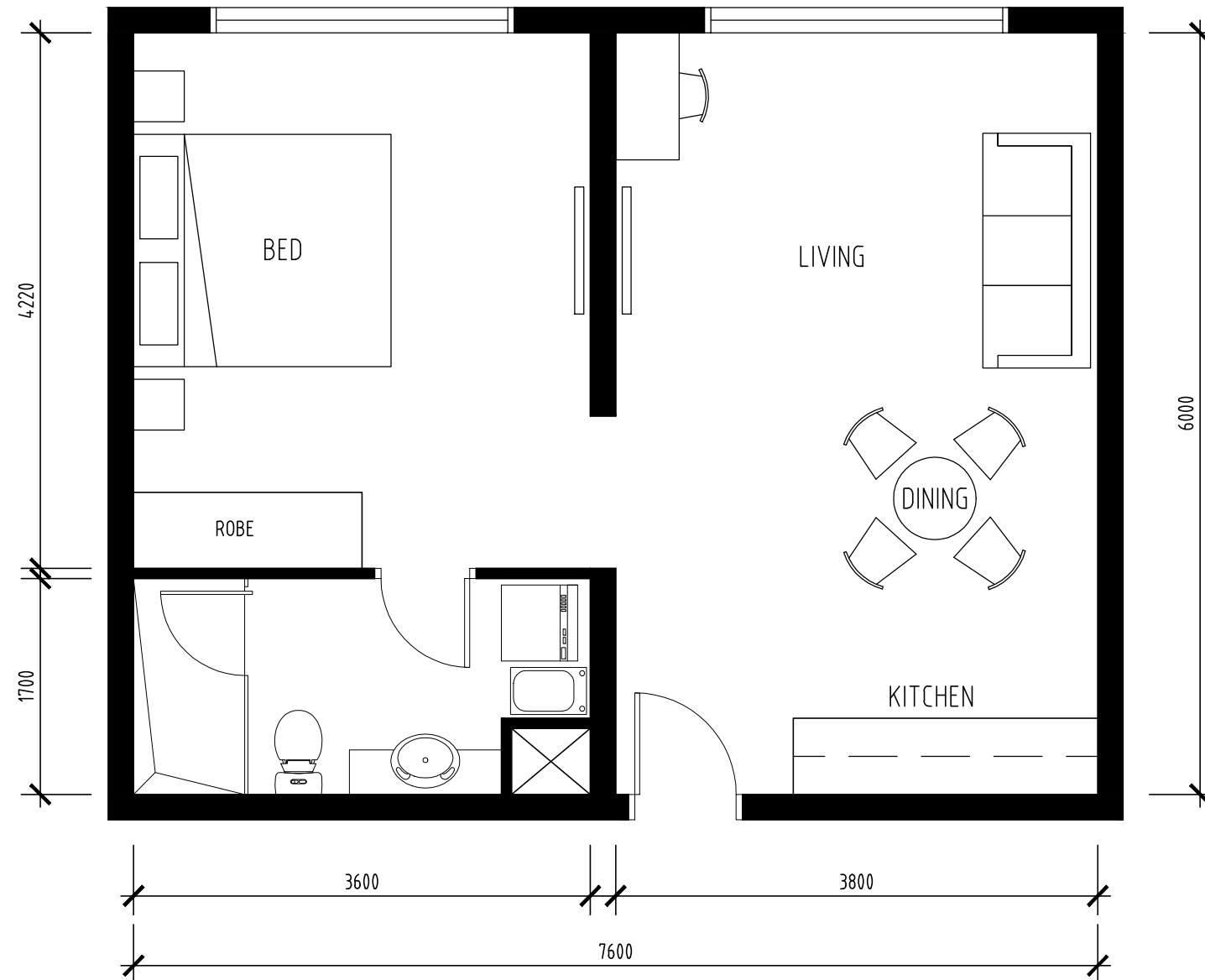


STUDIO
TYPE F

INTERNAL AREA	= 50 m ²
TOTAL AREA	= 50 m ²



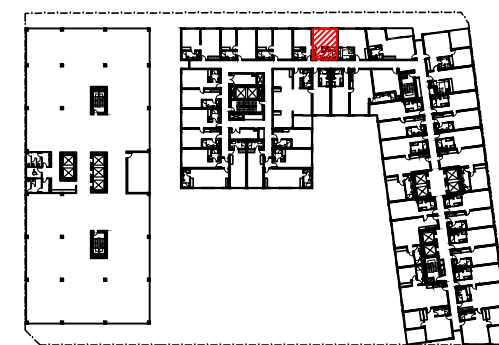
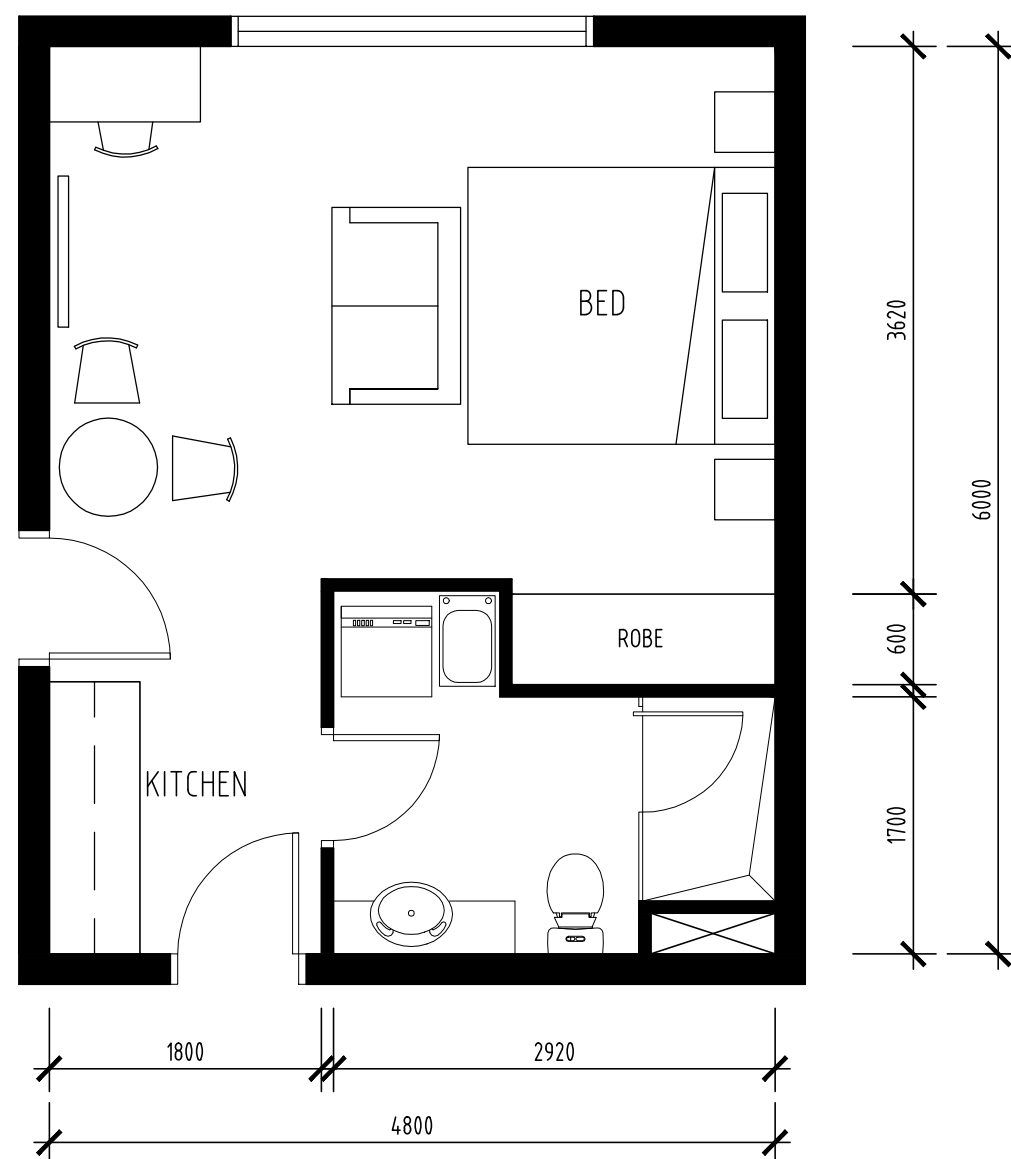
KEY - LEVELS 6 & 7



