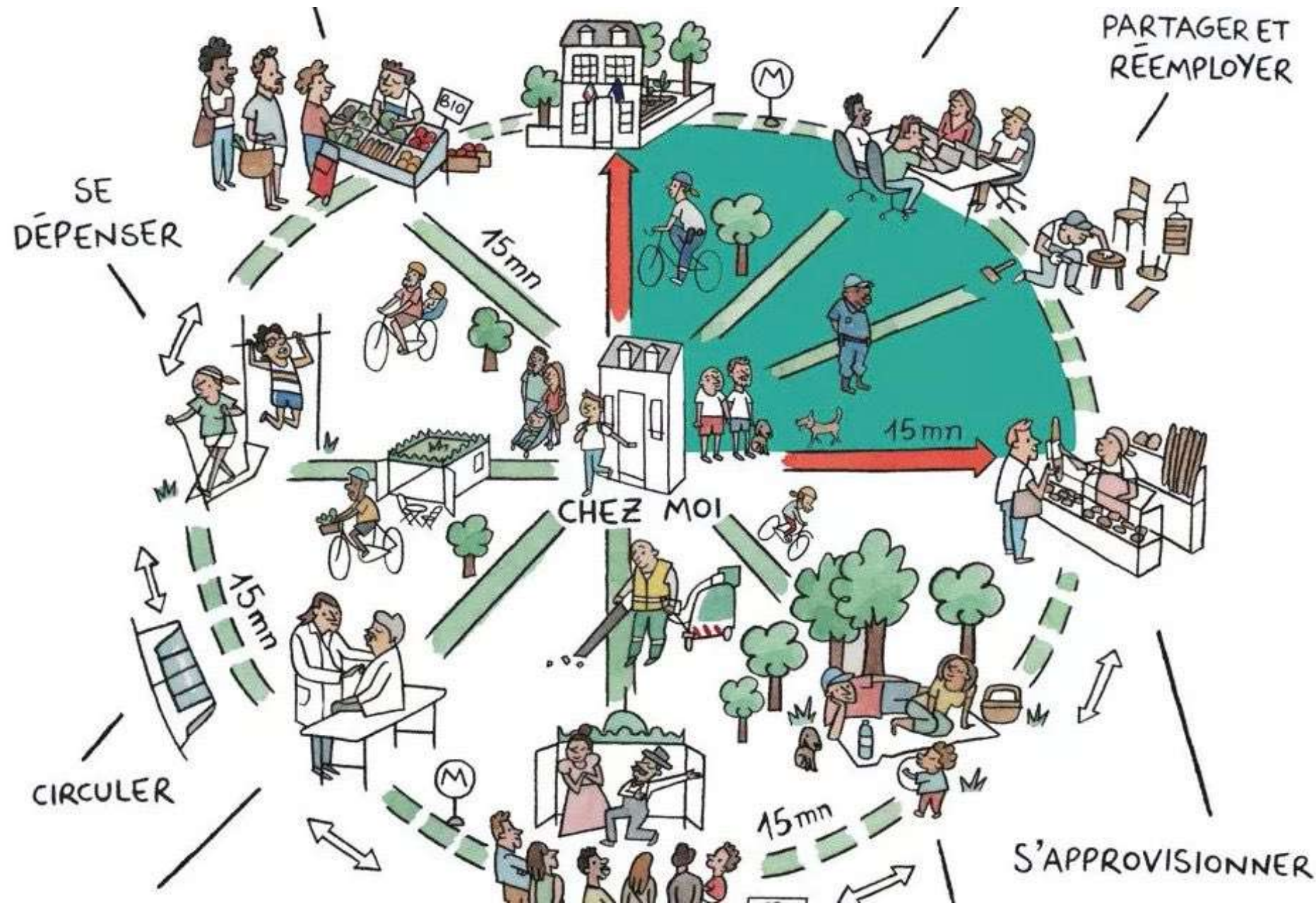
# Innovative Decarbonized Materials



Foto: Lorenz Märtl

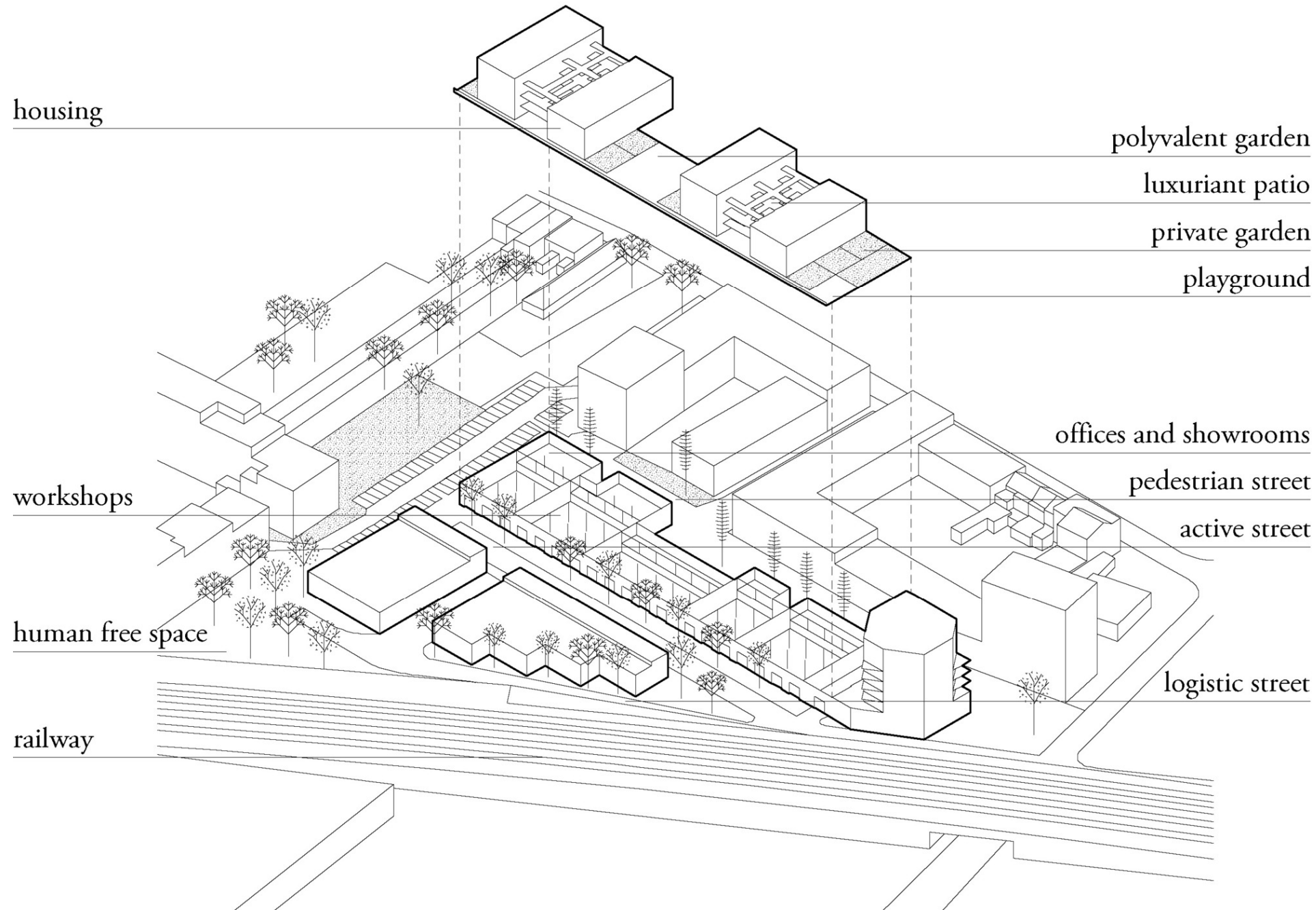


# 15 Minute Cities



- + radical mixing of uses
- + solidarity
- + sustainable mobility
- + radical affordability
- + radical density

# Productive Cities



- + Inhabited Milieu
- + Radical Mixing of uses
- + NovaCity, Anderlecht (BE)
- + 63 apts over workshops
- + Bogdan & van broeck, DDS+

