This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 862820

BUILD IN WOOD

DUTCH PILOT PROJECTS

PARTNERS

DANISH TECHNOLOGICAL INSTITUTE

WAUGH THISTLETON ARCHITECTS

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scandibyg

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Empowering you to realise

Treteknisk

storaenso

LOCATION

NEW RESIDENTAIL DEVELOPMENT

SUBURBAN SITE

Coordinates : 52°47'N 4°48'E

SCHAGEN - MUGGENBURG ZUID

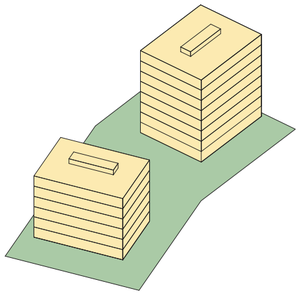
AMSTERDAM - MOLENWIJK

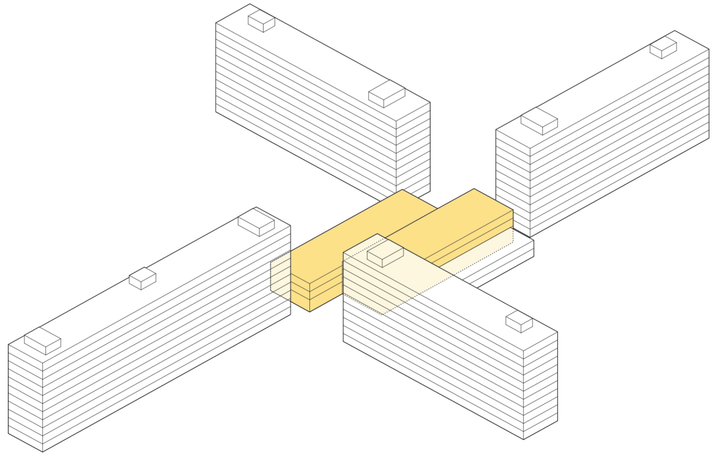
EXISTING BUILDING EXTENSION

PERI-URBAN SITE

Coordinates: 52°25'N 4°53'E

AT A GLANCE

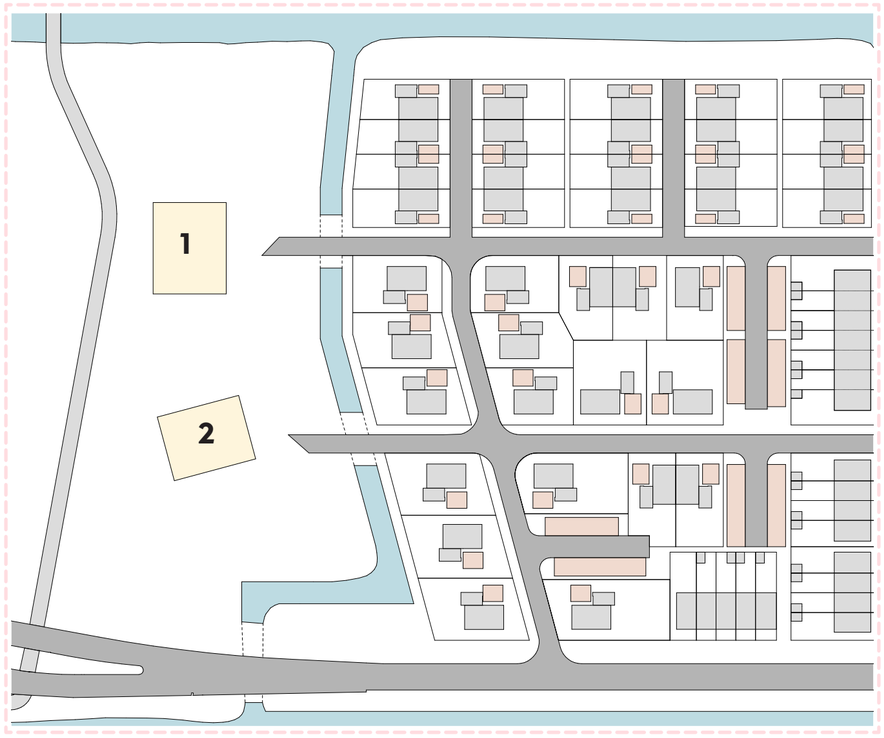




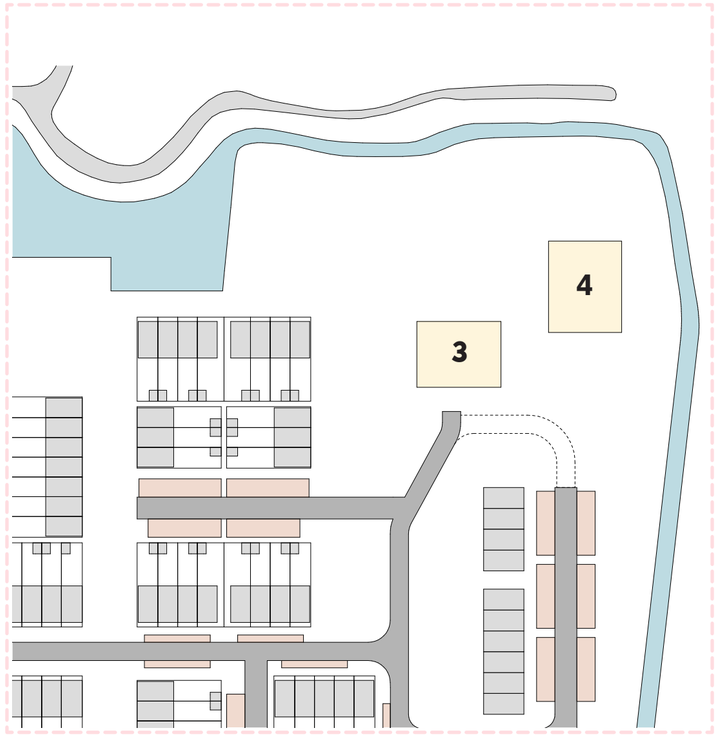
SCHAGEN MUGGENBURG ZUID	PARAMETERS	AMSTERDAM MOLENWIJK
4no.	Number of blocks	1 no. (exixtib build. extension)
Residential	Building Use	Residential
60 to 100 (depending on mix)	Number of houses	40
7000	GIA (m2)	6720 (resi. extension)
5 to 7 storey (3250 mm floor to floor)	Building Height (m)	4 exist.+ 3 extension (3000 mm floor to floor)
2.5+Self-weight	Assumed Dead Load (kN/m2)	2.5+Self-weight
2	Assumend Live Load (kN/m2)	2
6 floors/8 beams	Floor Vibration	6 floors/8 beams
55	Acoustic Performance (L'nTw, dB)	55
60	Fire Performance (mins.)	60
0.2 min.	U-Value (W/m2K)	0.2 min.

1.SCHAGEN - MUGGENBURG ZUID

SITE - MASTERPLAN



SITE A



SITE B

FOUR RESIDENTIAL BLOCKS

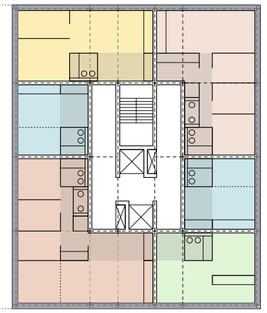
OUTLINE TARGET: 20 TO 40 HOUSES x BLOCK (final number depending on mix. and build. height)

BUILDING FOOTPRINTS SLIGHTLY DIFFERENTLY SIZED

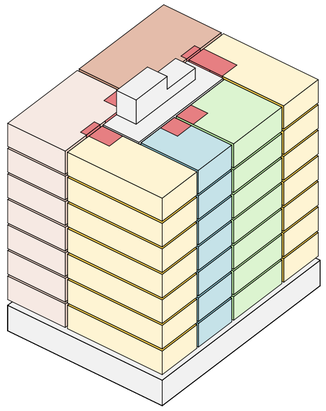
KEY:

- Pilot projects / Blocks (5 to 7 storey)
- Buildings (2 to 3 storey)
- Primary /Secondary roads
- Parking spaces
- Canals

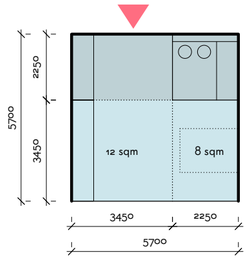
KEY HOUSE TYPES



TYPICAL FLOORPLAN (6 HOUSES X FLOOR CONFIGURATION)



48 HOUSES - TYPICAL 8 STOREY

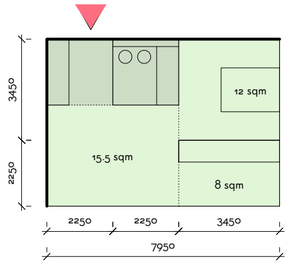


STUDIO

Single aspect unit

(never facing North)

33 sqm

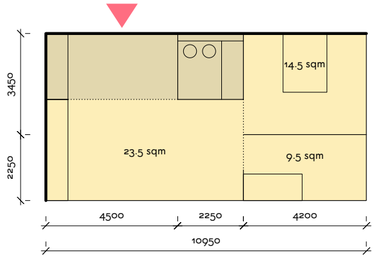


1 BED / 2 PERSON HOUSE

Dual aspect unit

(Corner unit)

46 sqm

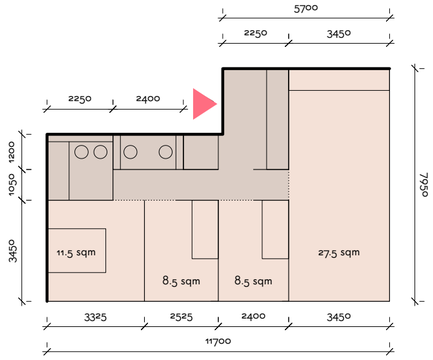


2 BED / 3 PERSON HOUSE

Dual aspect unit

(Corner unit)

63 sqm

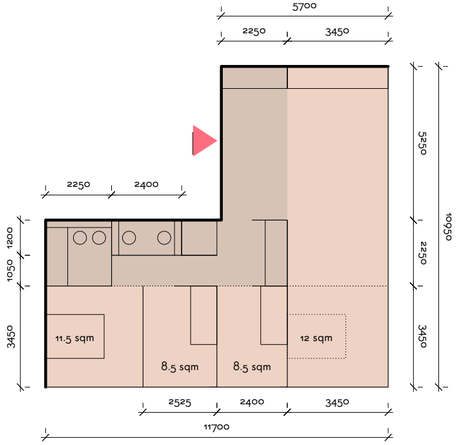


3 BED /4 PERSON HOUSE

Dual aspect unit

(Corner unit)

80 sqm



4 BED /6 PERSON HOUSE

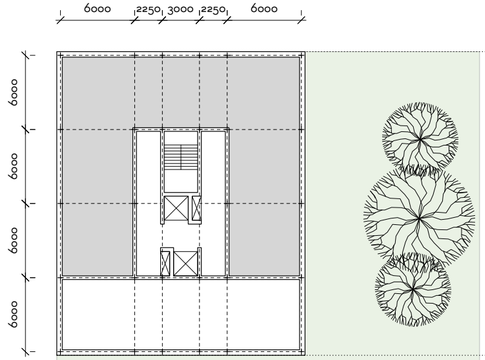
Dual aspect unit

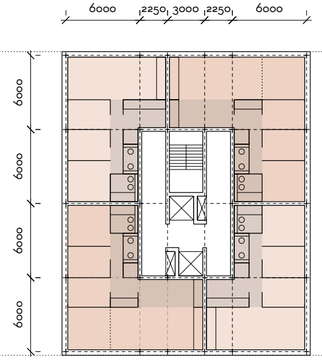
(Corner unit)

97 sqm

FIVE KEY HOUSE TYPES

MIX OF UNITS - ADAPTABILITY POTENTIAL





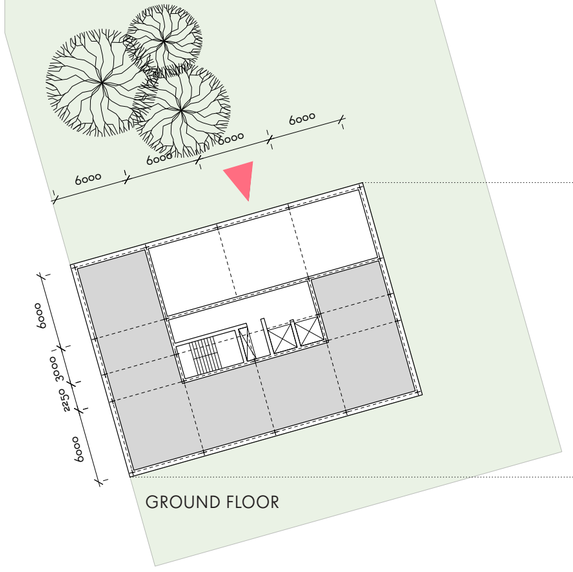
4 no. HOUSES x FLOOR - TYPICAL FLOOR CONFIGURATION A

6 no. HOUSES x FLOOR - TYPICAL FLOOR CONFIGURATION B

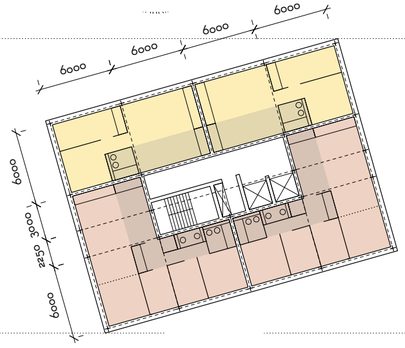
8 no. HOUSES x FLOOR - TYPICAL FLOOR CONFIGURATION C