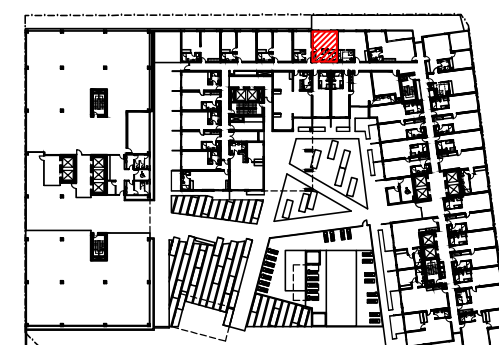
KEY - LEVEL 5

STUDIO
TYPE G

INTERNAL AREA	= 31.4 m ²
TOTAL AREA	= 31.4 m ²



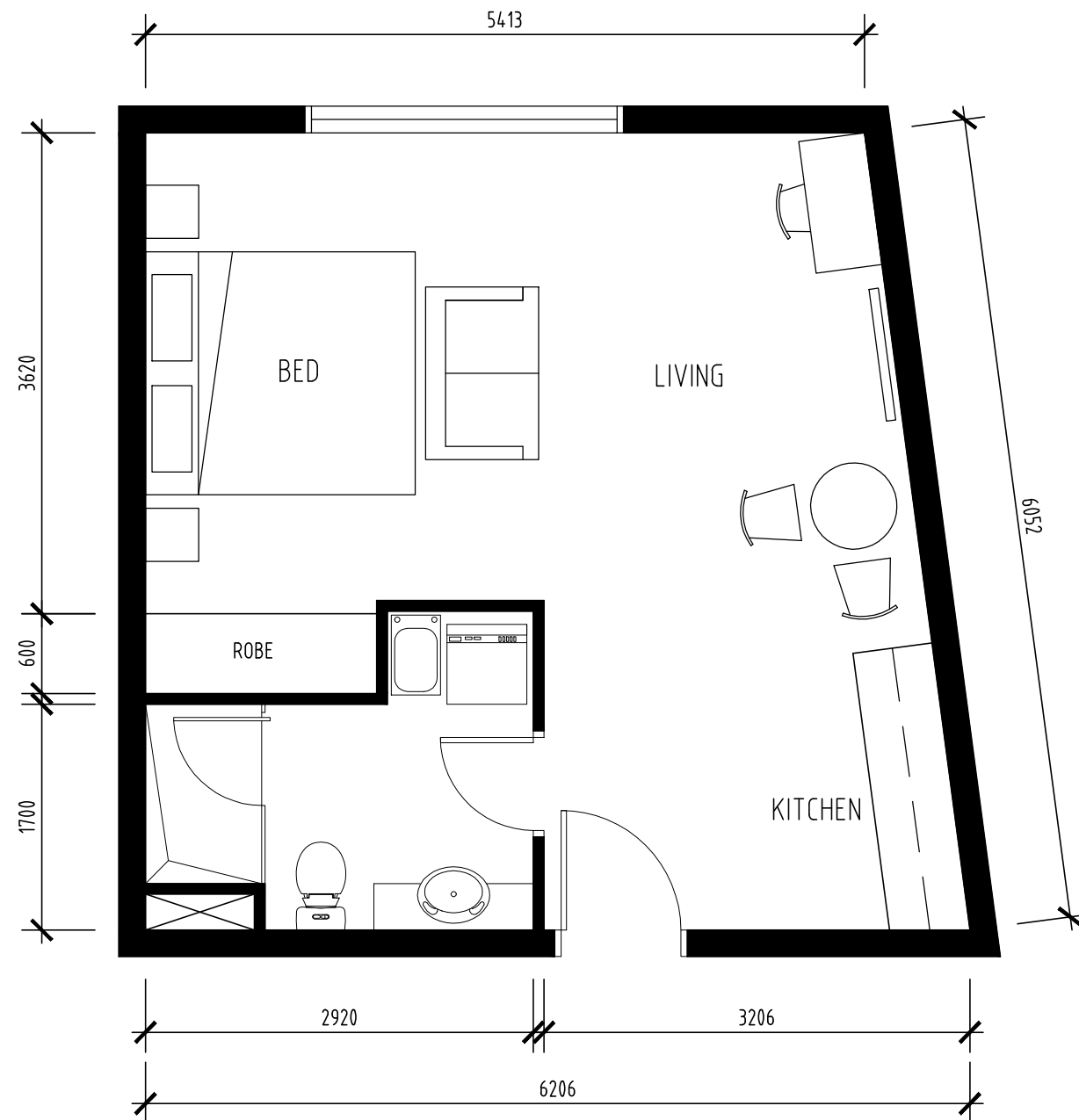
KEY - LEVELS 6 & 7



KEY - LEVEL 5

STUDIO
TYPE H

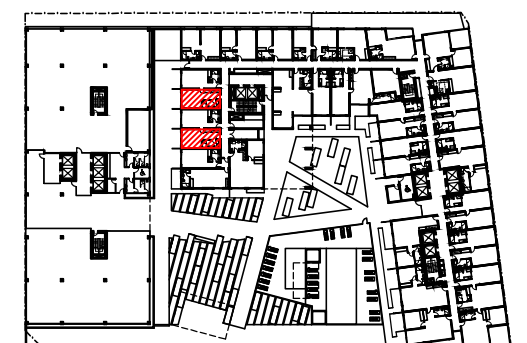
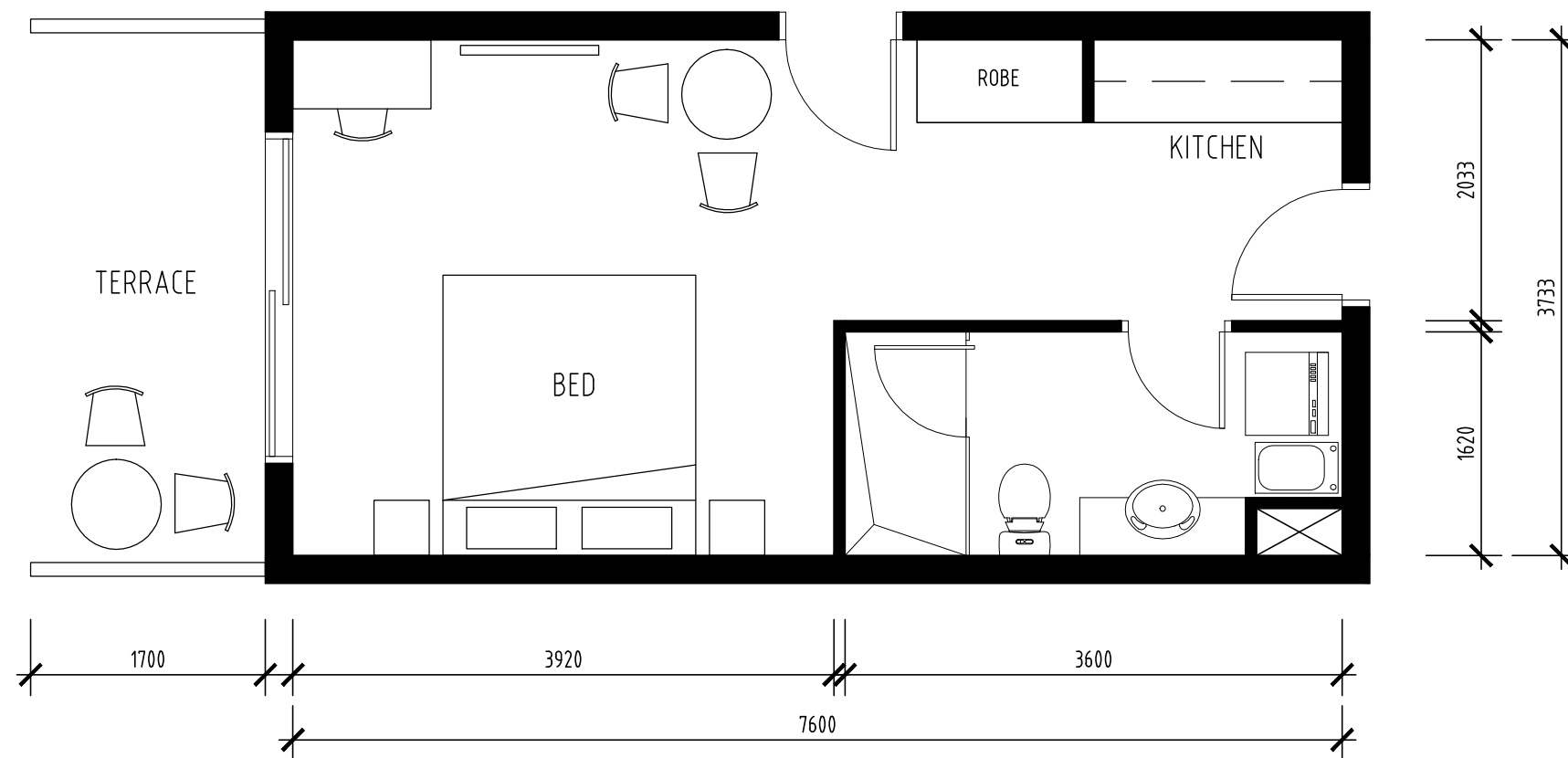
INTERNAL AREA	= 37.8 m ²
TOTAL AREA	= 37.8 m ²



KEY - LEVELS 6 & 7

STUDIO TYPE J PODIUM

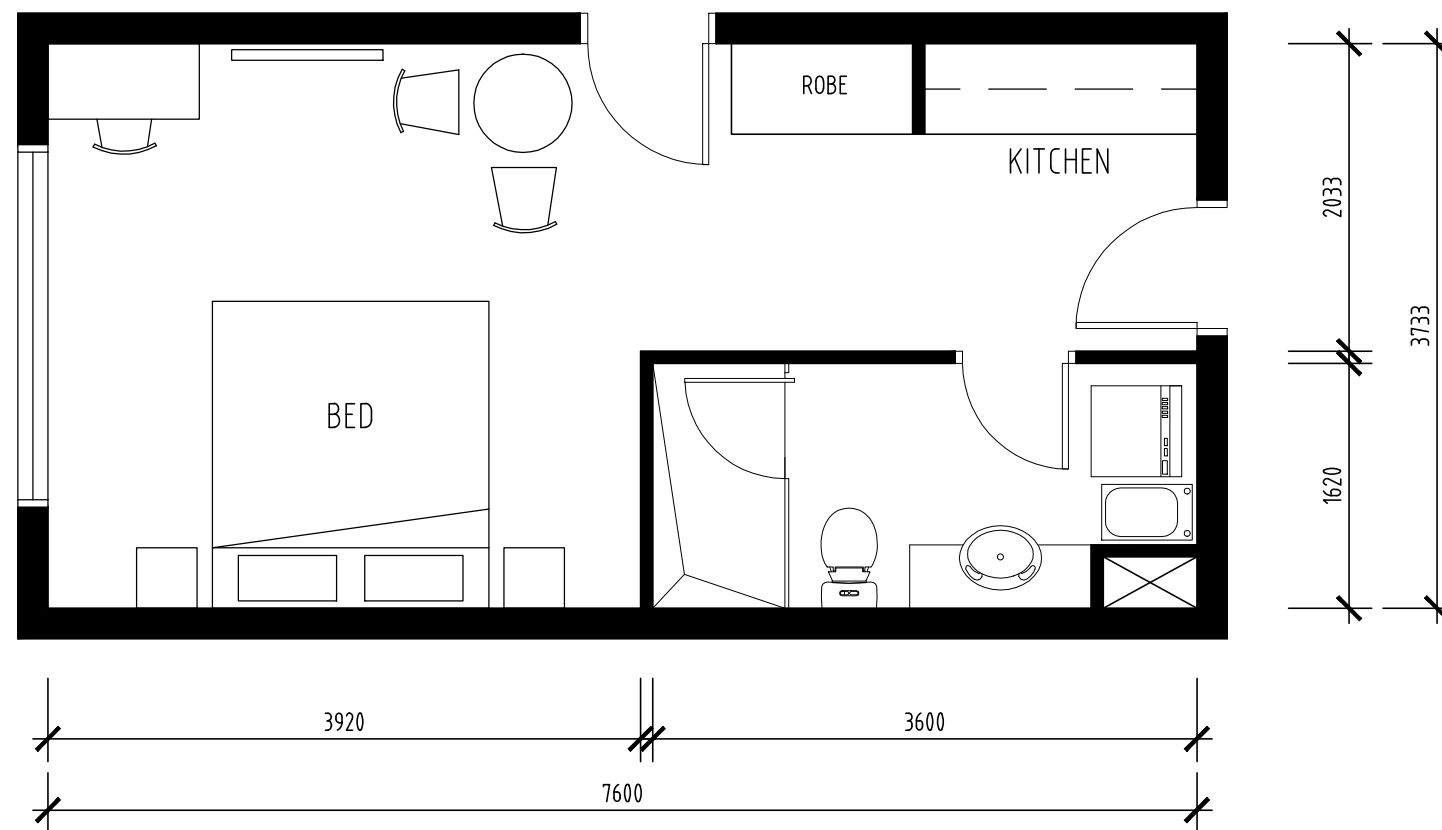
INTERNAL AREA	= 31 m ²
TERRACE AREA	= 6.5 m ²
TOTAL AREA	= 37.5 m ²



KEY - LEVEL 5

STUDIO
TYPE J

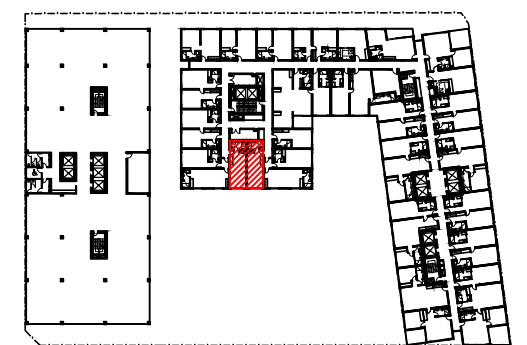
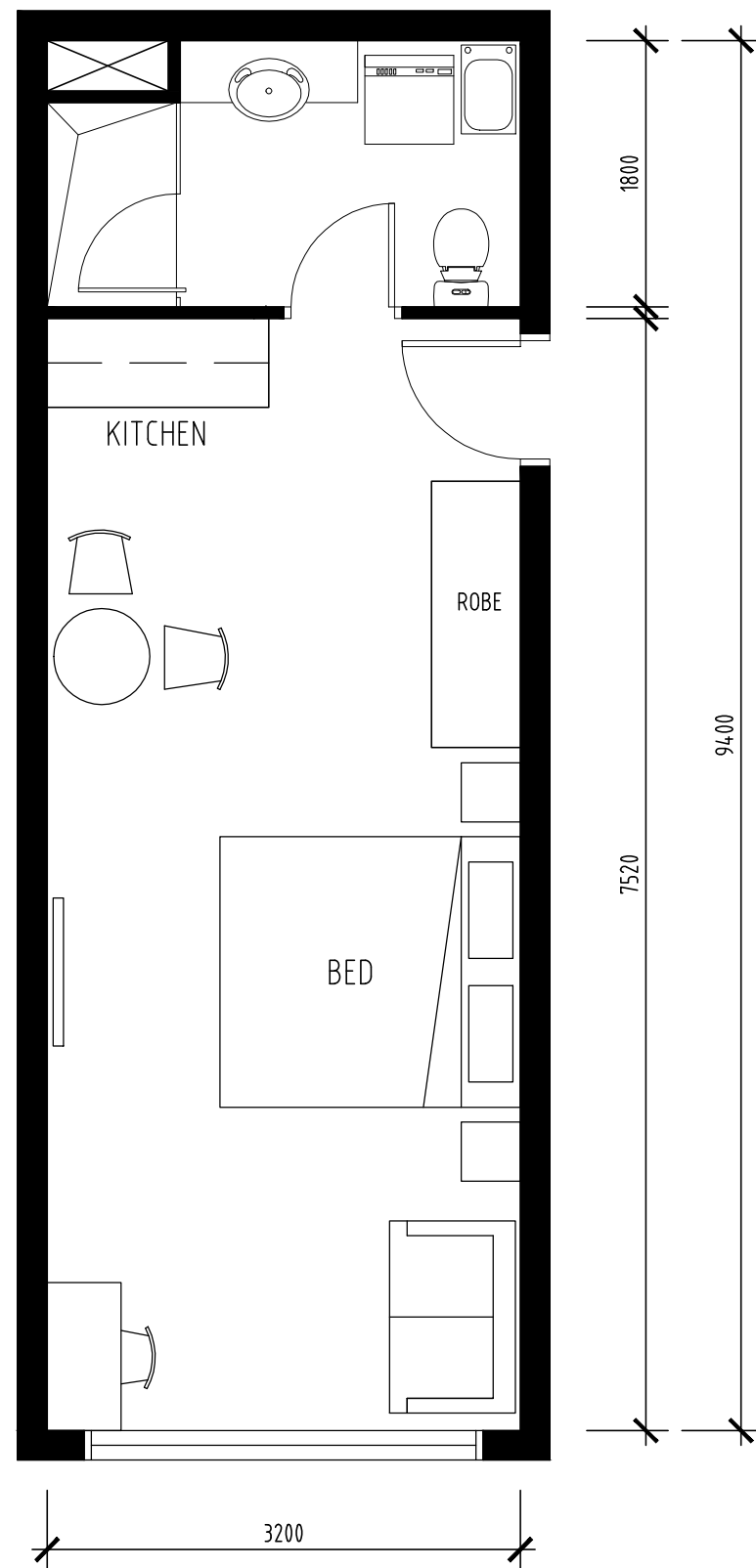
INTERNAL AREA	= 31 m ²
TOTAL AREA	= 31 m ²