Foto: Bogdan & van broeck



# Productive Cities



Rendering: Bogdan & van broeck



# Thank You for Listening!



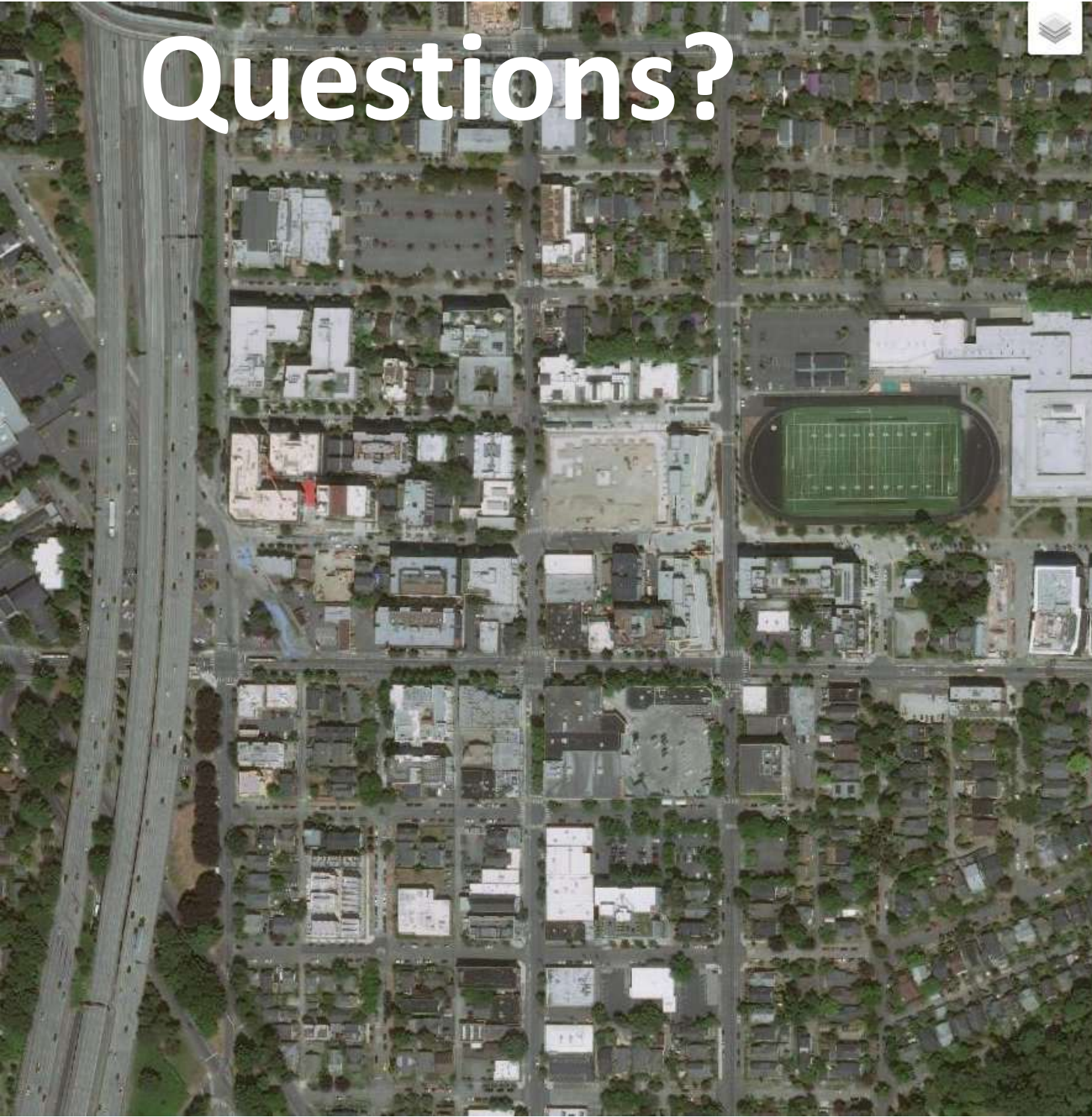
+ Michael Eliason

+ michael@larchlab.com

Foto: Heather Eliason



# Questions?



Two Maps One Scale