KEY:

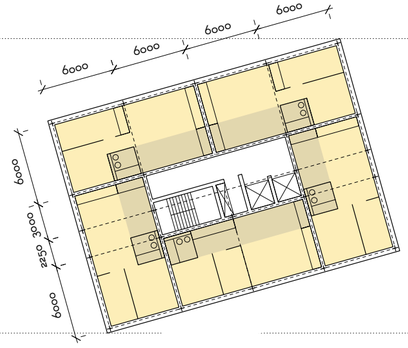
LOBBY / CIRCULATION
PLANT / CYCLES / STORAGE
STUDIO FLAT
1 BEDROOM FLAT
2 BEDROOM FLAT
3 BEDROOM FLAT
4 BEDROOM FLAT



GROUND FLOOR



4 no. UNITS x FLOOR - TYPICAL FLOOR CONFIGURATION A



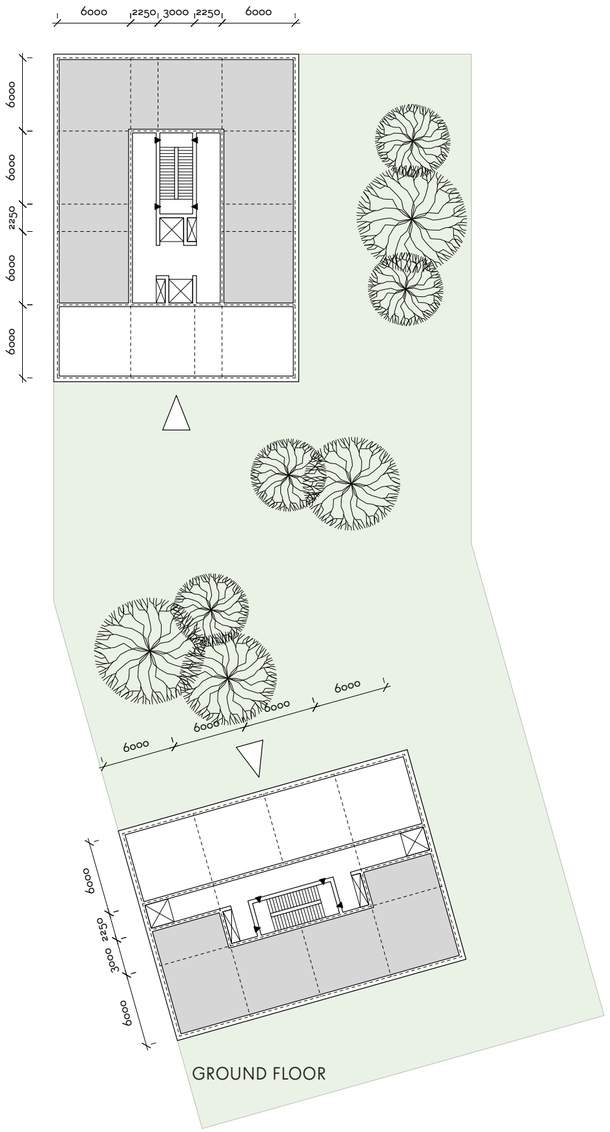
5no. UNITS x FLOOR - TYPICAL FLOOR CONFIGURATION B

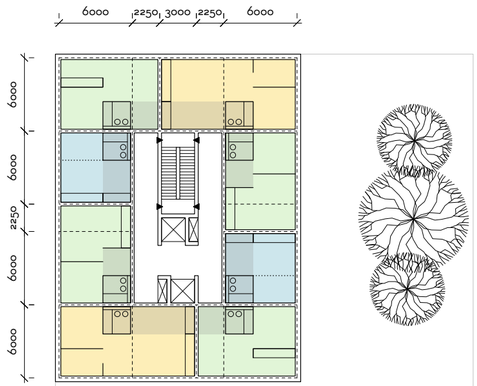
7no. UNITS x FLOOR - TYPICAL FLOOR CONFIG. C

Note: To comply with dutch fire regulations the core could include “wokkel staricase” creating two escape routes; see also page 22 for alternative design with douple escape stairs.

BUILD-IN-WOOD

MIX OF UNITS - ADAPTABILITY POTENTIAL (MAX. CAPACITY)

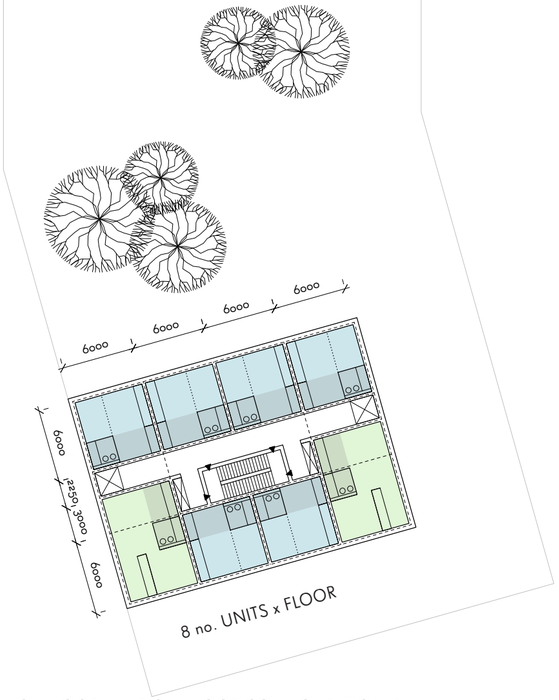




8 no. UNITS x FLOOR - TYPICAL FLOOR CONFIGURATION D

KEY:

- LOBBY / CIRCULATION
- PLANT / CYCLES / STORAGE
- STUDIO FLAT
- 1 BEDROOM FLAT
- 2 BEDROOM FLAT



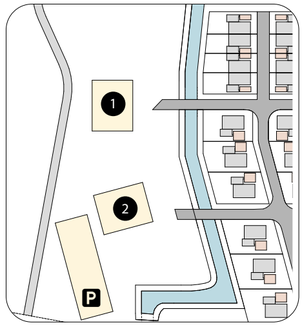
8 no. UNITS x FLOOR - TYPICAL FLOOR CONFIGURATION D

NOTE :

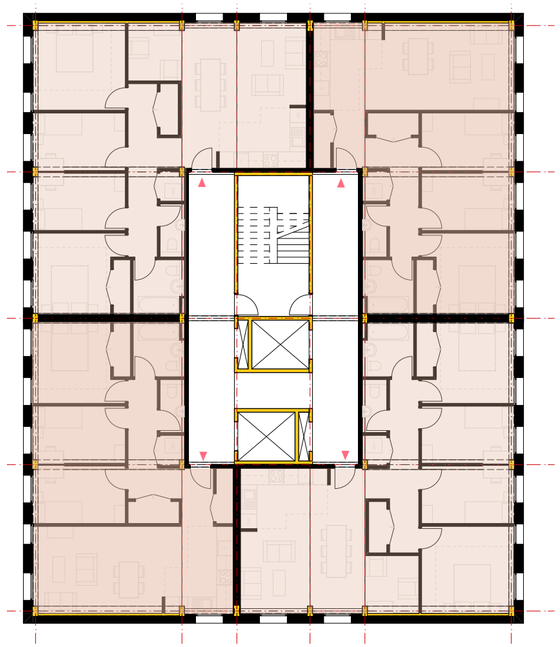
This additional plan configuration - that includes double escape stairs - maximises the number of units that are accessed per core (8 no.); we could design eight even smaller units and reduce the floorplan, but we do not recommend creating floor plans with more units.

"Development proposals should ensure that the number of dwellings accessed from a single core does exceed eight per floor. Deviation (by exception) from this requirement will need to be justified and mitigated by maximising corridor widths (beyond 1500mm) and introducing natural ventilation/daylight to corridors. (Excerpt from the London Housing Design Guide)

TYPICAL PLAN

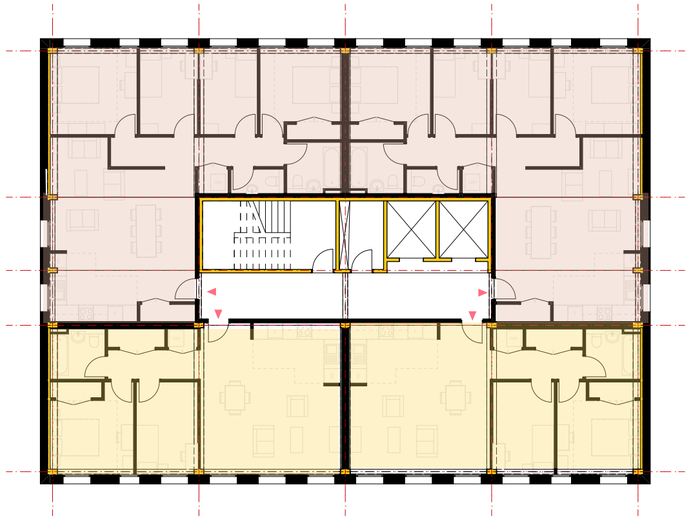


SITE A_PLAN



BUILDING 1 _ 4 no. UNITS x FLOOR

Note: see page 32 for layout with two escape stairs/routes; alternatively core could include “wokkel staricase” creating two escape routes



BUILDING 2 _ 4 no. UNITS x FLOOR

Note: see page 32 for layout with two escape stairs/routes

MASSING AND GRIDS

MASSING

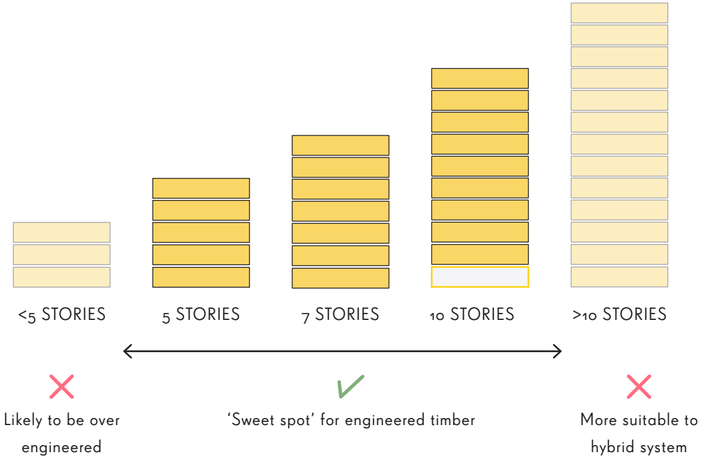
The Build-in-Wood structural system has been designed for buildings between 5 and 10 stories in height.
If built with the system, projects of less than 5 stories could be over engineered, containing redundant material. However, an unique approach to using engineered timber can facilitate specific design aspirations in low rise schemes and so should be considered on a case by case basis. For buildings over 10 stories, consideration of a hybrid approach, using engineered timber alongside other materials such as concrete and steel, could be required in order to keep member sizes practical and to use each material to its advantage. From this point of view the Shagen residentail blocks falls within the "sweet spot" for maximum use of engineered timber.

GRIDS

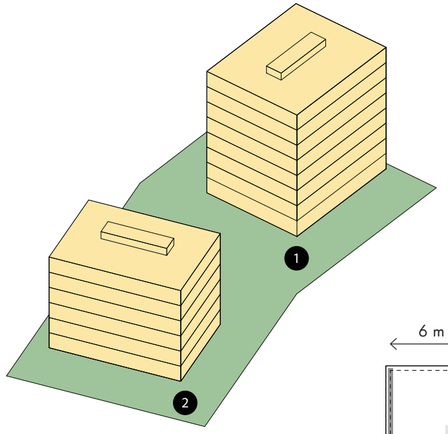
We must design a timber building as a timber building from the outset; in order to choose the most efficient span dimensions and structural solutions: trying to force it into structural grids conceived for traditional building materials such as concrete or steel will result in material and component size inefficiencies. Grids need to be defined trying foresee the best possible use of space and also to optimise the relative sizes of all structural components: efficiency is a multifaceted concept (belonging to the categories of material, cost, space) that does only depend on column spacing and area efficiencies.Two main grid types are commonly used for post&beam structures: the square and the rectangular one.

The choice between the two is influenced by the following considerations:
- span/dimensional ranges for floor panels
- max. allowable building height, floor to floor and internal/room heights
- material efficiency
- cost: e.g. thinner floor panels lower the overall material costs but this saving is often offset by a larger beam/columns number.
Square grids are moderately material efficient as this configuration makes the slabs work as hard as the beams.

Rectangular grids are more material efficient: in this case the geometry of the primary structure (beams) means that slabs sizes can be optimised (the narrower grid dimension being determined by structural, vibrational and of the floor slab panels) whilst the larger grid dimension is based on layout needs.