KEY - LEVELS 6 & 7

STUDIO
TYPE K

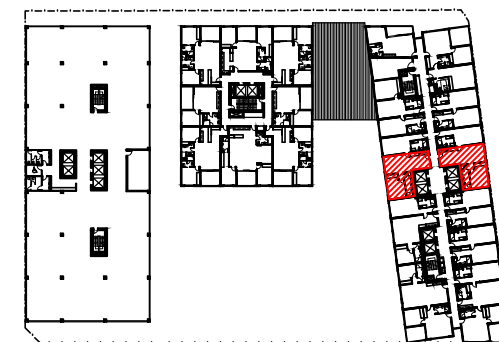
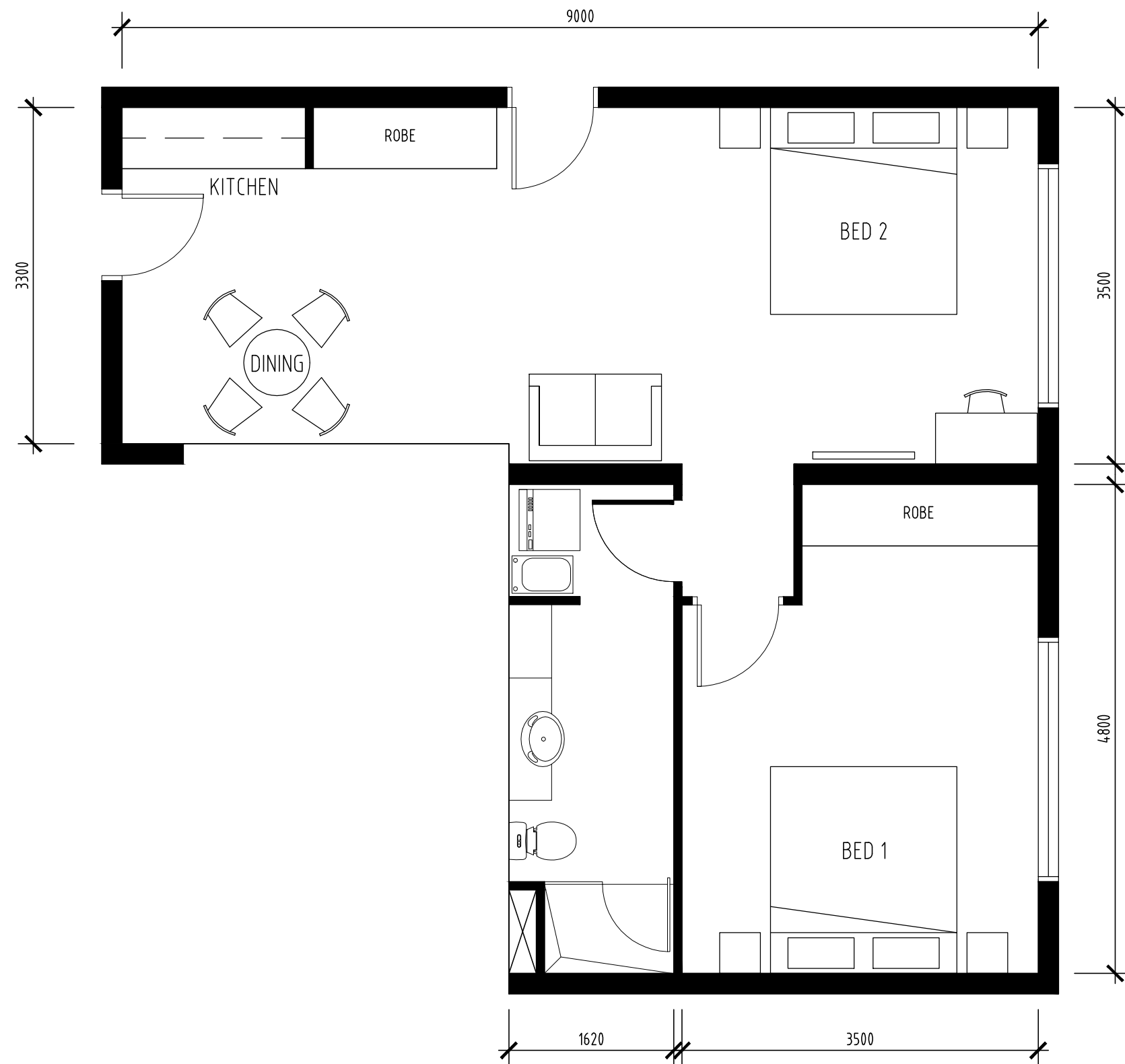
INTERNAL AREA	= 33 m ²
TOTAL AREA	= 33 m ²



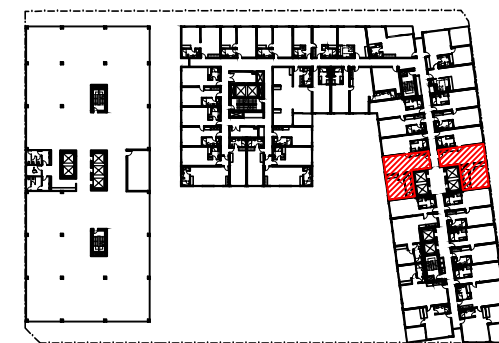
KEY - LEVELS 6 & 7

2 BED STUDIO TYPE A

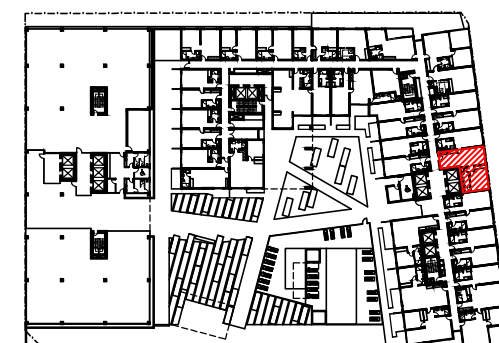
INTERNAL AREA	= 60.3 m ²
TOTAL AREA	= 60.3 m ²