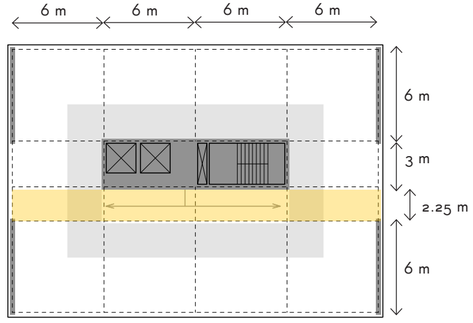
THE SHAGEN 5 to 7 STOREY DEVELOPMENT



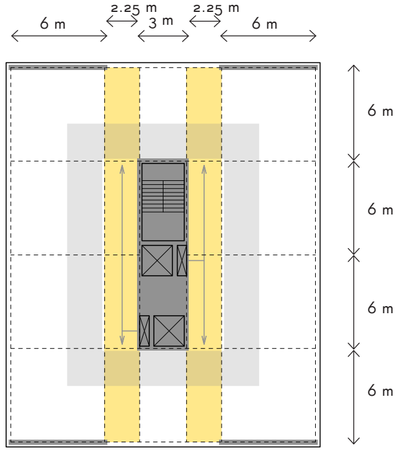
FOCUS ON SITE A

BUILDING 1 AND 2

5 to 7 STOREY



BUILDING GRID 2



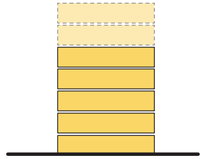
BUILDING GRID 1

KEY:

Service bay /distribution corridor

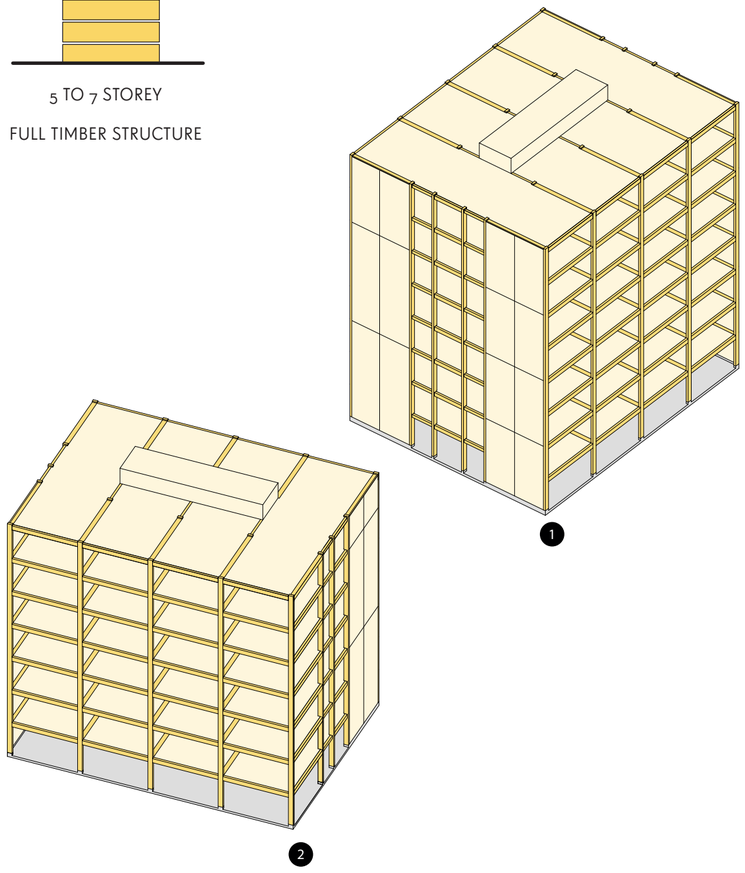
Wet areas

STRUCTURAL SYSTEM

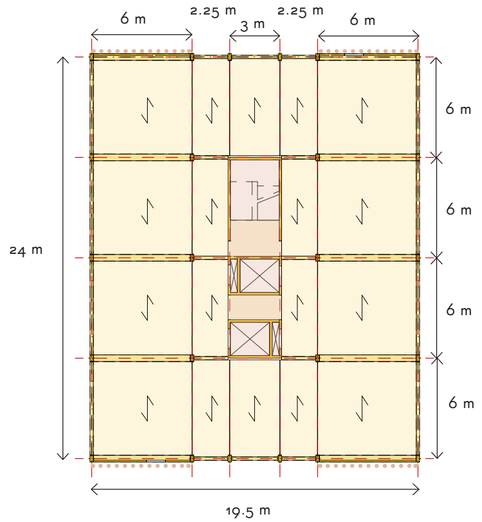


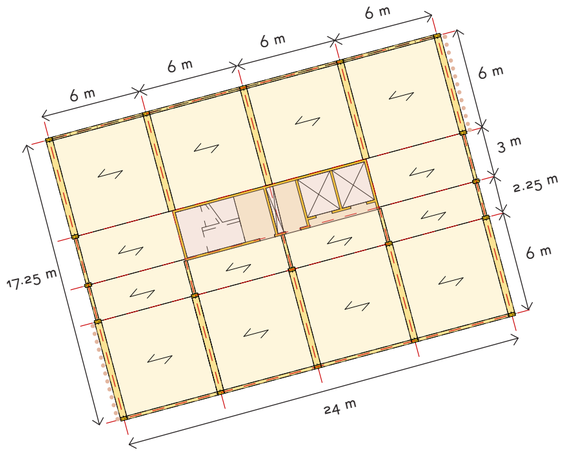
5 TO 7 STOREY

FULL TIMBER STRUCTURE

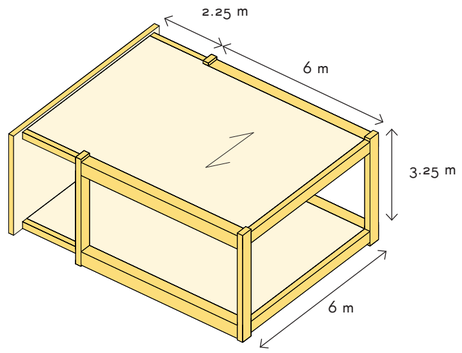


STRUCTURAL DESIGN CONCEPT - AXONOMETRIC VIEW





STRUCTURAL DESIGN CONCEPT - TYPICAL PLAN



TYPICAL STRUCTURAL BAY

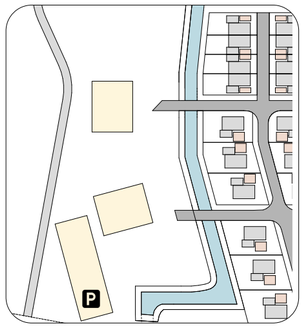
KEY

- CLT cores (stability structure)
- CLT shear walls (stability structure_ see plans) (*)
- Glulam beams
- Glulam Columns
- CLT slabs spanning direction
- Ground floor slab (see axonometry)

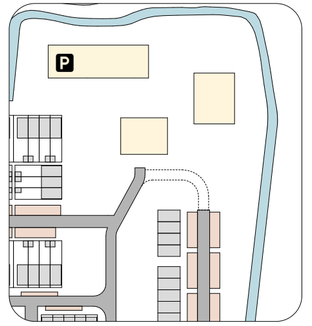
Note: (*) Shear-walls needed where indicated.
Openings, if needed, to be vertically aligned.

SYSTEM - CARPARK INTEGRATION

SITE OVERVIEW

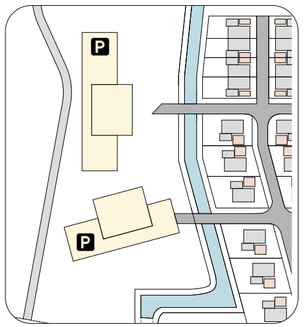


SITE A_PLAN

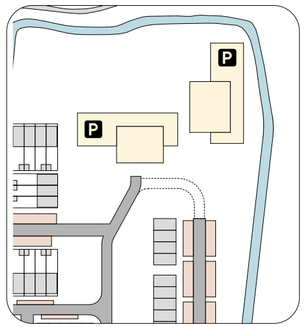


SITE B_PLAN

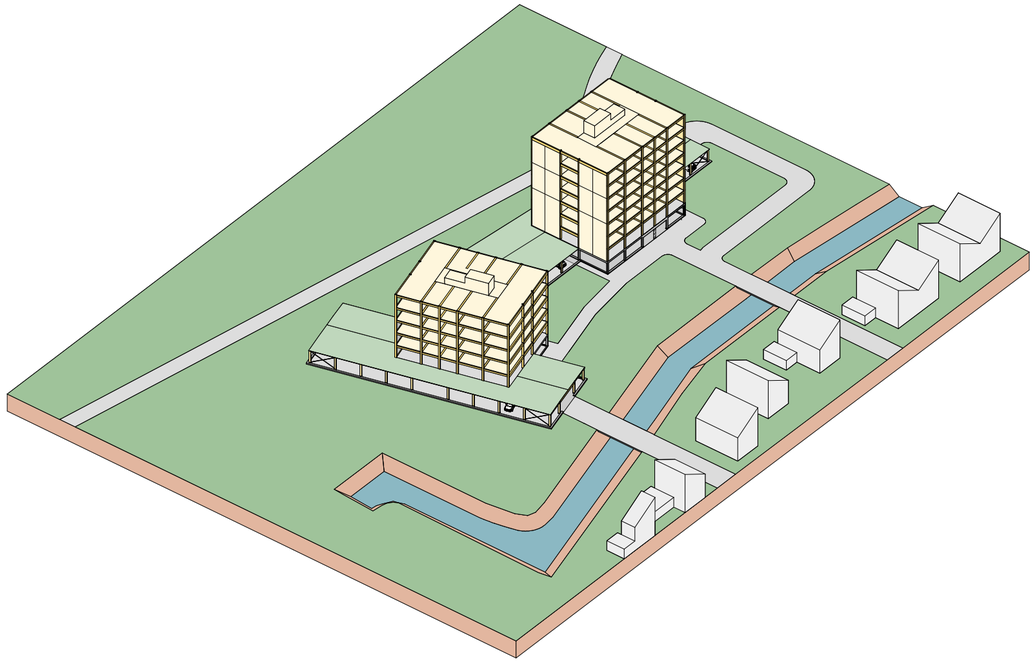
OTHER CARPARK INTEGRATION OPTIONS



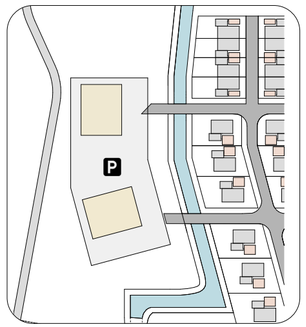
SITE A_ PLAN



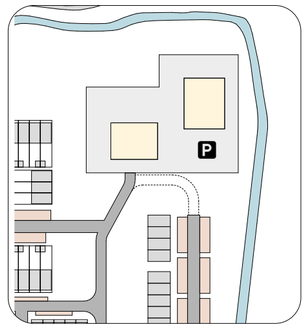
SITE B_ PLAN



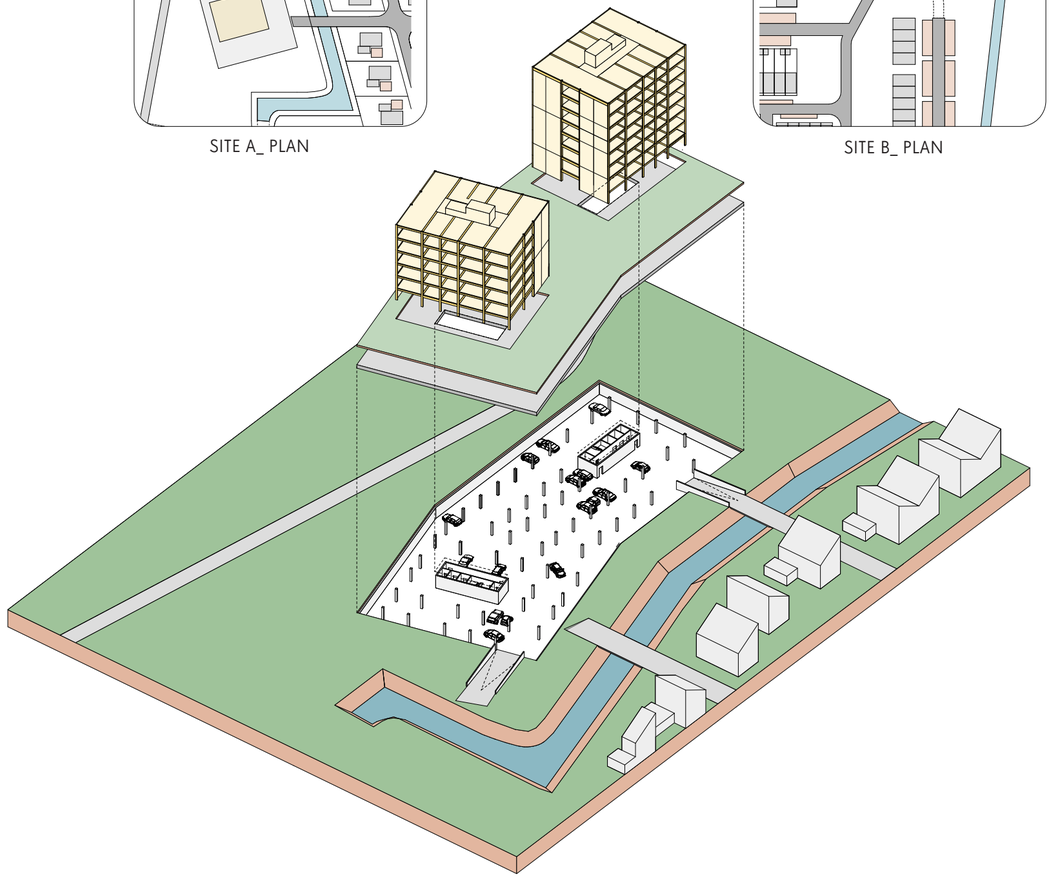
SITE A_ ABOVE GROUND - ONE STOREY CARPARK INTEGRATED WITH HOUSING BLOCK STRUCTURE



SITE A_ PLAN



SITE B_ PLAN



SITE A_ UNDERGROUND CARPARK INTEGRATED WITH HOUSING BLOCK STRUCTURE

STRUCTURE - UNDERGROUND/INTEGRATED CARPARK COORDINATION

The Build-in-Wood system can be adapted to coordinate with car park structures placed either under or over-ground.

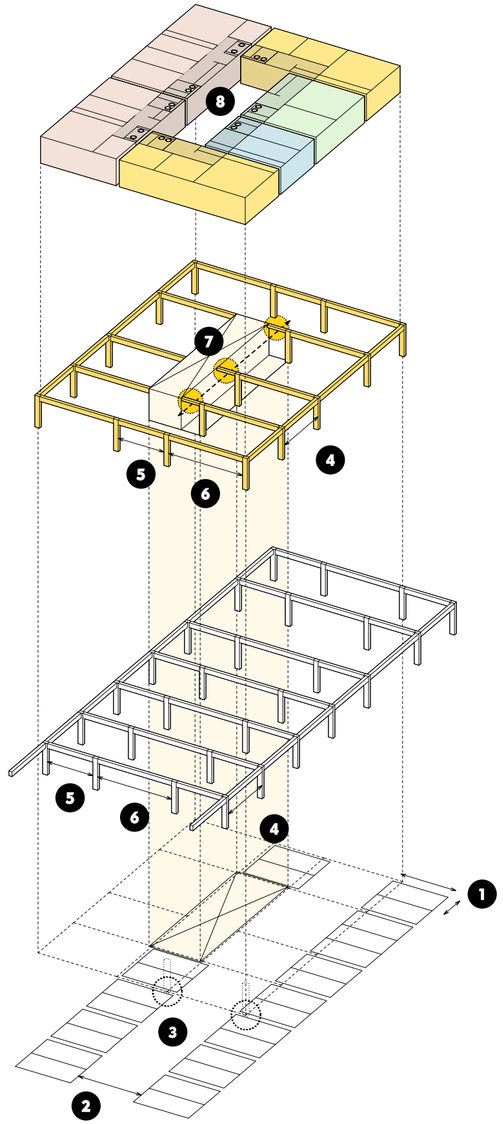
Two options have been explored (both compliant with Dutch NEN 2443 regulation) for the Muggengurg buildings: a one drive aisle and a two drive aisle, which depends on the amount of the required car park spaces. Both options are based on the idea that continuity between timber and concrete structures allow for max. materila and cost efficiency.

Key considerations:

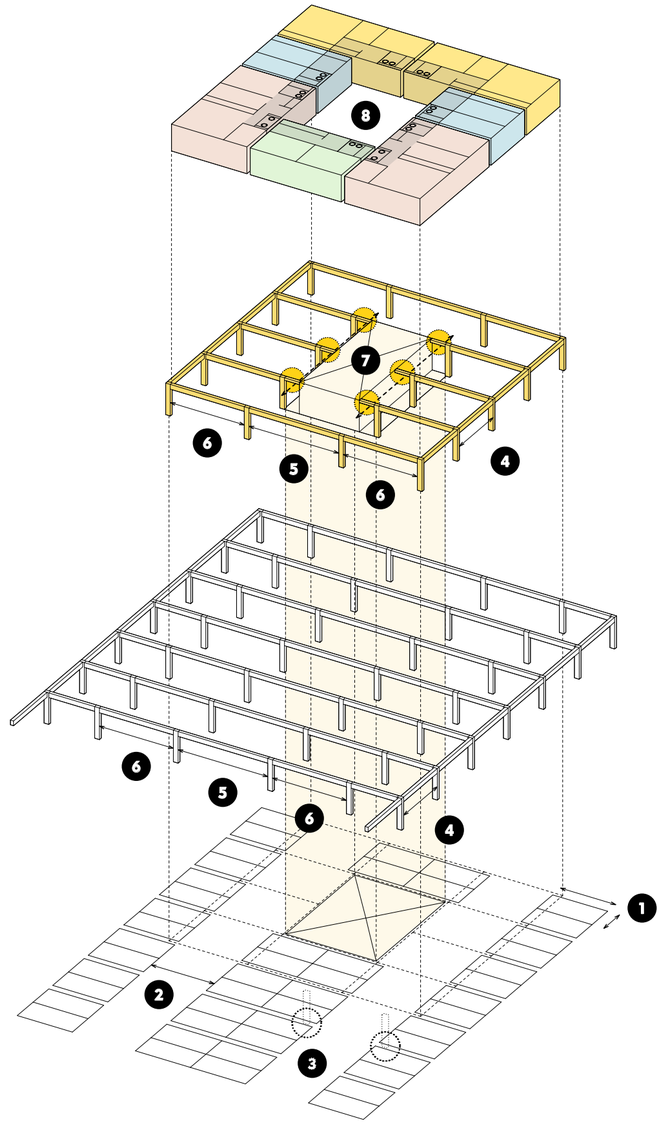
- A standard car park space is 2.500m x 5.130m
- The drive aisle for perpendicular parking must be> 5.660 m*
- The columns in line with the car park spaces must be recessed between 0.500m and 1.500m
- 5.700m span to allow for two cars, 8.100m span for 3 cars
- 4.800m span for the one drive aisle option, 9.000m span for the two drive aisles option
- 7.500m span for both options
- Shorter span shallower beams at the service area
- Wet areas ring around the core

Alternatively we could design a transfer structure - e.g. concrete down-stand beams - at the interface between concrete and timber structure. This approach would allow for each structure (timber/ concrete) to be independent: a flexibility that has important cost implications but might also be advantageous, especially when dealing with existing structures that are outdated in terms of min. parking spaces dimensions.

Note:
(*) in non-public car parks whilst in public carpark it need to be >6.00m

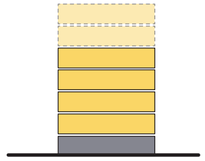


ONE DRIVE ISLE



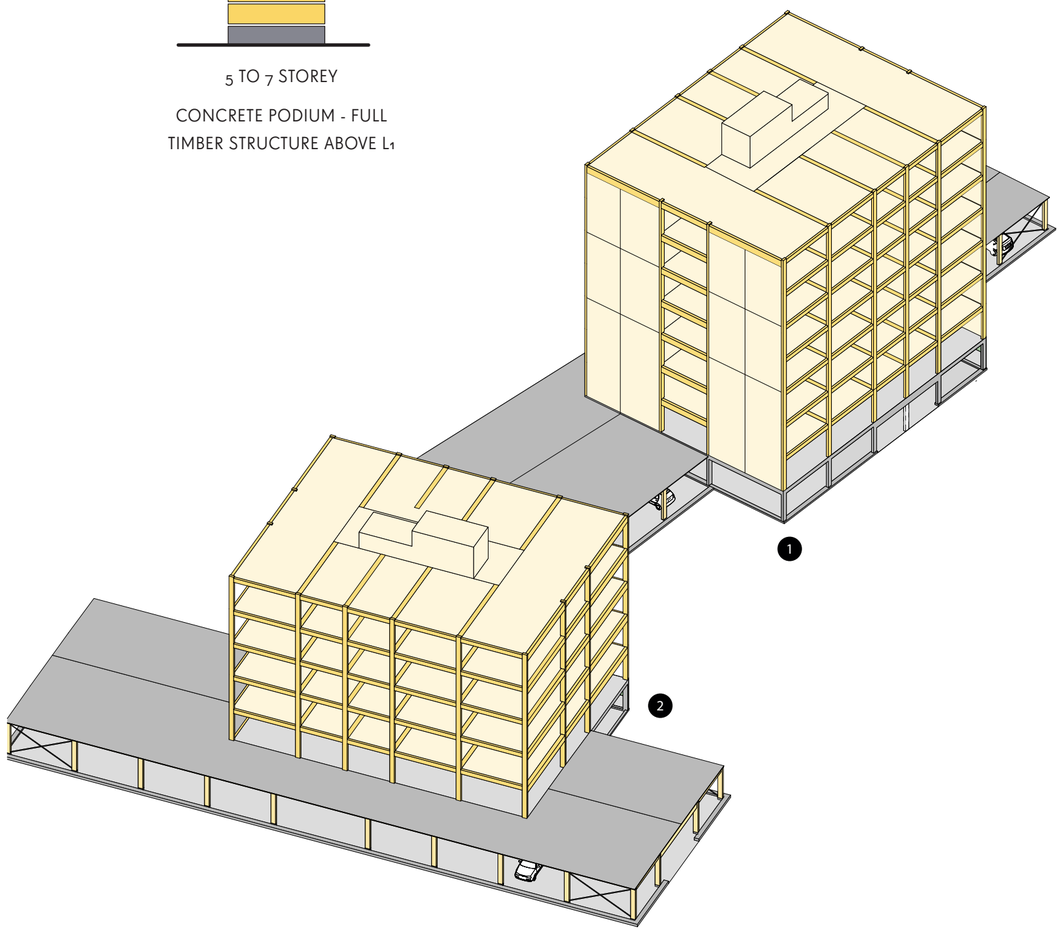
TWO DRIVE ISLE

STRUCTURE ADJUSTMENTS TO INTEGRATE ONE STOREY ABOVE-GROUND CARPARK



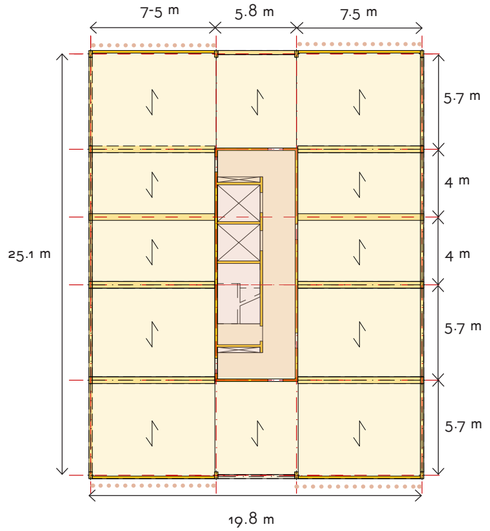
5 TO 7 STOREY

CONCRETE PODIUM - FULL
TIMBER STRUCTURE ABOVE L1

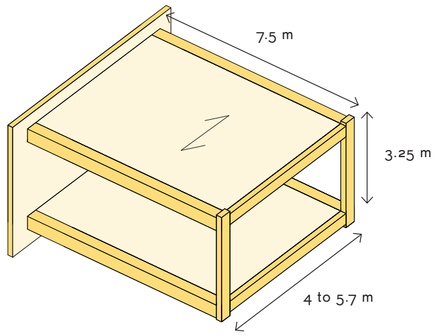


STRUCTURAL DESIGN CONCEPT - AXONOMETRIC VIEW

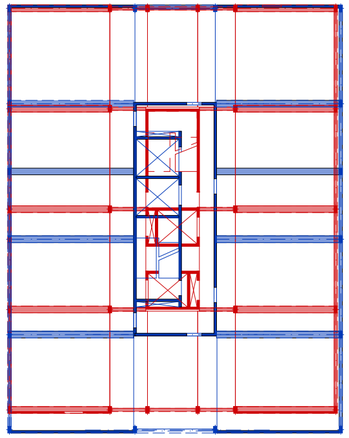
Note ground floor RC concrete podium to interface with car park
and protect/elevate timber structure



STRUCTURAL DESIGN CONCEPT - TYPICAL PLAN



TYPICAL STRUCTURAL BAY



STRUCTURAL OF BIW "INITIIAL" AND

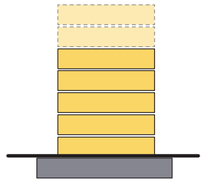
"ADJUSTED" STRUCTURES

KEY

- CLT cores (stability structure)
- CLT shear walls (stability structure_ see plans) (*)
- Glulam beams
- Glulam Columns
- CLT slabs spanning direction
- Ground floor slab (see axo. drawing)
- "Adjusted" structure (to cope with integrated GF carpark)
- BIW "initial" structure (see page 22)

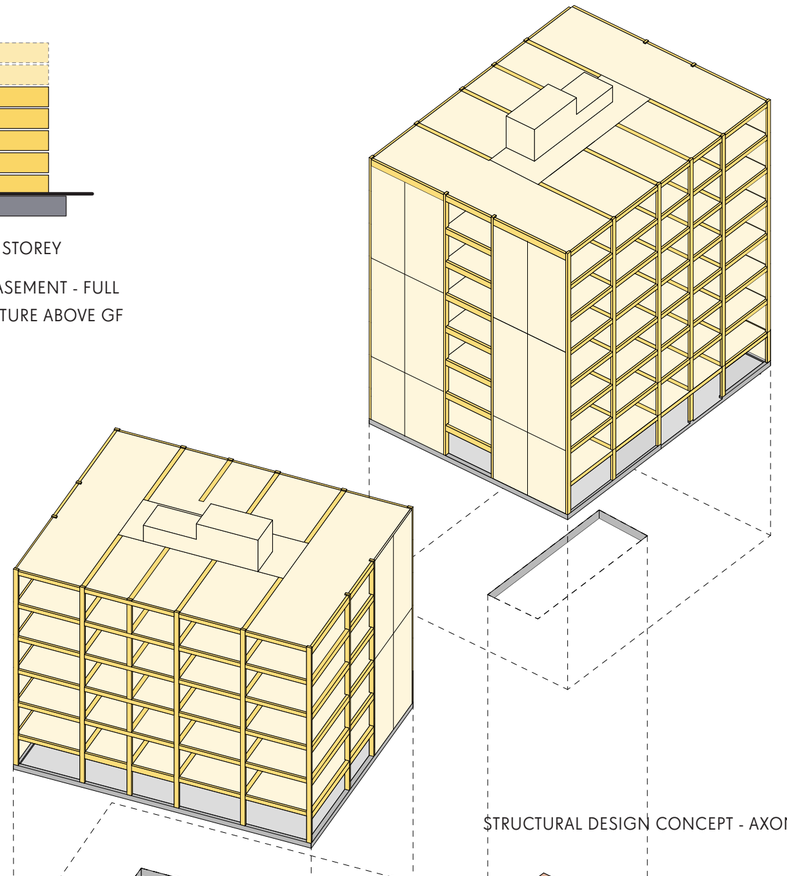
Note: (*) Shear-walls needed where indicated.
Openings, if needed, to be vertically aligned.