KEY - LEVELS 8 & 9



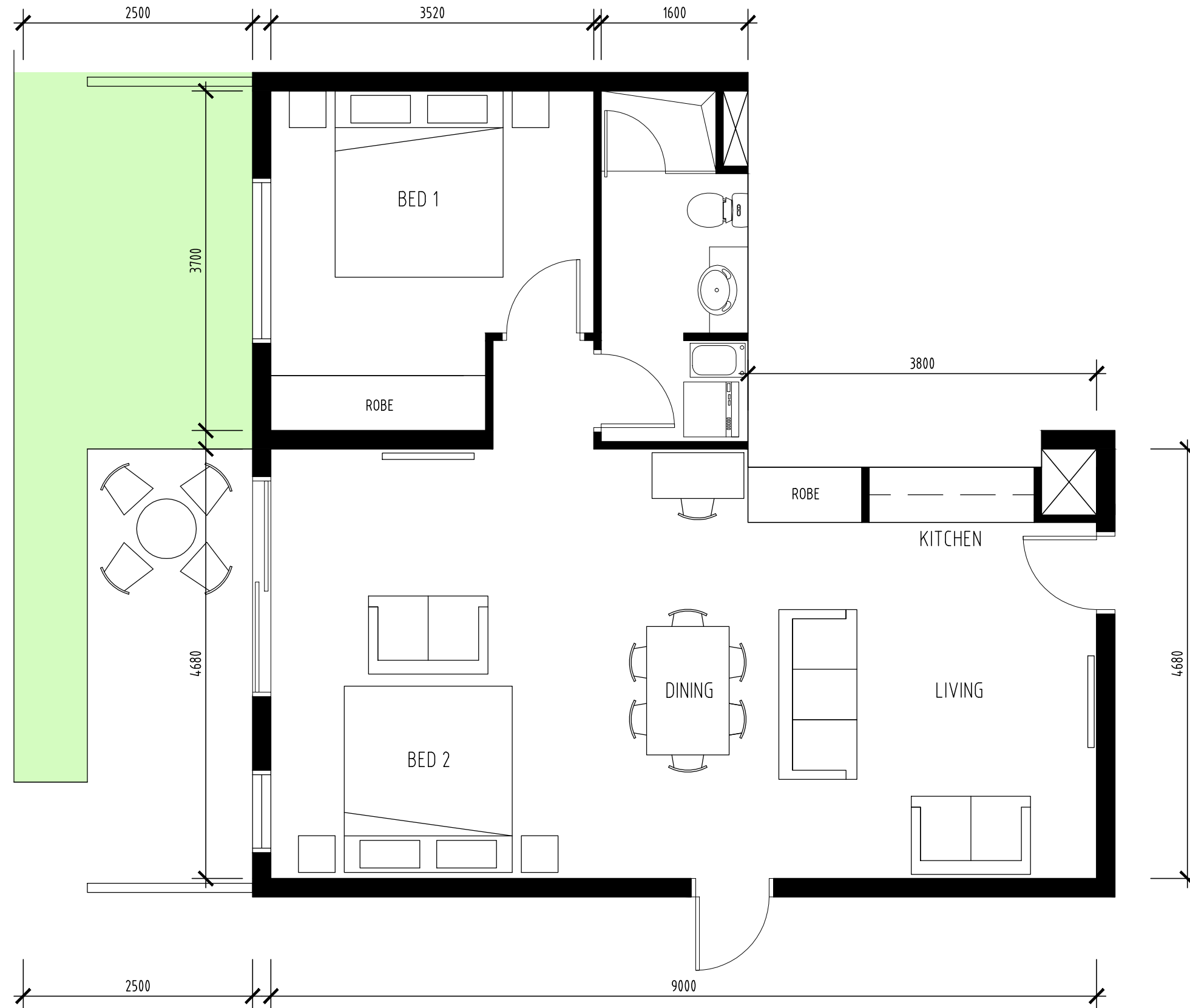
KEY - LEVELS 6 & 7



KEY - LEVEL 5

2 BED STUDIO TYPE B PODIUM

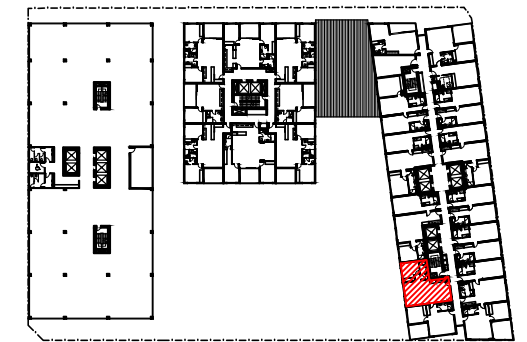
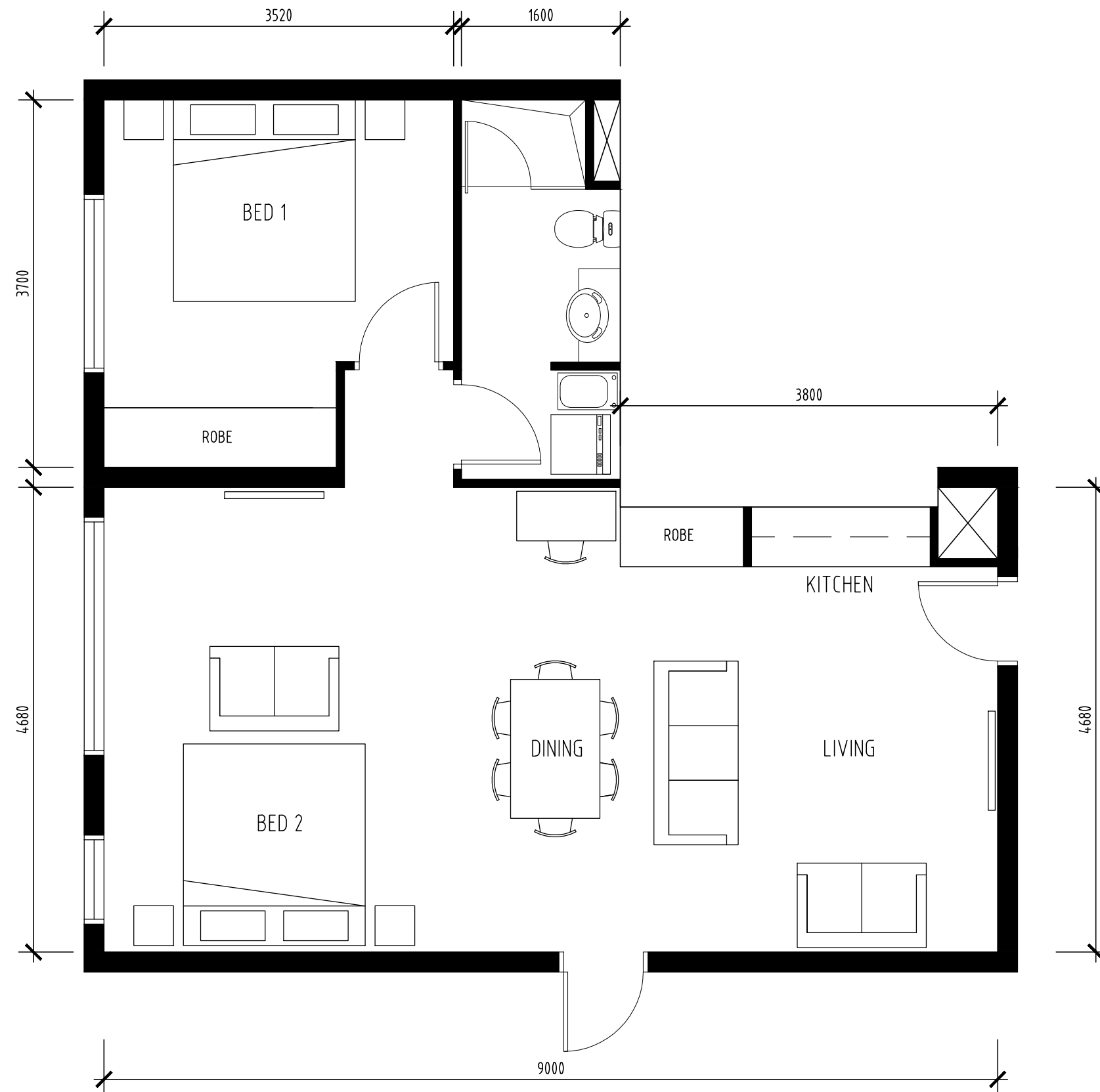
INTERNAL AREA	= 65.4 m ²
TOTAL AREA	= 65.4 m ²



KEY - LEVEL 5

2 BED STUDIO TYPE B

INTERNAL AREA	= 65.4 m ²
TOTAL AREA	= 65.4 m ²



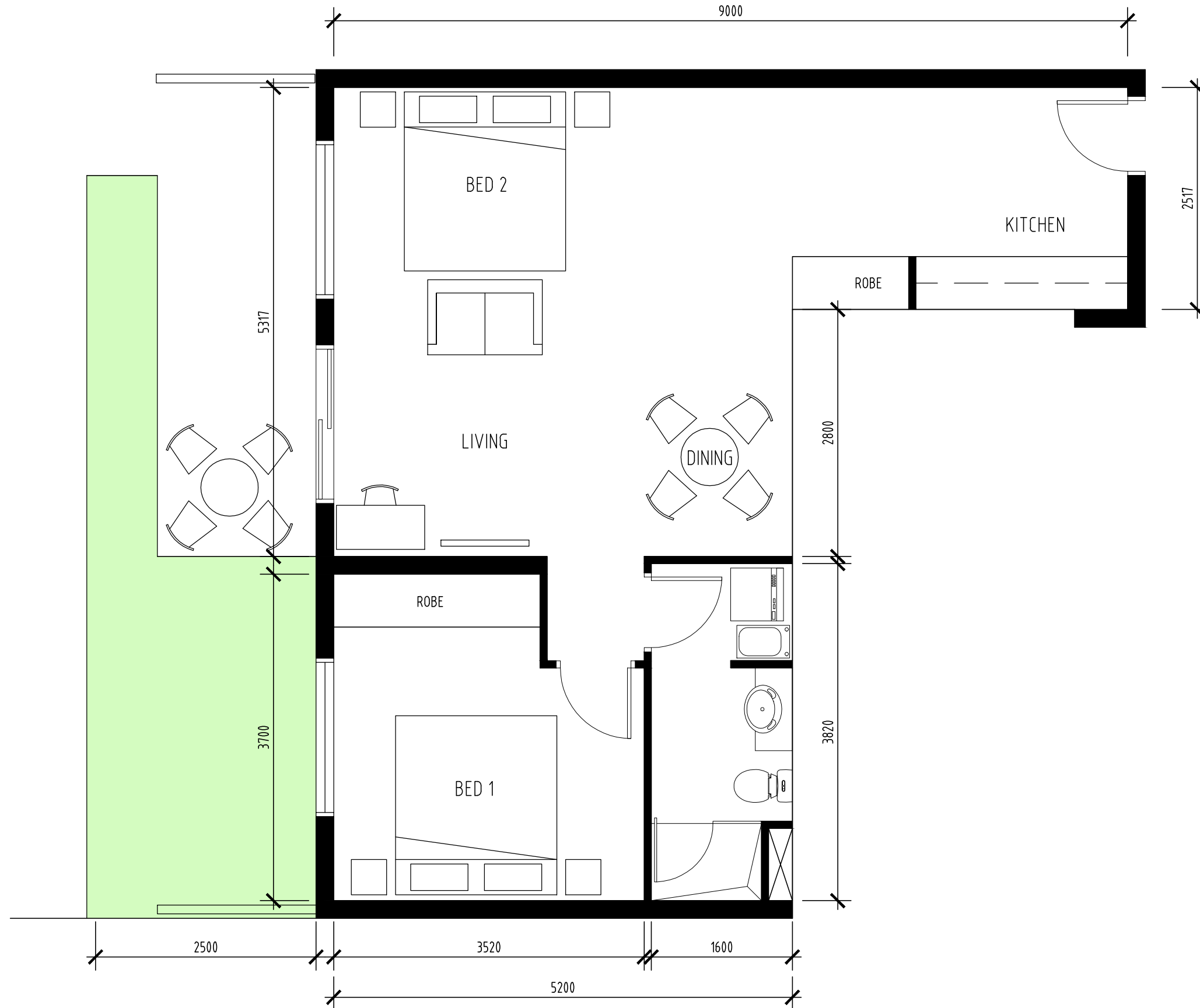
KEY - LEVELS 8 & 9



KEY - LEVELS 6 & 7

2 BED STUDIO TYPE C PODIUM

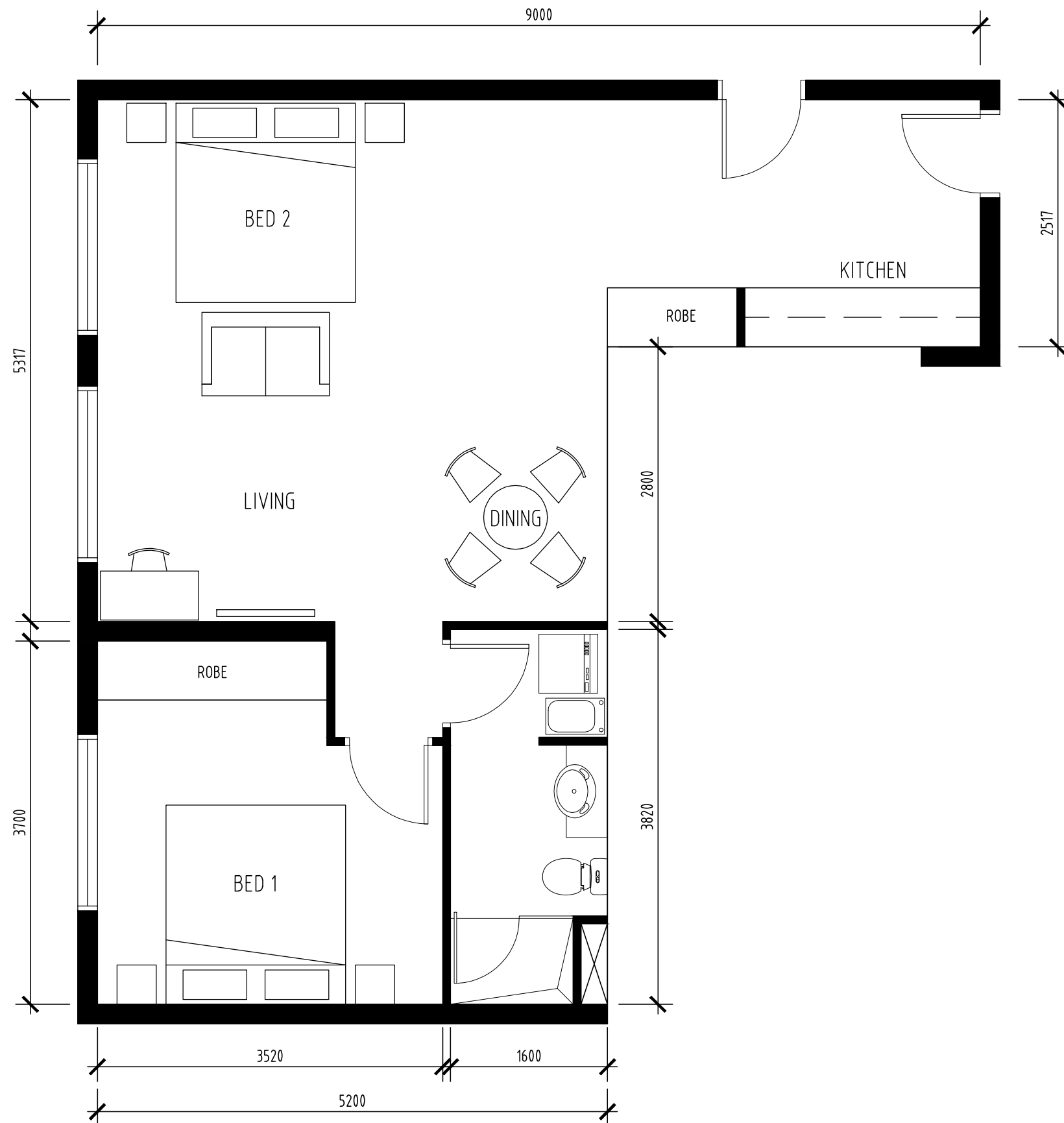
INTERNAL AREA	= 61.1 m ²
TOTAL AREA	= 61.1 m ²