STRUCTURE ADJUSTMENTS TO COORDINATE WITH UNDERGROUND CARPARK

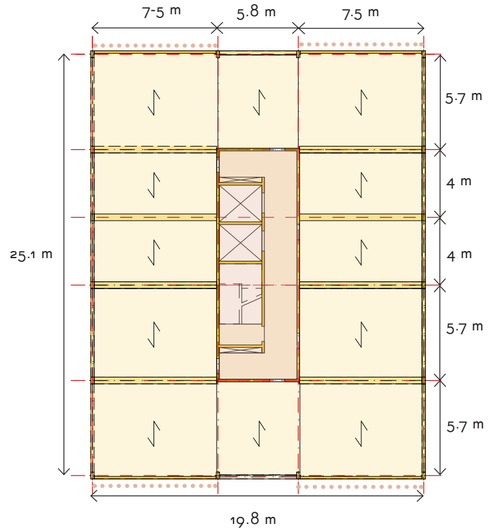


5 TO 7 STOREY

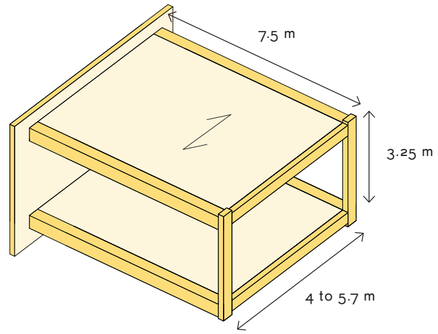
CONCRETE BASEMENT - FULL
TIMBER STRUCTURE ABOVE GF



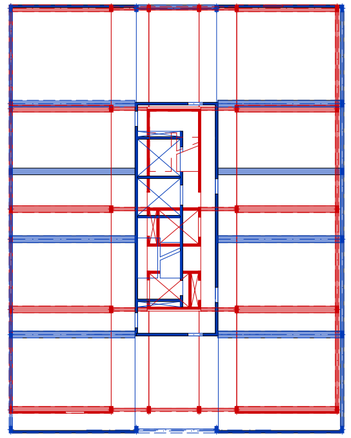
STRUCTURAL DESIGN CONCEPT - AXONOMETRIC VIEW



STRUCTURAL DESIGN CONCEPT - TYPICAL PLAN



TYPICAL STRUCTURAL BAY



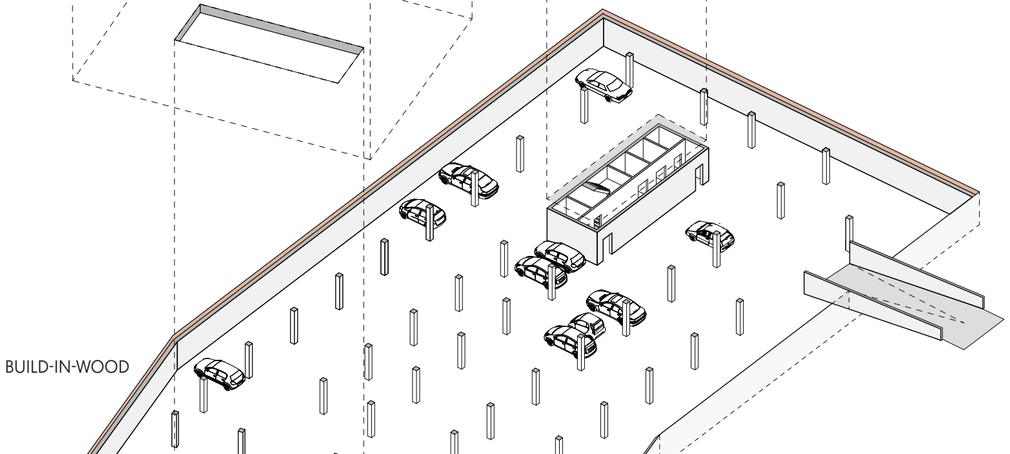
STRUCTURAL OF BIW "INITIIAL" AND

"ADJUSTED" STRUCTURES

KEY

- CLT cores (stability structure)
- CLT shear walls (stability structure_ see plans) (*)
- Glulam beams
- Glulam Columns
- CLT slabs spanning direction
- Ground floor slab (see axo. drawing)
- "Adjusted" structure (to cope with integrated GF carpark)
- BIW "initial" structure (see page 22)

Note: (*) Shear-walls needed where indicated.
Openings, if needed, to be vertically aligned.

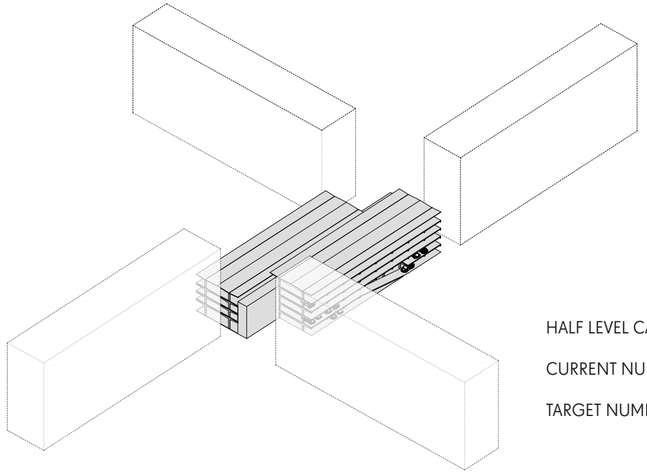


BUILD-IN-WOOD

2.AMSTERDAM - MOLENWIJK

THE SITE IN TIME

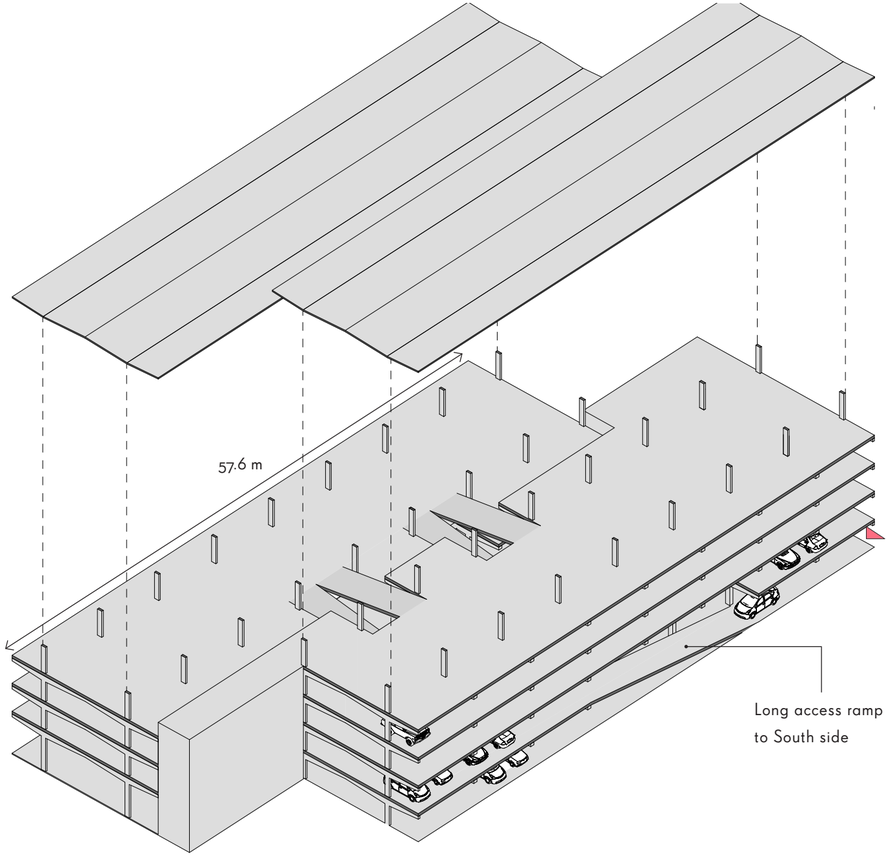
EXISTING CARPARK

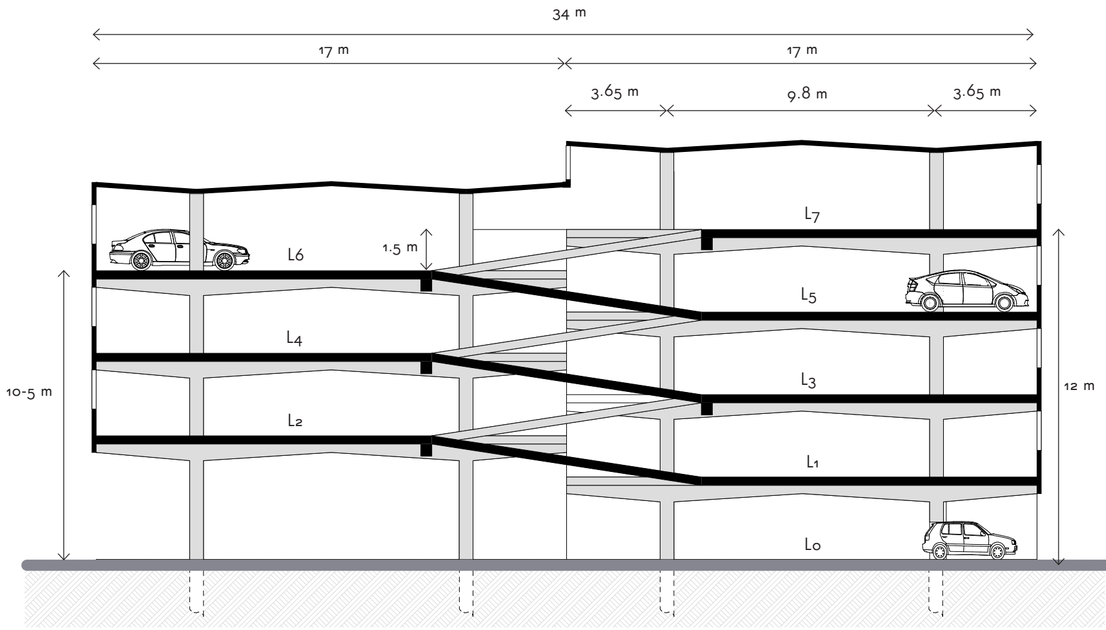


HALF LEVEL CAR PARK

CURRENT NUMBER OF PARKING SPACES: 264

TARGET NUMBER OF PARKING SPACES (AFTER REFURB.): 208 CAR



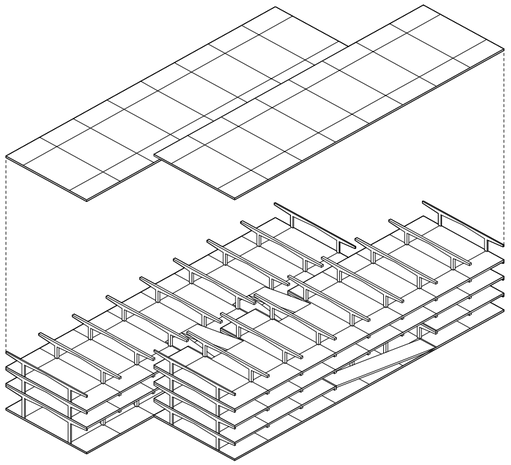


Geschatte situatie	Huidige parkeergarage: wordt ongeveer voor 90% gebruikt	
320 woningen, appartementen	Parkeernorm = 0.9	
Parkeren begane grond, beschikbaar voor bezoekers	85 (66 bij 2 auto's per stramien)	PN=0.27 (0.2)
Parkeren verdiepingen	202 (waarvan 8 op BG)	PN=0.63
Huidige bezetting, gebruikte parkeerplaatsen	287 (268)	