KEY - LEVEL 5

2 BED STUDIO TYPE C

INTERNAL AREA	= 61.1 m ²
TOTAL AREA	= 61.1 m ²



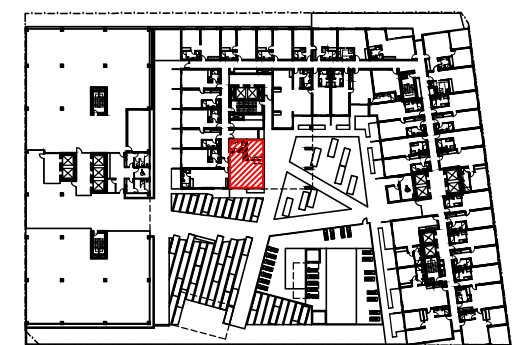
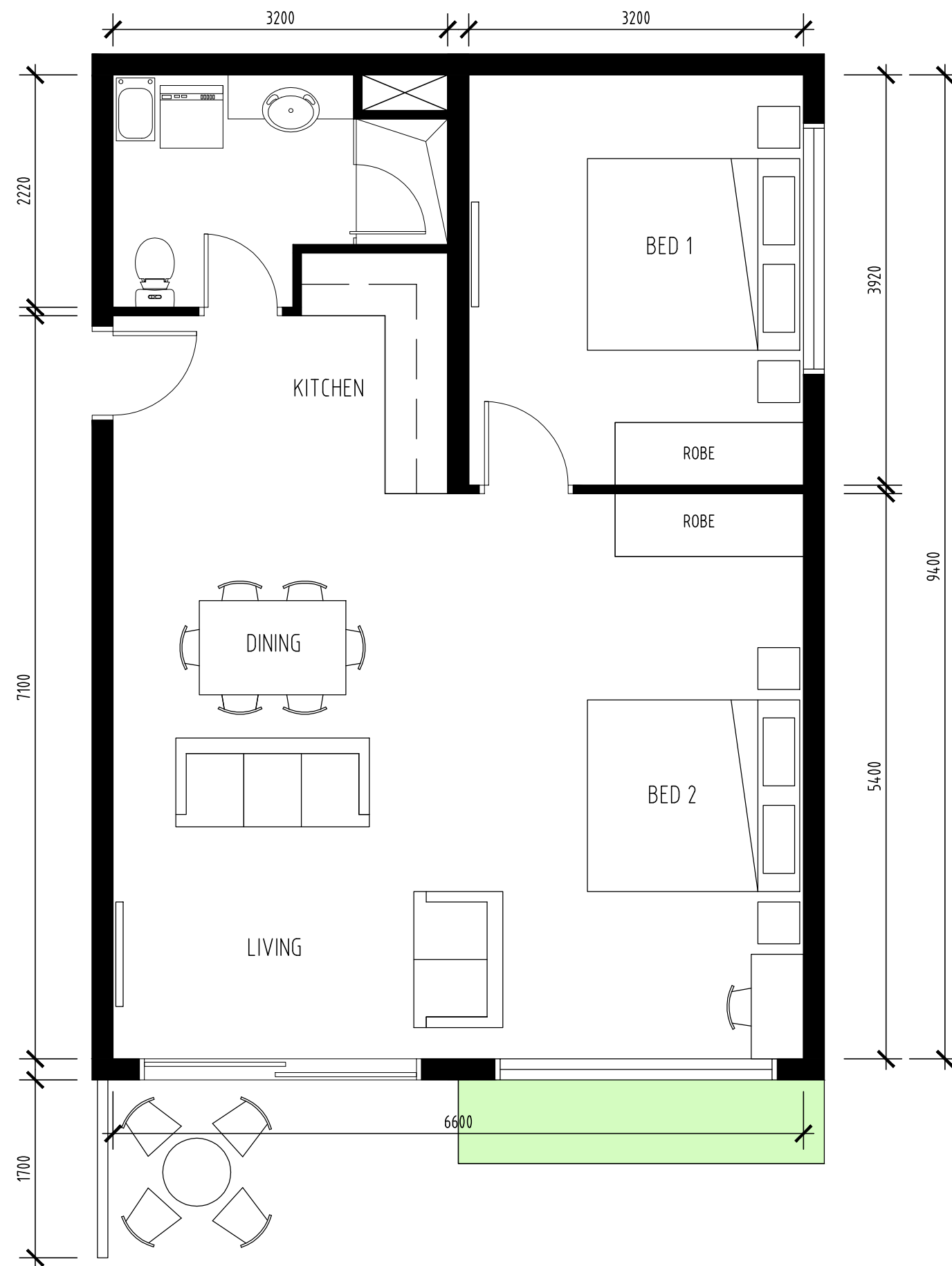
KEY - LEVELS 8 & 9



KEY - LEVELS 6 & 7

2 BED STUDIO TYPE D

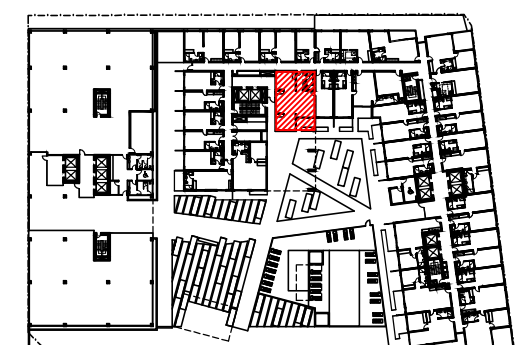
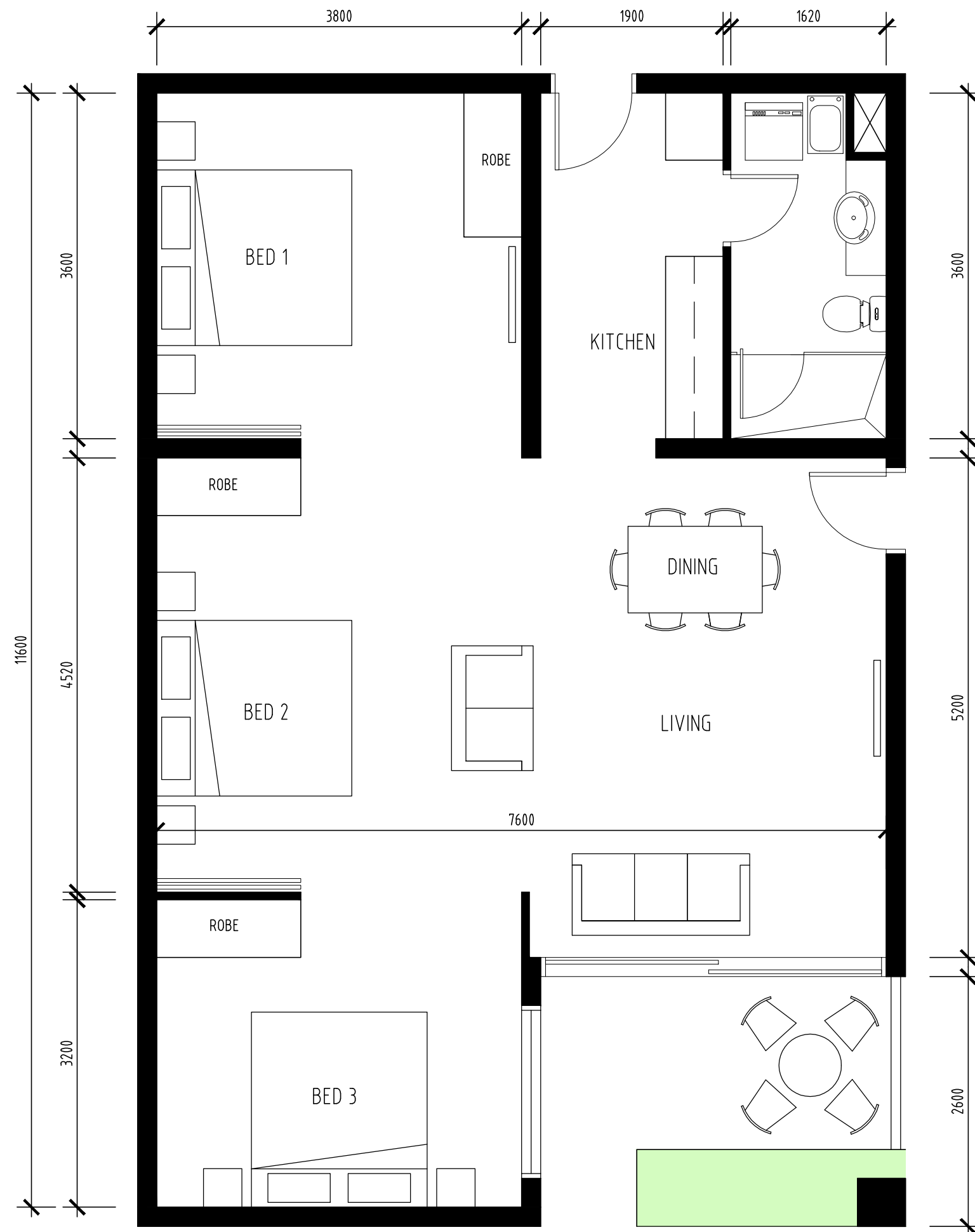
INTERNAL AREA	= 67 m ²
TOTAL AREA	= 67 m ²



KEY - LEVEL 5

3 BED STUDIO - PODIUM

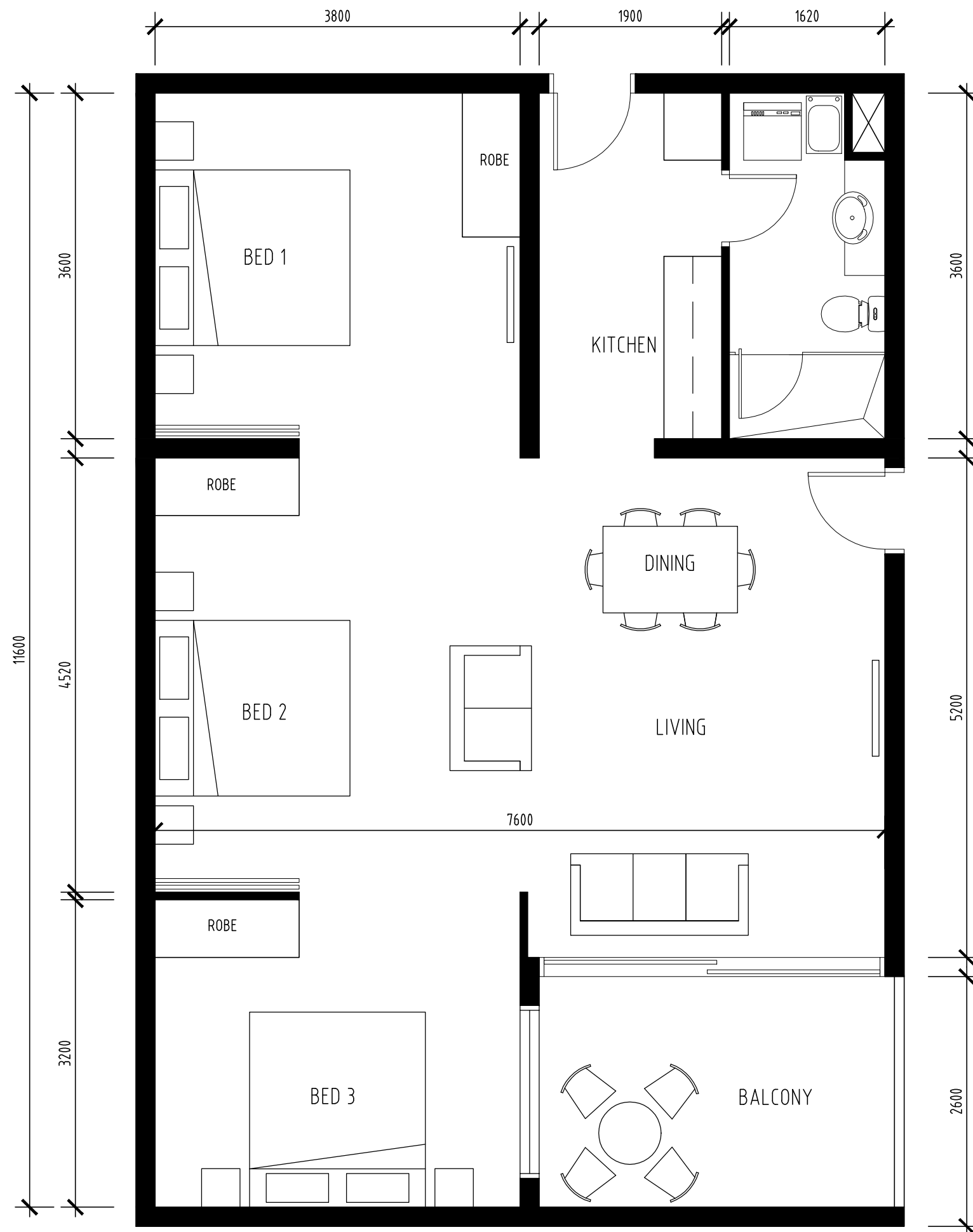
INTERNAL AREA	= 82.1 m ²
TOTAL AREA	= 82.1 m ²