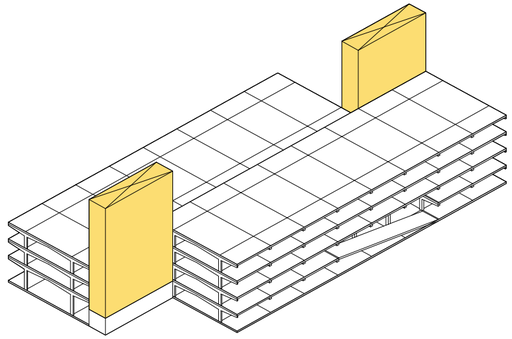
- Parking ground floor, available for visitors
- Parking floors
- Cyrrently used parking lots

source: Vanshagen Architecten

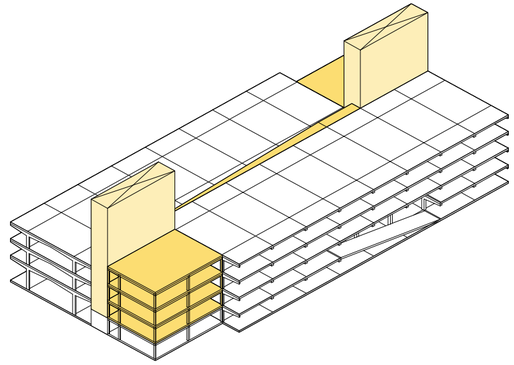
INITIAL, DISCARDED IDEA - EXTENDING THE EXISTING CARPARK



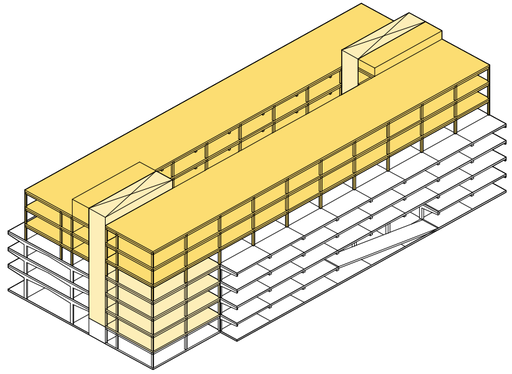
1 HALF LEVEL CAR PARK RETAINED EXCEPT FOR LIGHTWEIGHT ROOF



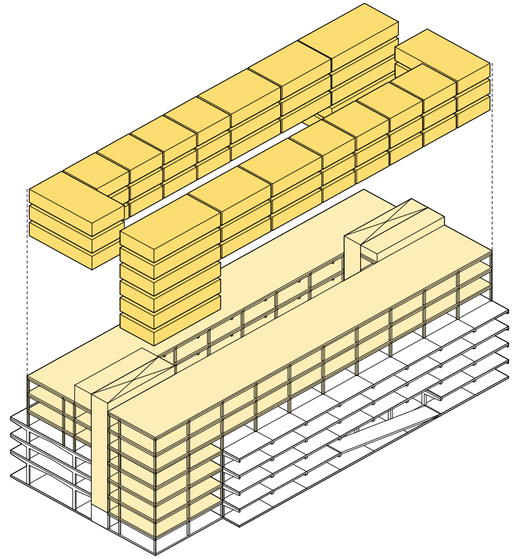
2 NEW WOODEN CORES ADJACENT TO EXIST. STRUCTURE TO LINK LEVELS ON BOTH ENDS OF THE EXISTING STRUCTURE



3 CORNERS FILLED WITH WOODEN EXTENSION. CENTRALLY LOCATED RAMP TO CONNENCT ALL CARPARK DECKS

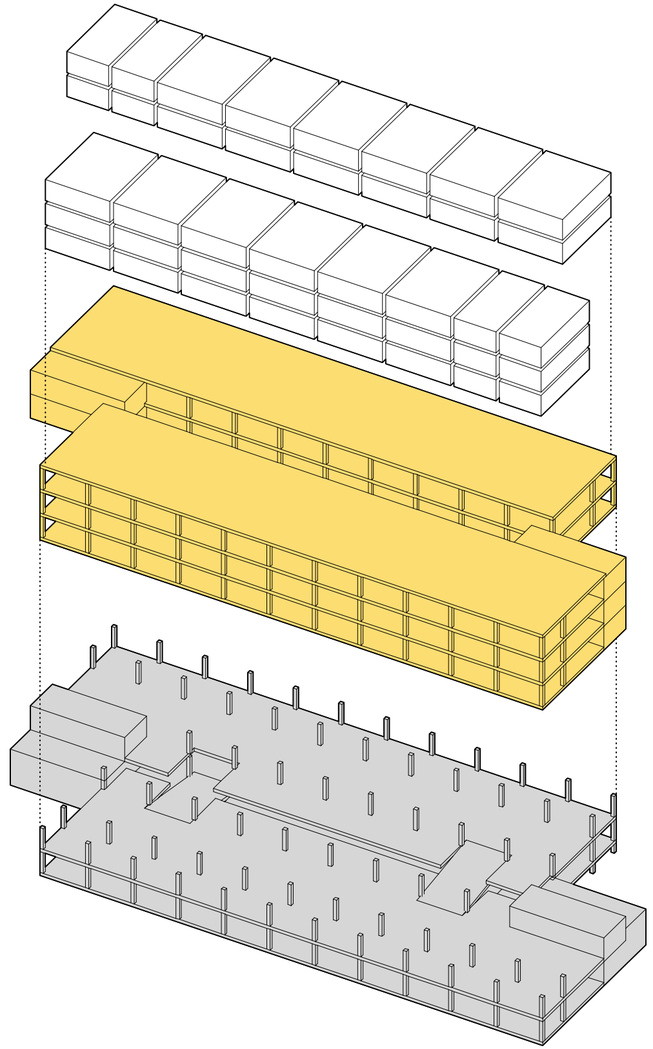


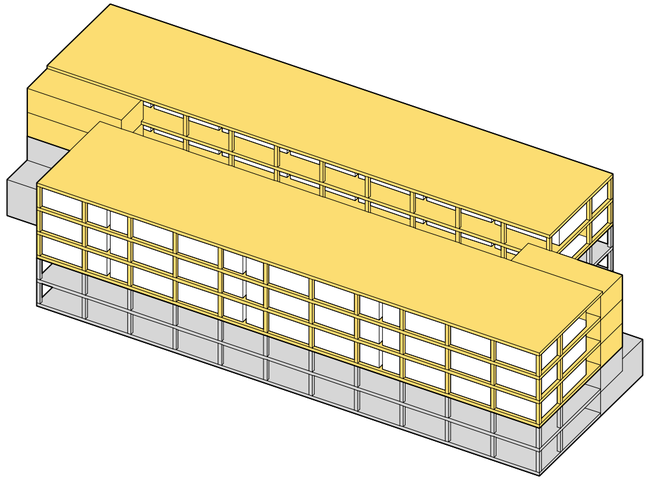
4 3 STOREY WOODEN EXTENSION TO OVER THE EXISTING CONCRETE STRUCTURE



5 POTENTIAL TO CREATE 53 HOMES EXTENDING UPWARDS AND SIDEWAYS THE EXISITNG STRUCTURE

NEW CARPARK WITH SAME FOOTPRINT

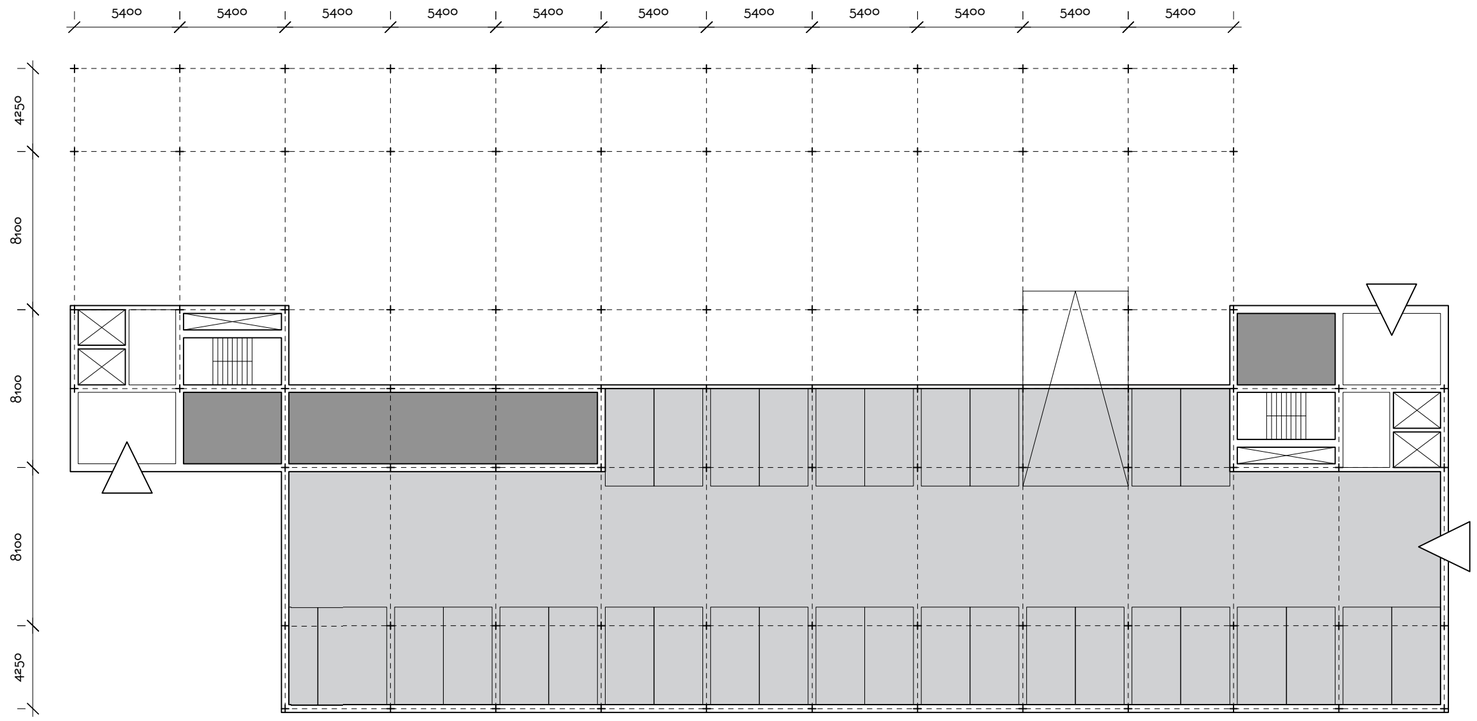




RE-BUILD RC CONCRETE CARPAK WITH UPPER TIMBER EXTENSION

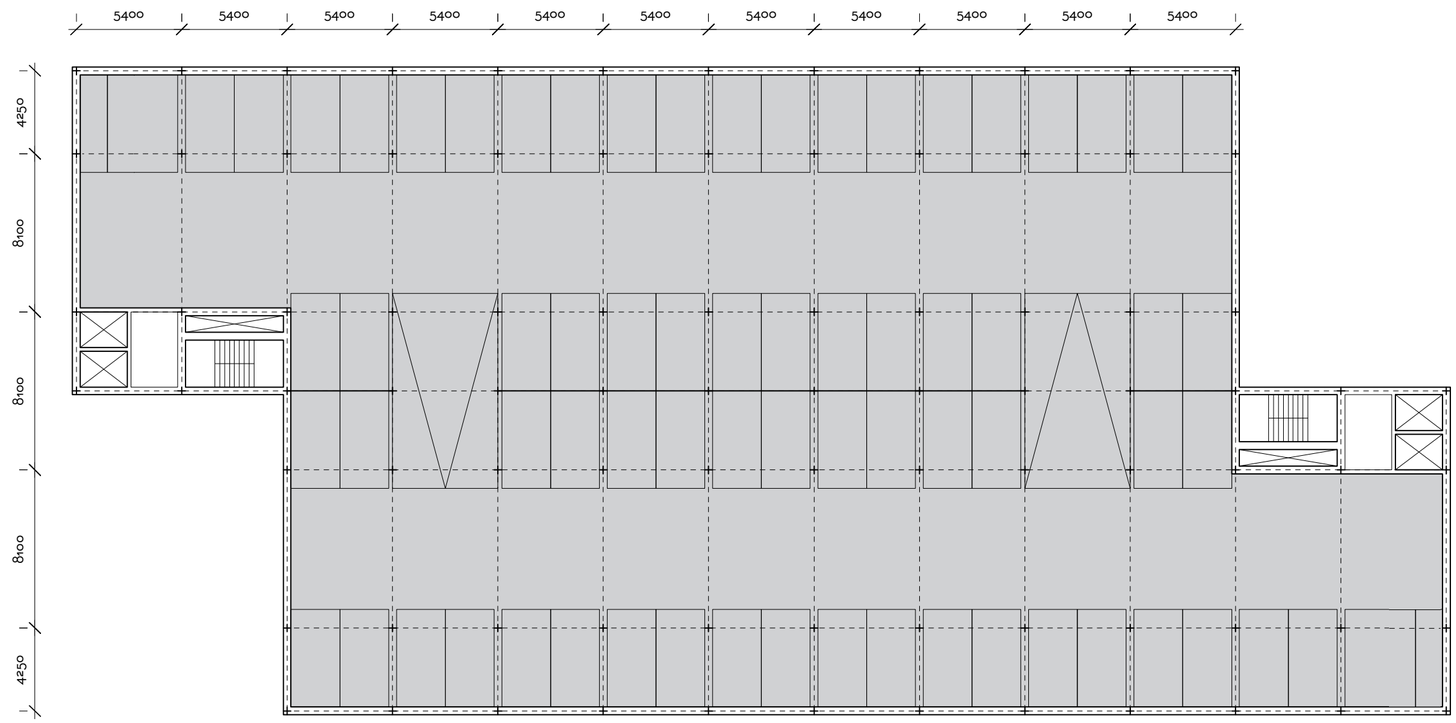
40 RESIDENTAIL UNITS - 190 CAR PARKING SPACES

CARPARK FLOOR (SINGLE)



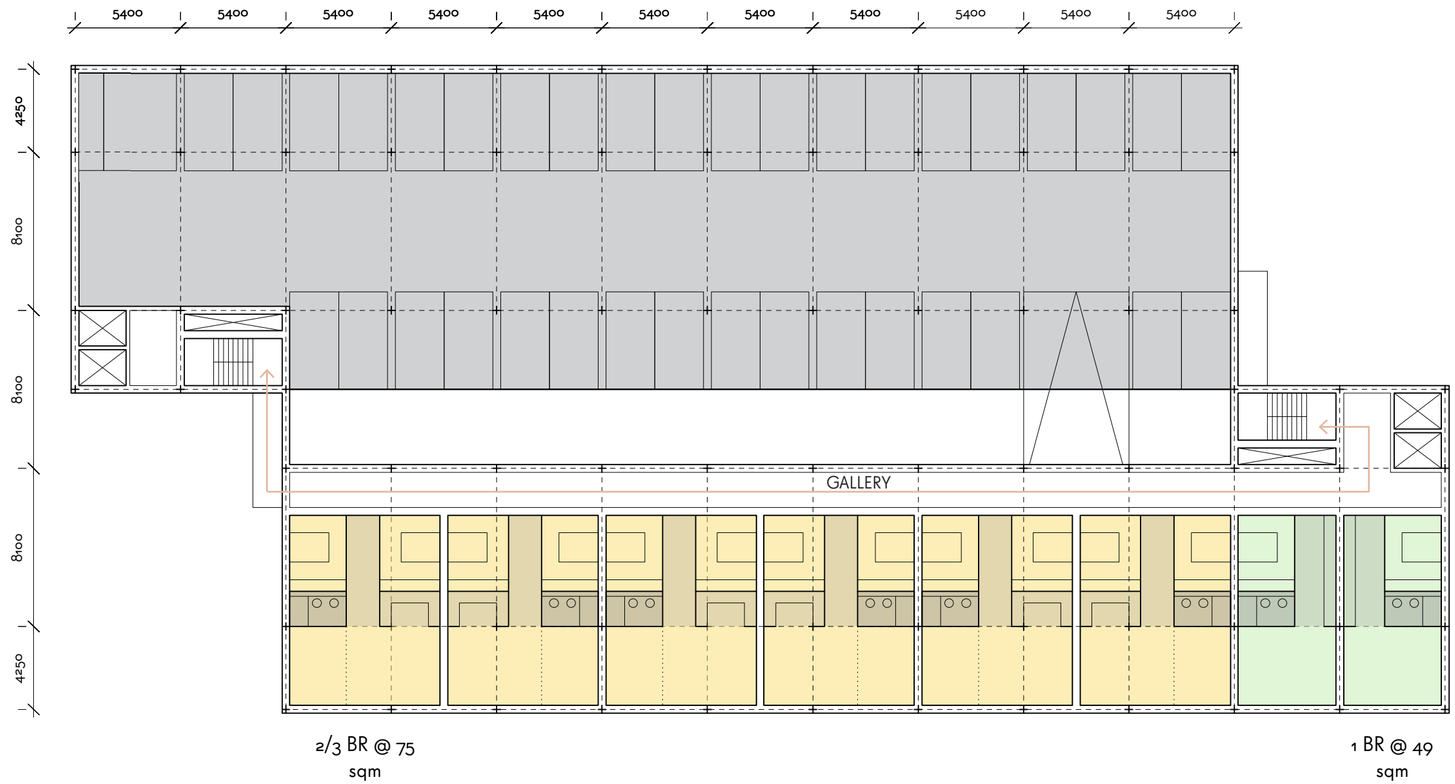
TYPICAL CARPARK FLOOR (32 PARKING SPACES)

CARPARK FLOOR (DOUBLE)



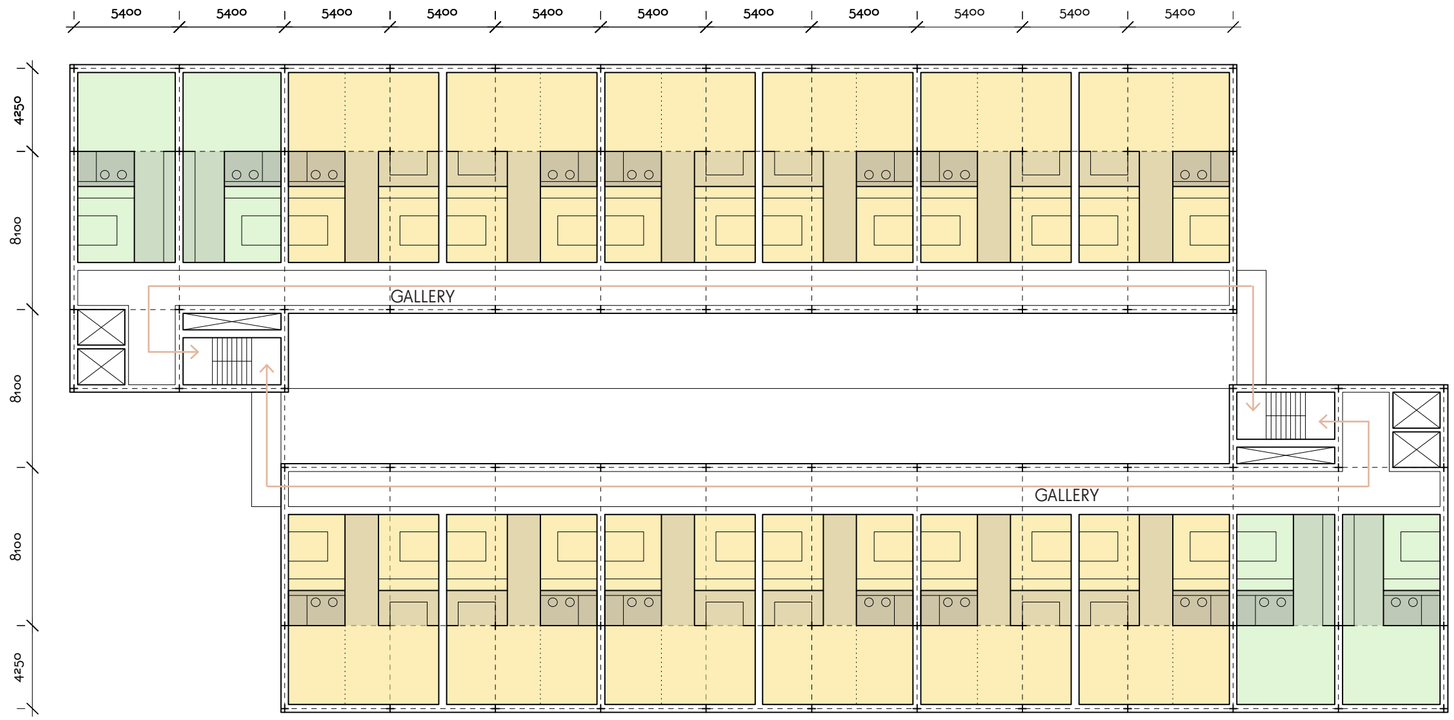
TYPICAL CARPARK FLOOR (72 PARKING SPACES)

MIXED USE FLOOR



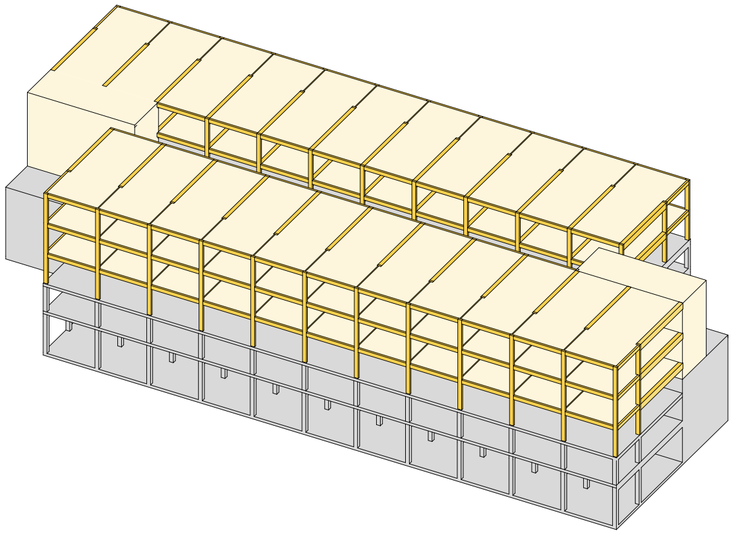
MIXED USE FLOOR - 8 HOMES AND 32 CARPARK SPACES

RESIDENTIAL FLOOR

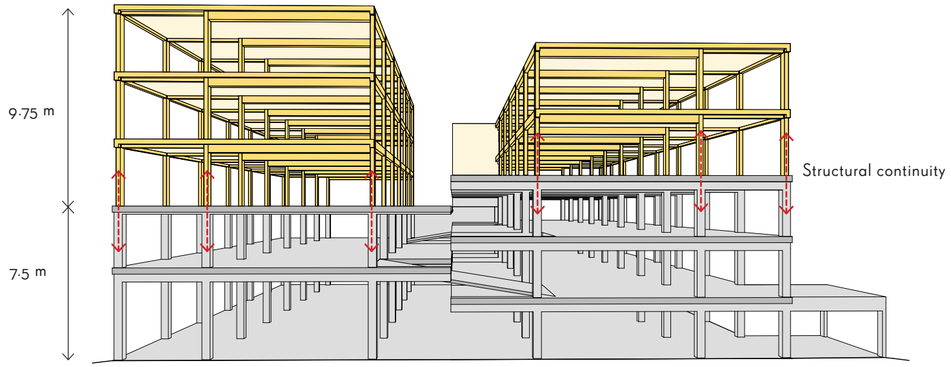


RESIDENTIAL FLOOR - 16 HOMES

TIMBER EXTENSION - STRUCTURE



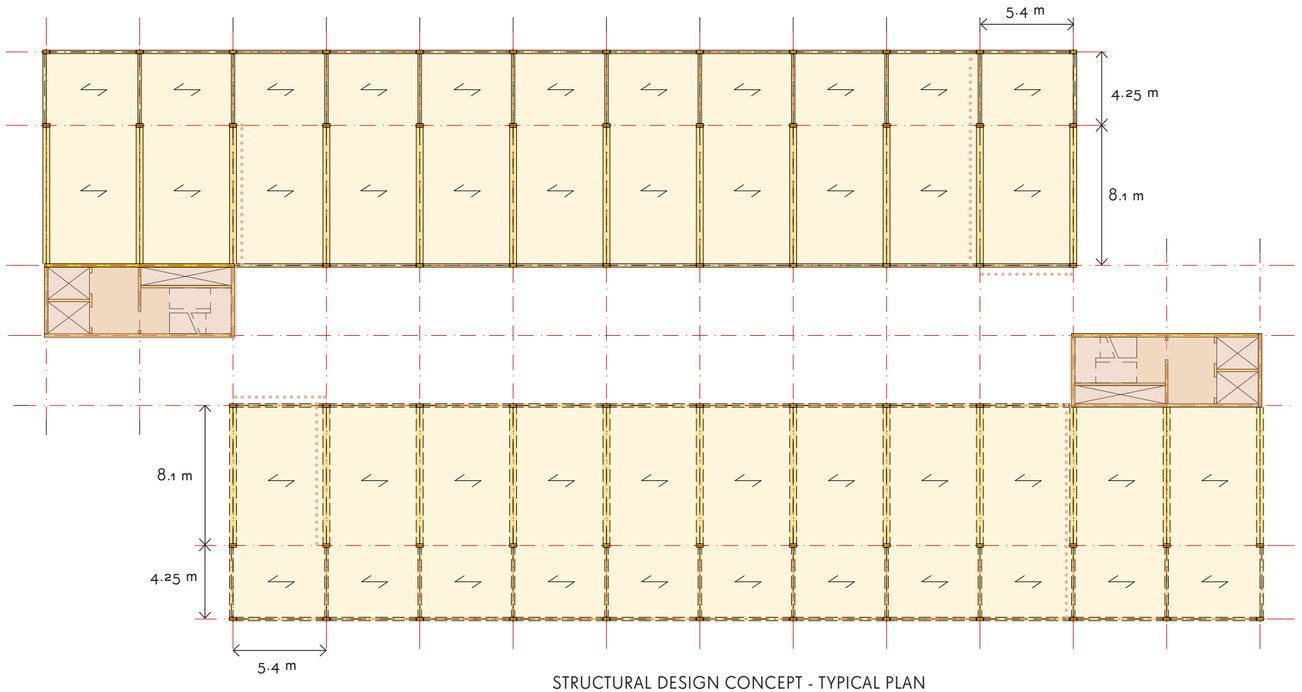
STRUCTURAL DESIGN CONCEPT - AXONOMETRIC VIEW



SECTION WITH HIGHLIGTED NEW RC CONCRETE CARPARK AND RESIDENTAIL EXTENSION

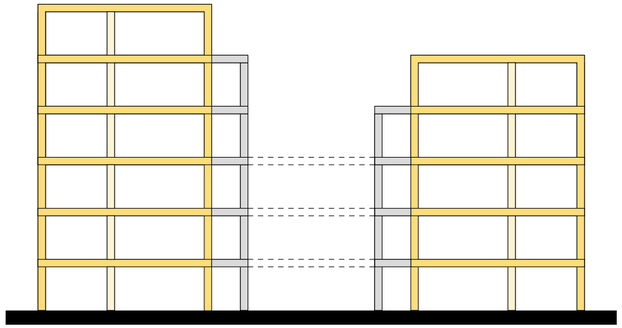
KEY

- CLT cores (stability structure)
- CLT shear walls (stability structure_ see plans)
- Glulam beams
- Glulam Columns
- CLT slabs spanning direction
- Ground floor slab (see axonometry)
- Structural continuity (Timber - RC)