KEY - LEVEL 5

3 BED STUDIO

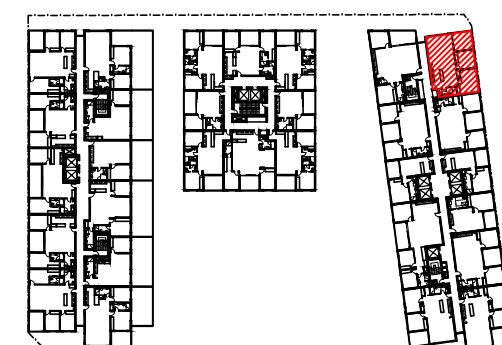
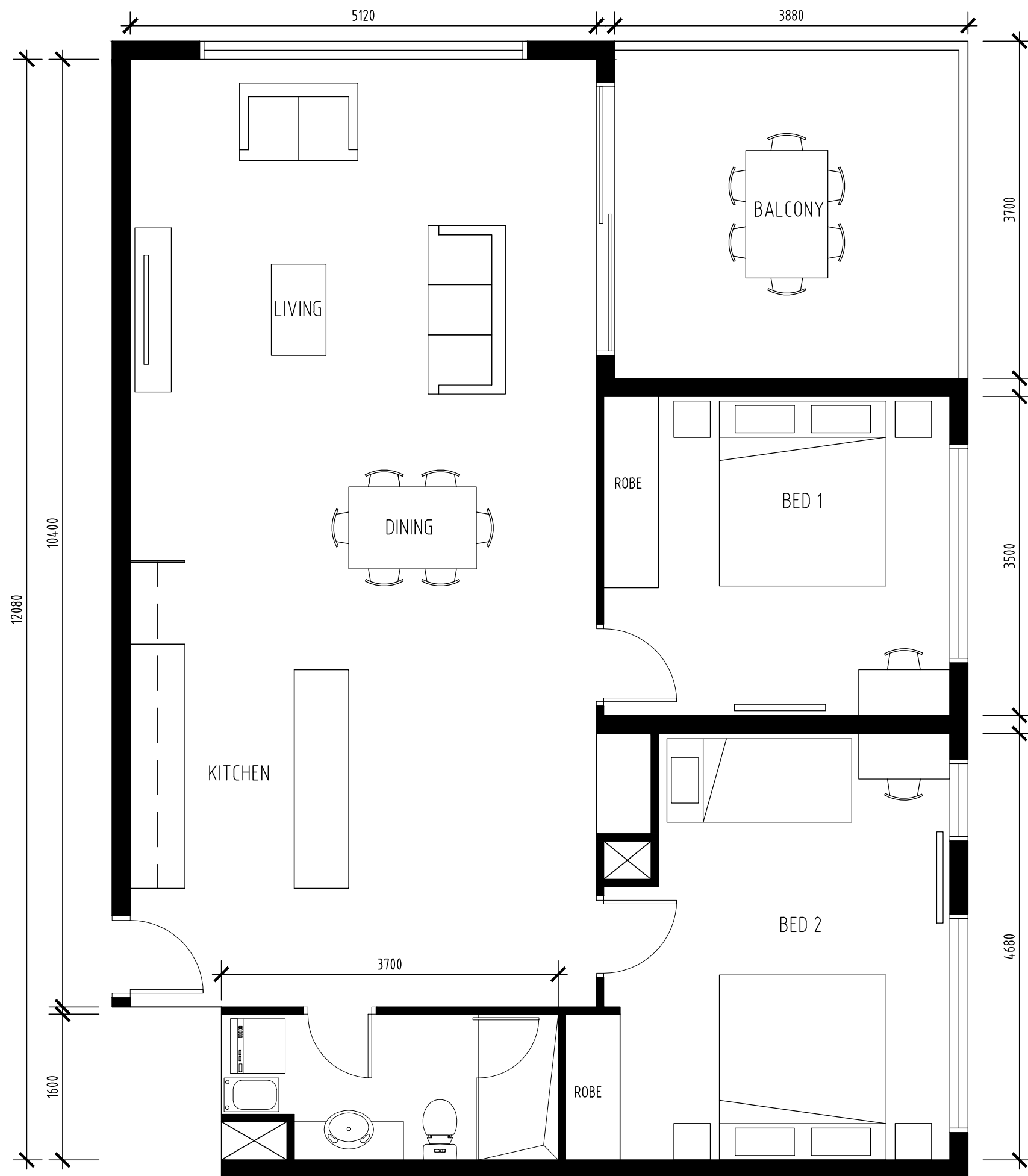
INTERNAL AREA	= 82.1 m ²
BALCONY AREA	= 10.1 m ²
TOTAL AREA	= 92.2 m ²



KEY - LEVELS 6 & 7

SERVICE APARTMENT
TYPE SA.01

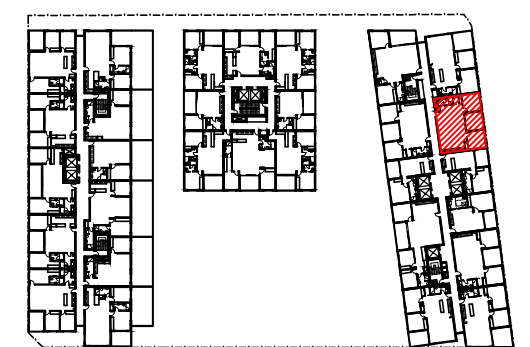
INTERNAL AREA	= 98.1m ²
BALCONY AREA	= 15.1m ²
TOTAL AREA	= 113.2m ²



KEY - LEVELS 10 - 11

SERVICE APARTMENT
TYPE SA.02 A

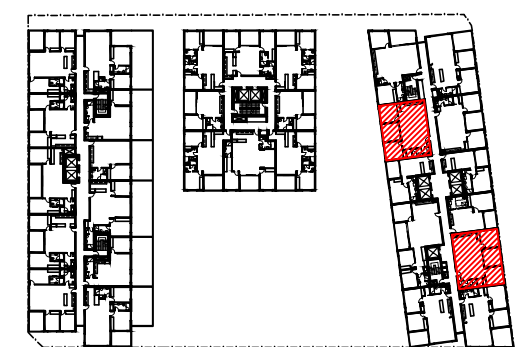
INTERNAL AREA	= 89.2m ²
BALCONY AREA	= 13.6m ²
TOTAL AREA	= 102.8m ²



KEY - LEVELS 10 - 11

SERVICE APARTMENT
 TYPE SA.02 B
 TYPE SA.02 C (MIRRORED)

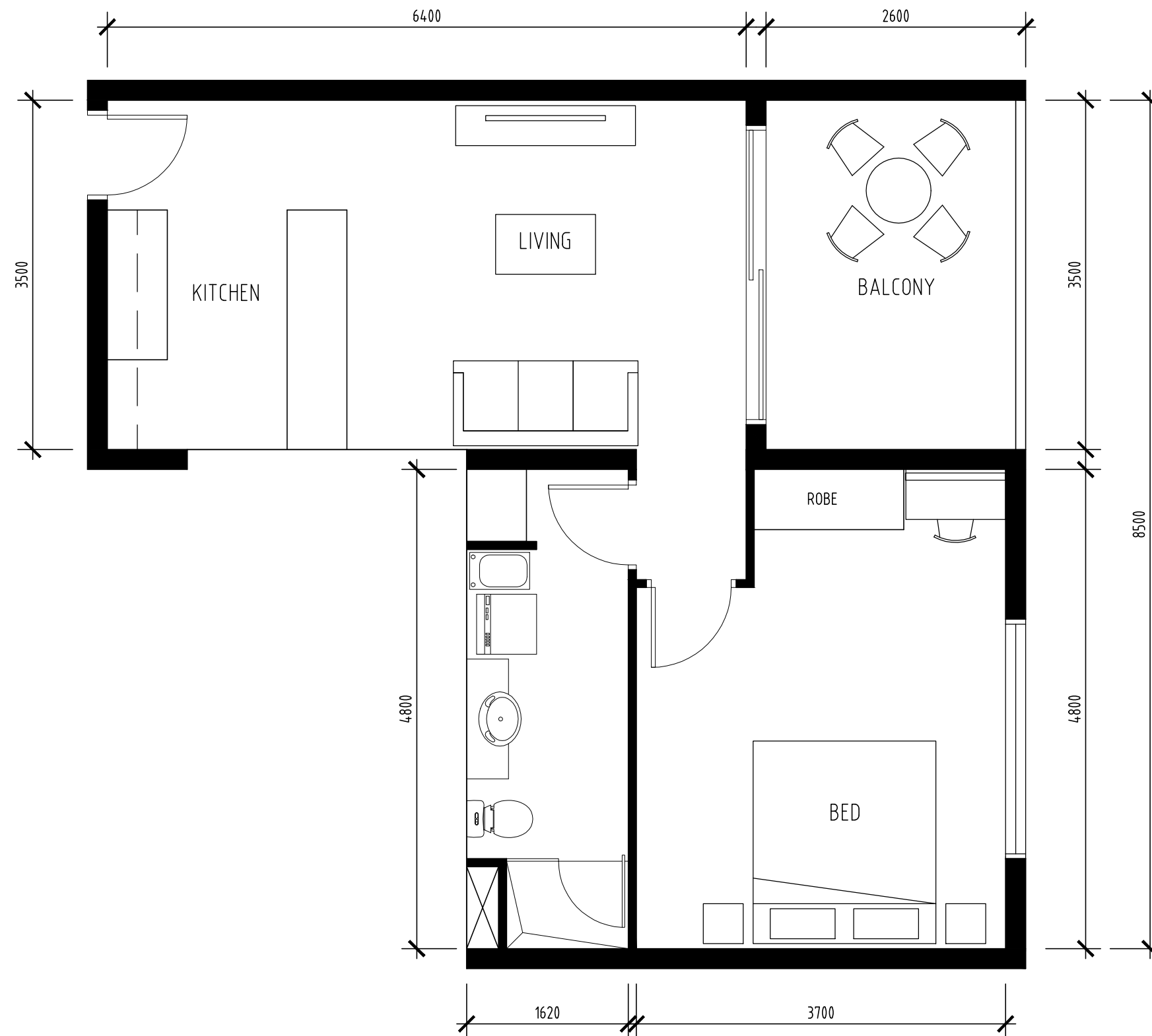
INTERNAL AREA	= 89.6m ²
BALCONY AREA	= 13.6m ²
TOTAL AREA	= 103.2m ²



KEY - LEVELS 10 - 11

SERVICE APARTMENT
TYPE SA.03 A
TYPE SA.03 B (MIRRORED)