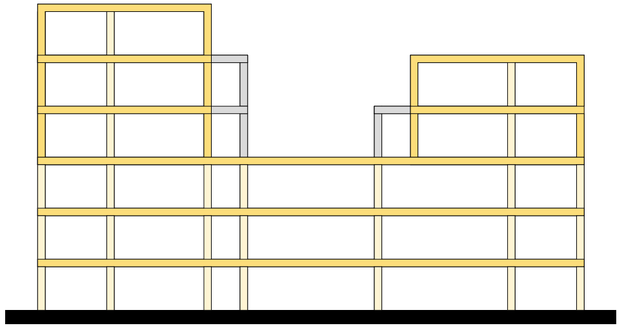


STRUCTURAL DESIGN CONCEPT - TYPICAL PLAN

REVISED APPROACH: DEMOLITION OF EXISTING CARPARK - NEW TIMBER CARPARK



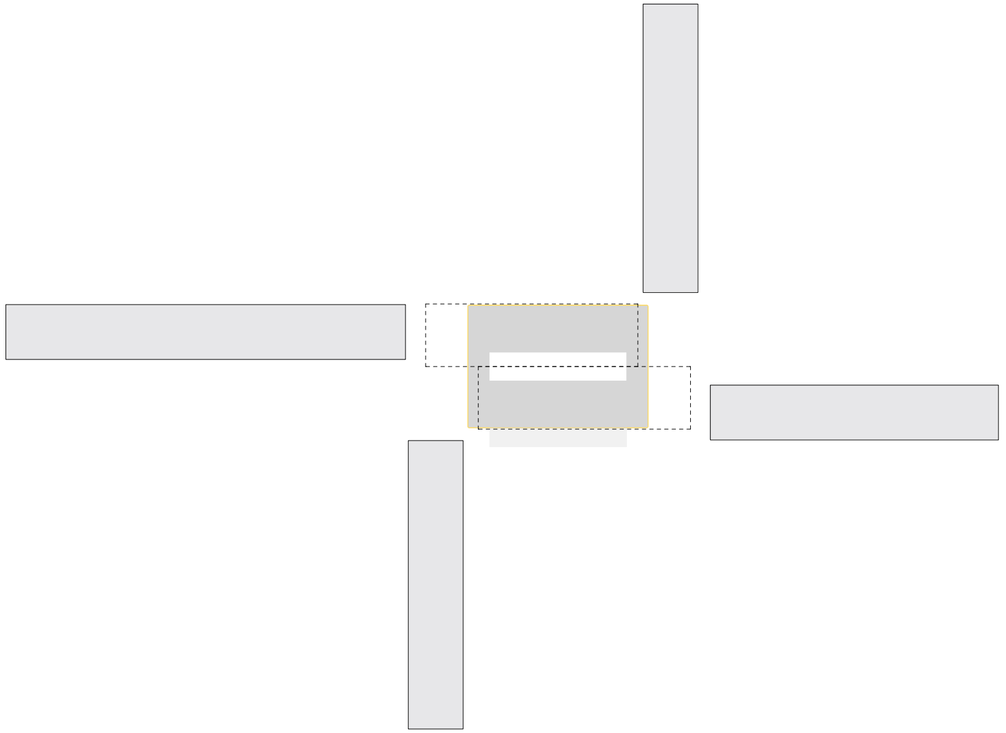
FUTURE (FULL RESIDENTIAL)



DAY ONE (MIXED USE)

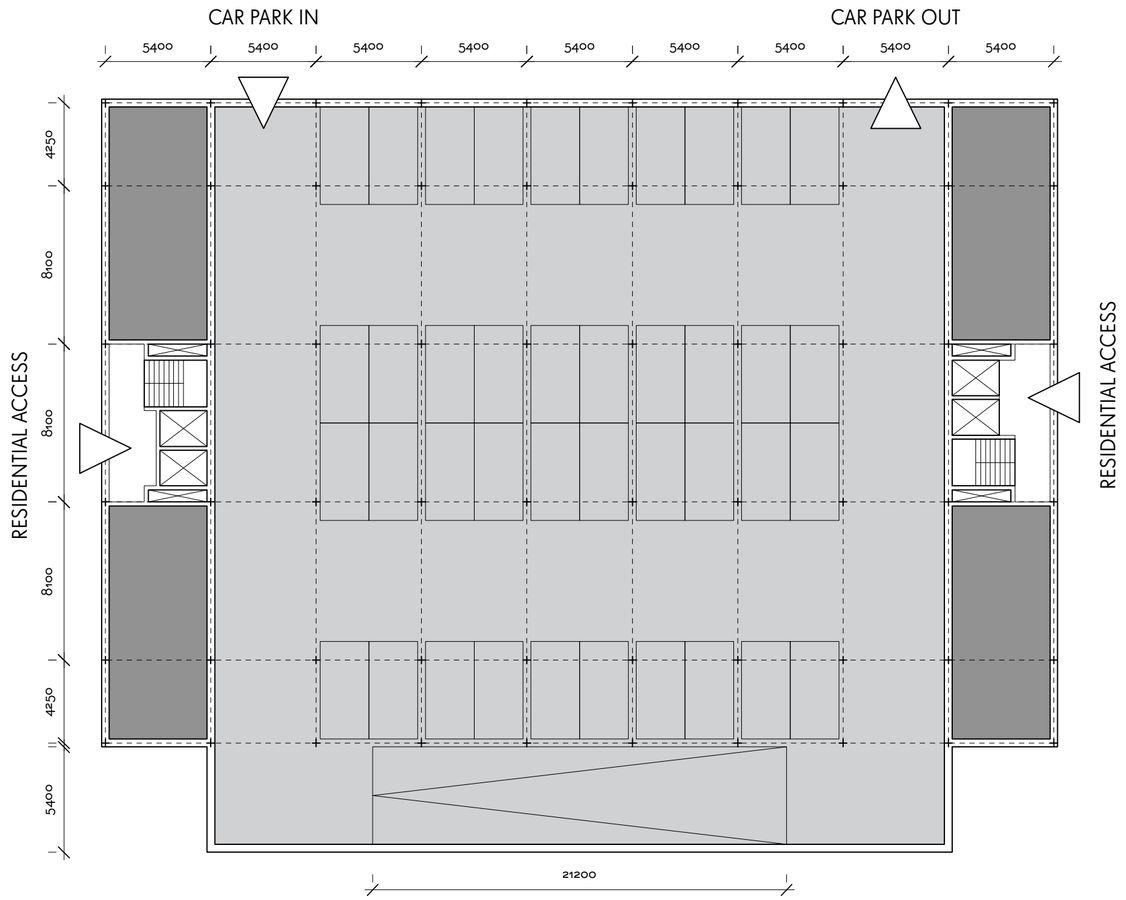
CONTINUOS CAR PARK FLOORS FOR + RESIDENTIAL ABOVE

FULL TIMBER STRUCTURE: REVERSIBLE / FUTURE PROOF ARCHITECTURE



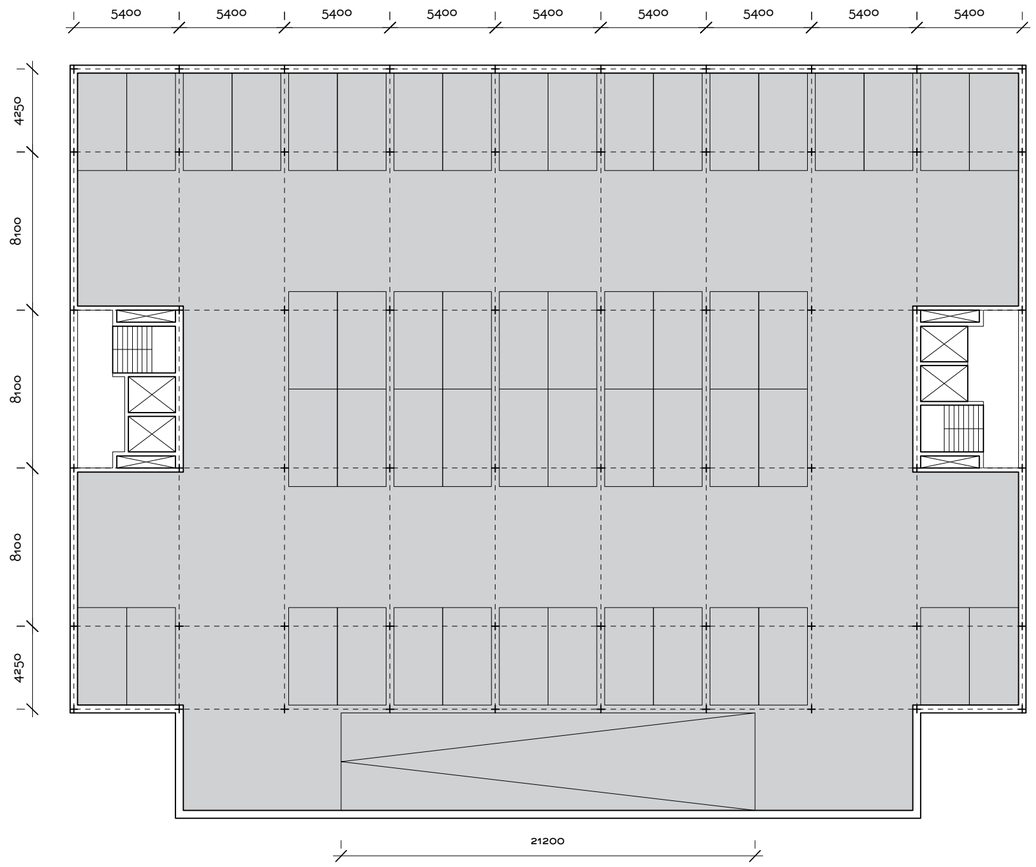
SITE INSERTION

GROUND FLOOR CARPARK



40 PARKING SPACES

TYPICAL CARPARK FLOOR

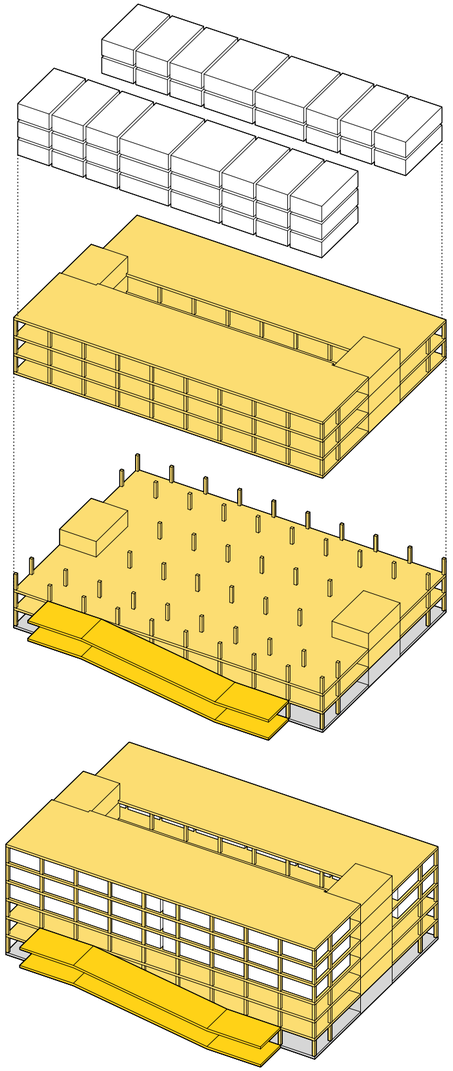


52 PARKING SPACES

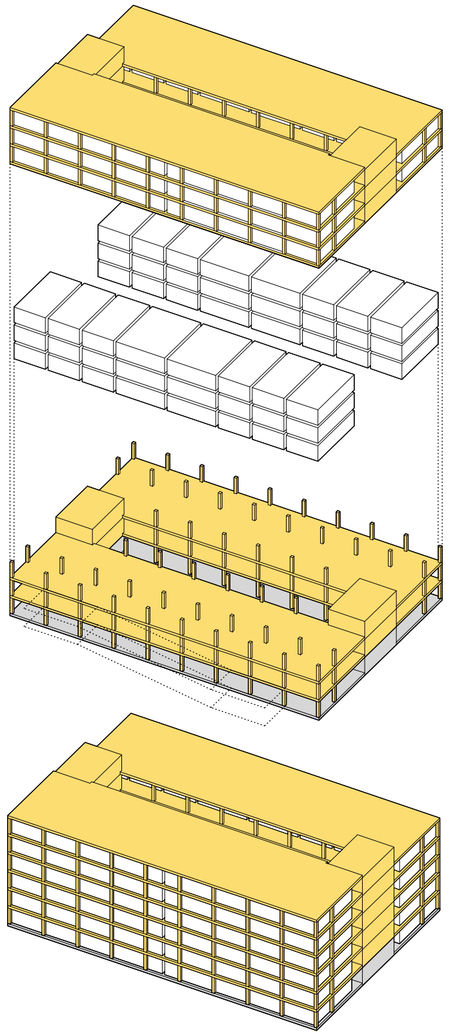
TYPICAL RESIDENTIAL FLOOR

16 HOUSED PER FLOOR

REVISED APPROACH: DEMOLITION OF EXISTING CARPARK - NEW MIXED USE STRUCTURE



MIXED USE STRUCTURE (HOUSING + CARPARK)



FURTURE FULL HOUSING CONVERSION