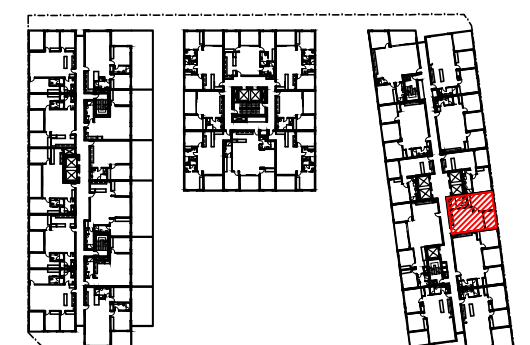
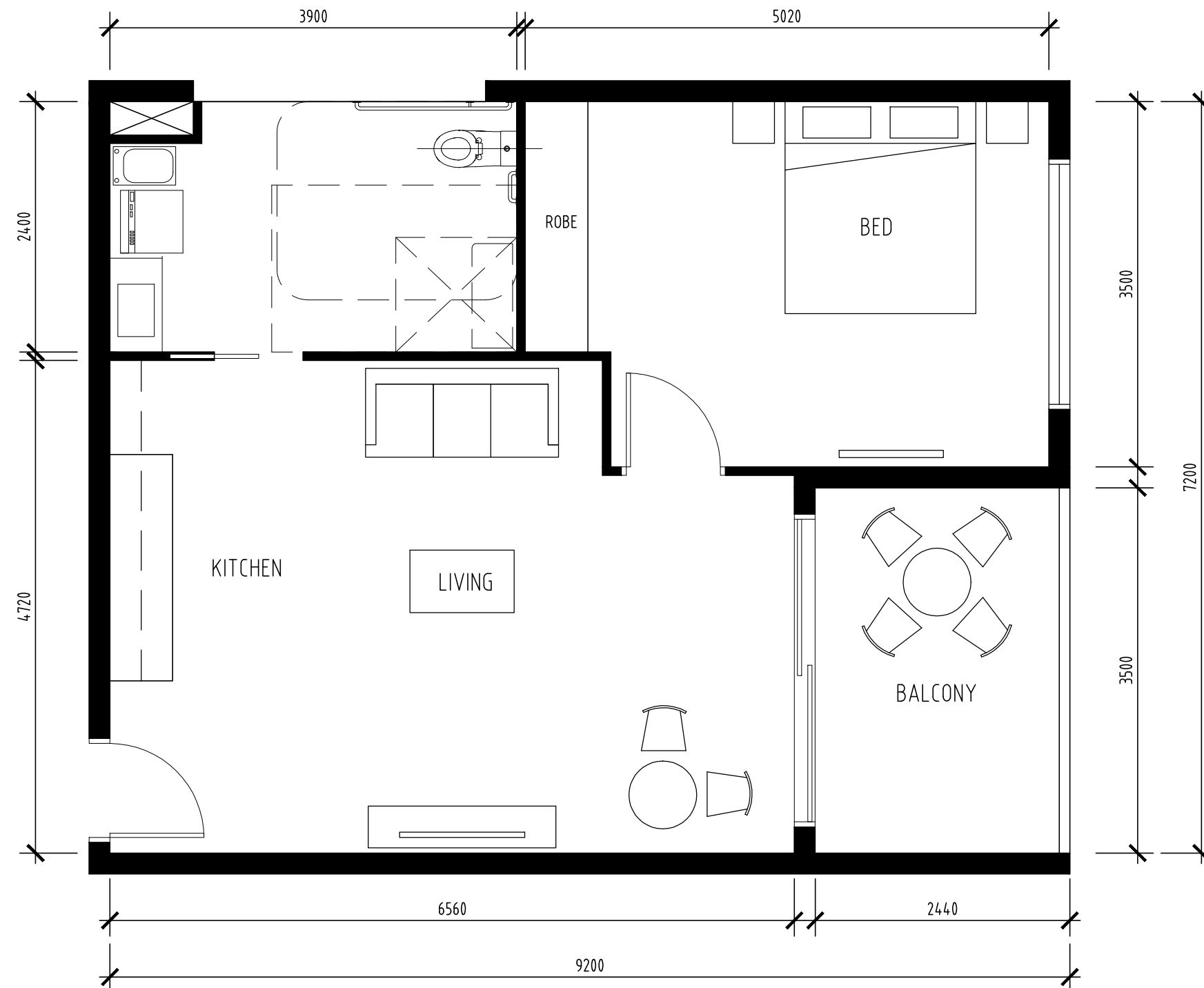
INTERNAL AREA	= 52m ²
BALCONY AREA	= 10m ²
TOTAL AREA	= 62m ²



KEY - LEVELS 10 - 11

SERVICE APARTMENT
TYPE SA.04 A
ACCESSIBLE - RH

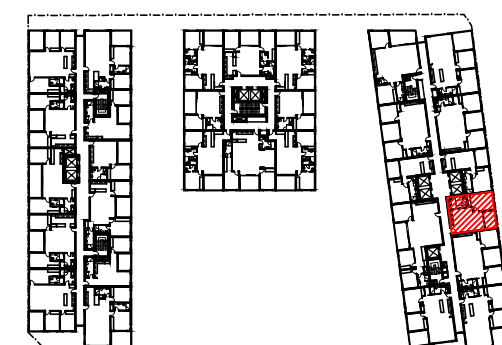
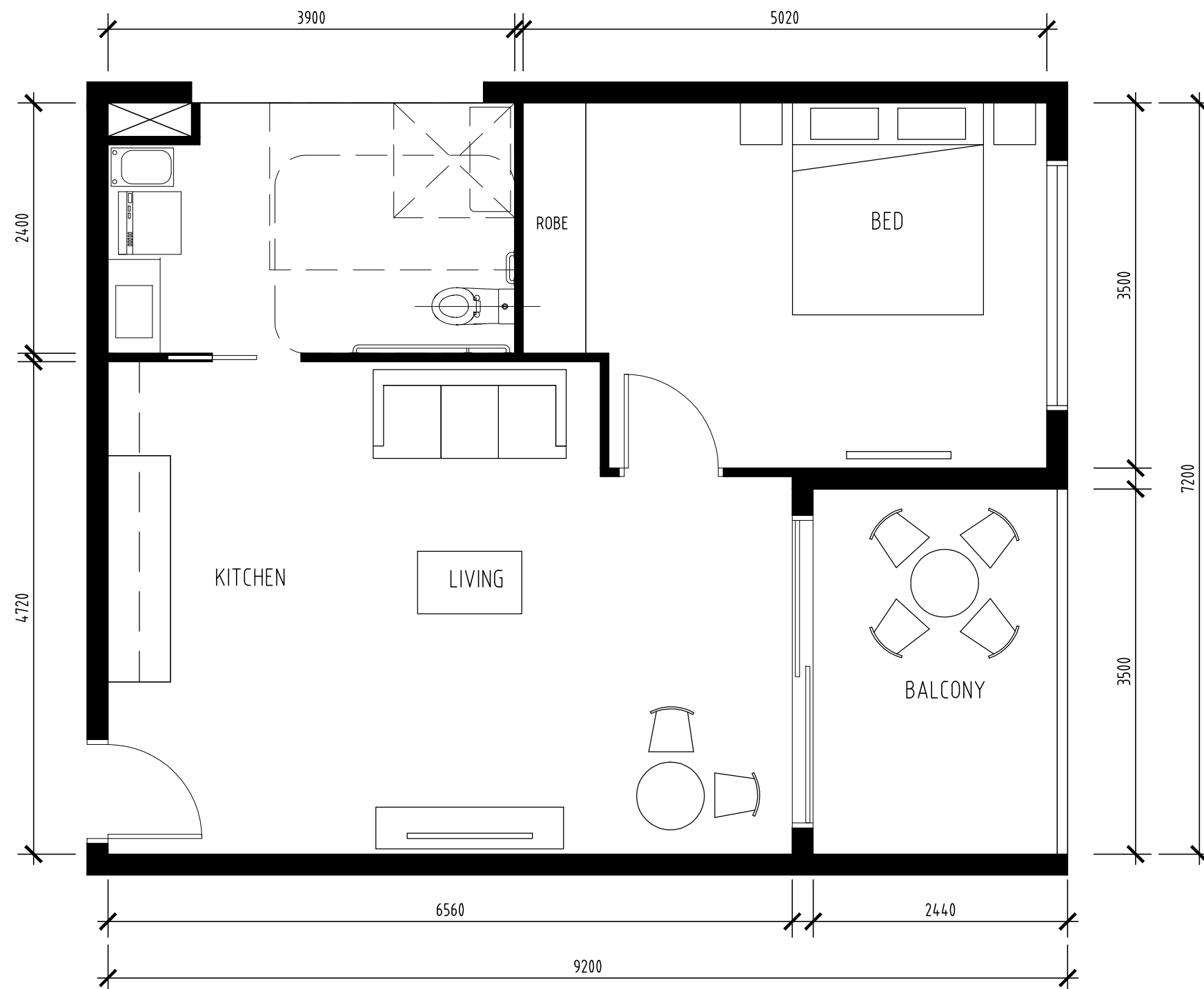
INTERNAL AREA	= 59.1m ²
BALCONY AREA	= 9.3m ²
TOTAL AREA	= 68.4m ²



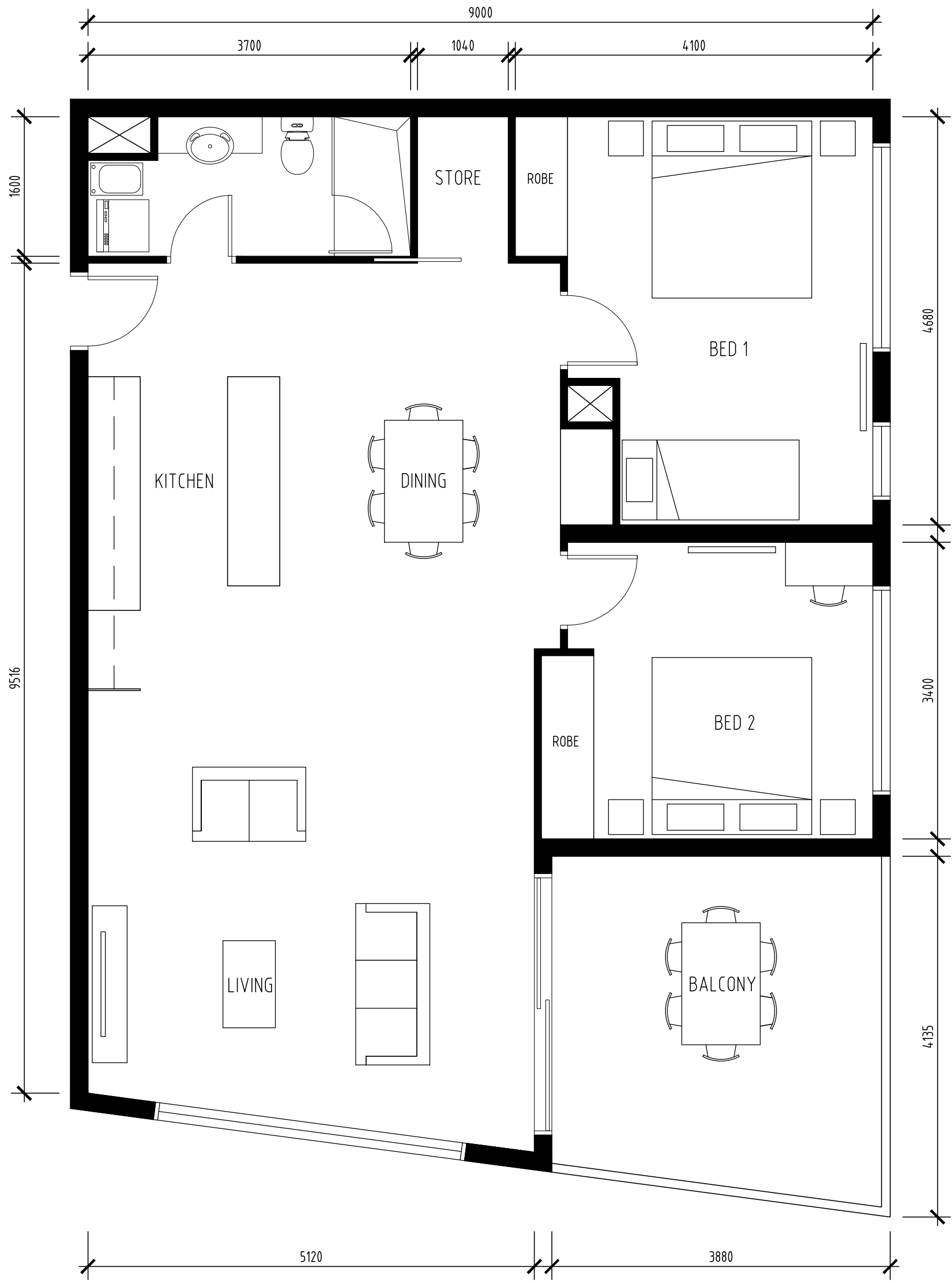
KEY - LEVEL 10

SERVICE APARTMENT
TYPE SA.04 B
ACCESSIBLE - LH

INTERNAL AREA	= 59.1m ²
BALCONY AREA	= 9.3m ²
TOTAL AREA	= 68.4m ²

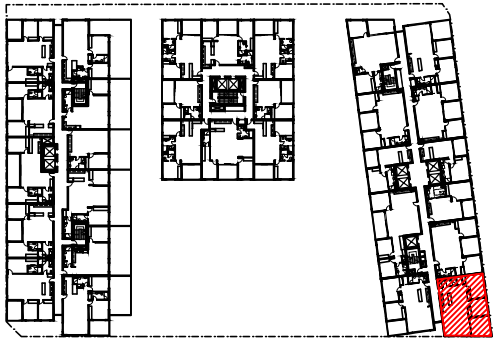


KEY - LEVEL 11

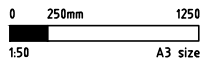


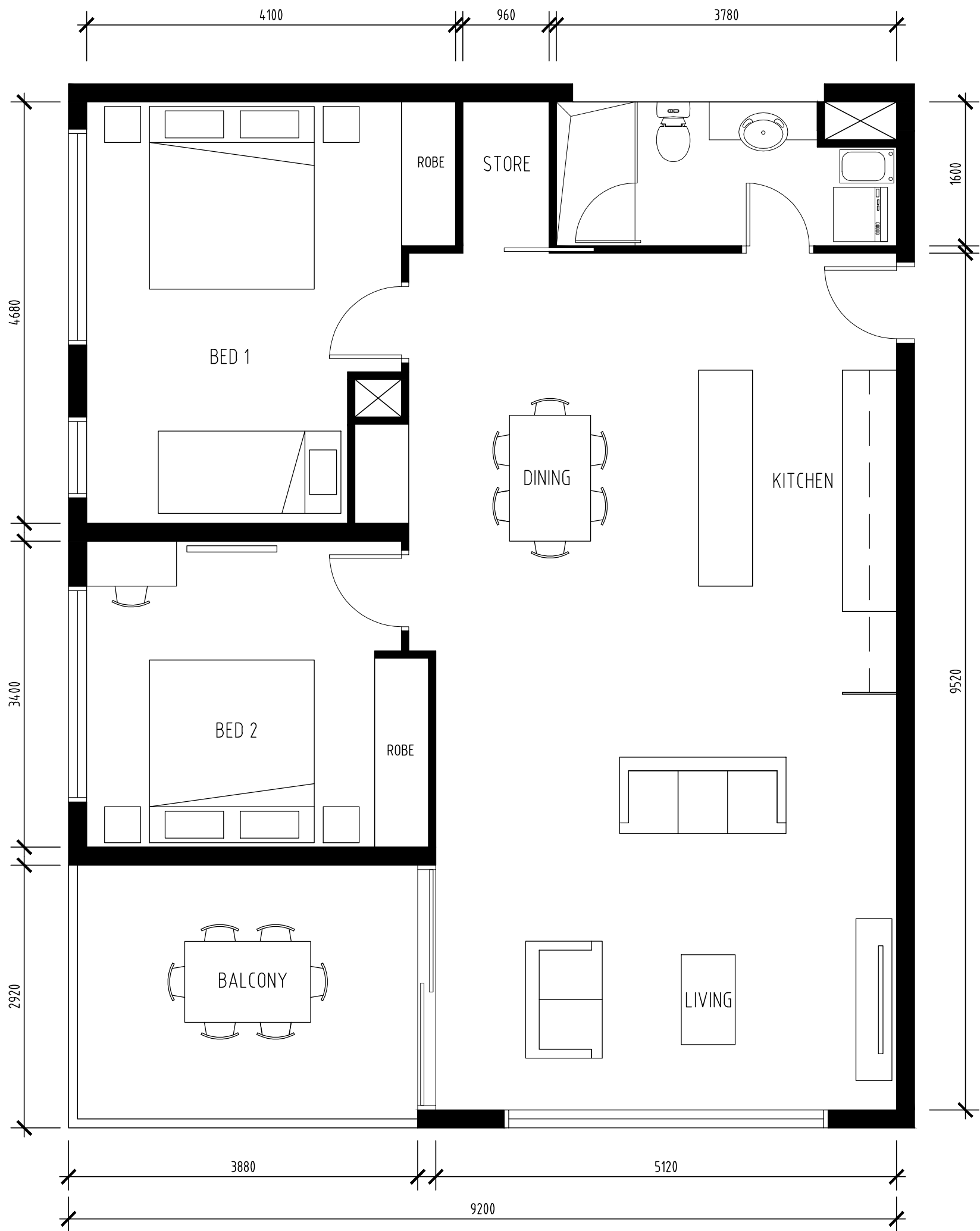
SERVICE APARTMENT
TYPE SA.05

INTERNAL AREA	= 97m ²
BALCONY AREA	= 15.8 m ²
TOTAL AREA	= 112.8m ²



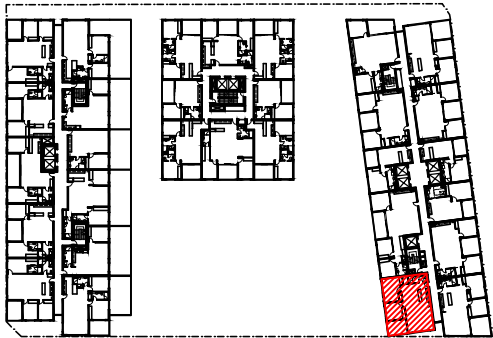
KEY - LEVELS 10 - 11



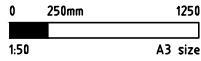


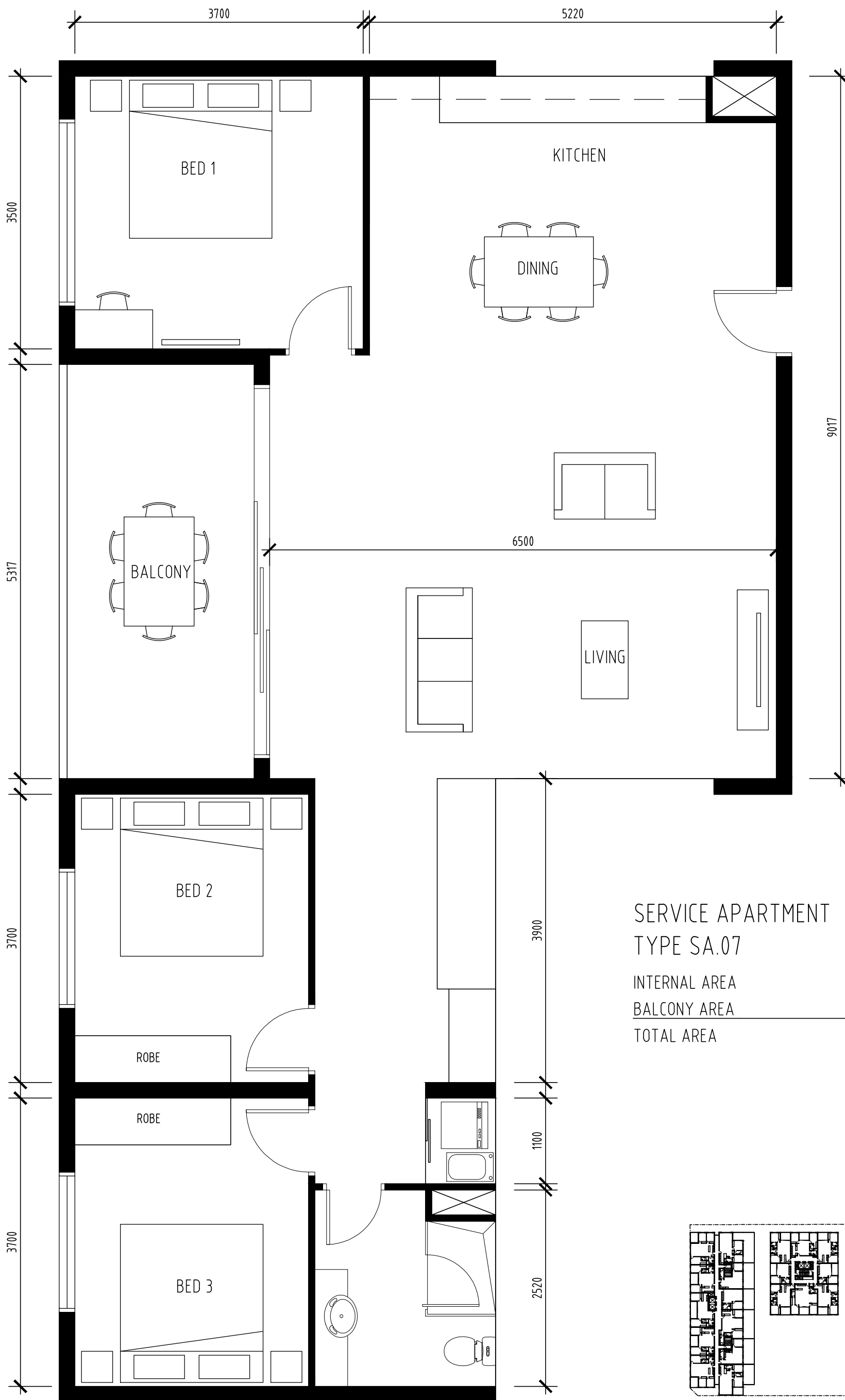
SERVICE APARTMENT
TYPE SA.06

INTERNAL AREA	= 94.7m ²
BALCONY AREA	= 12m ²
TOTAL AREA	= 106.7m ²



KEY - LEVELS 10 - 11





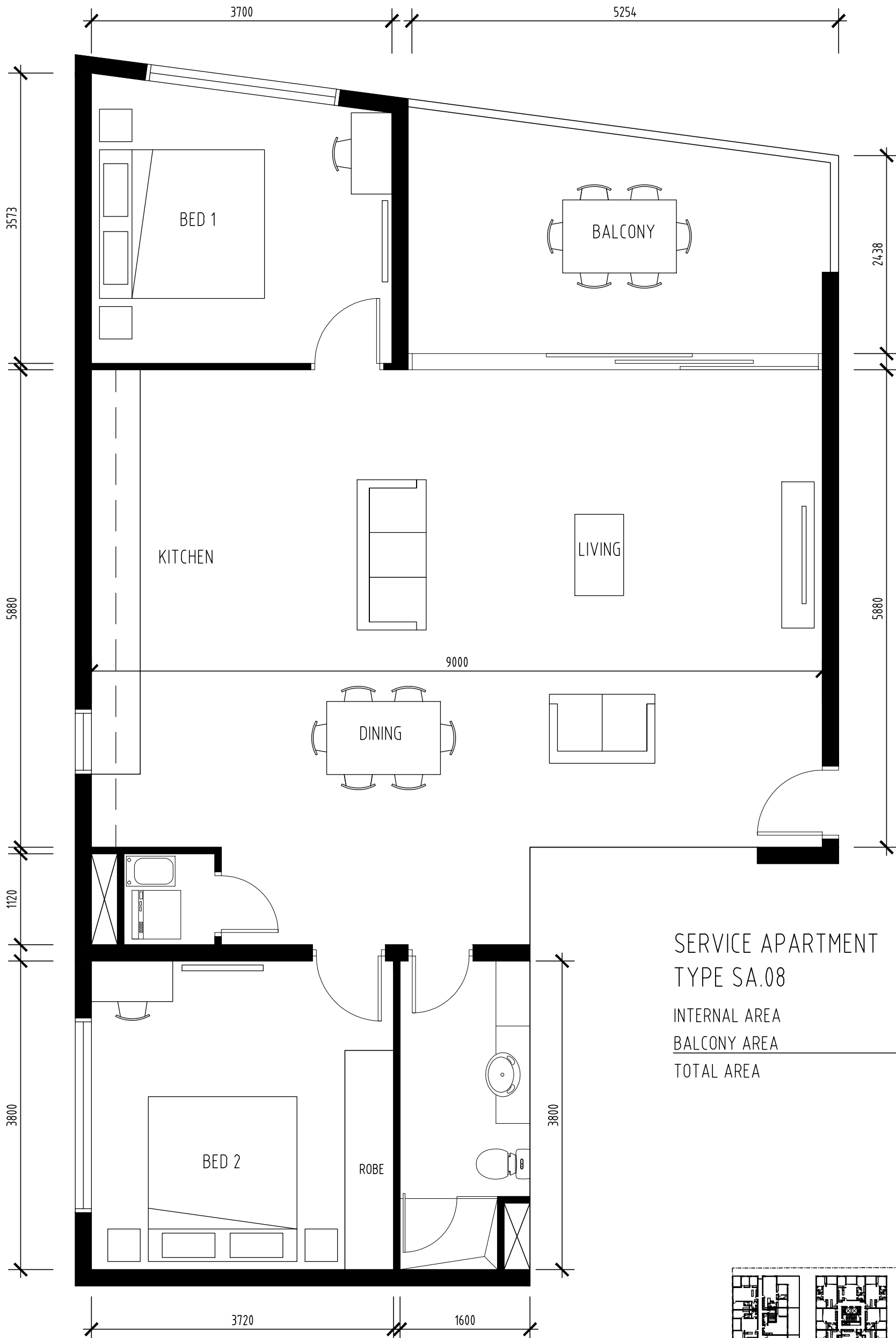
SERVICE APARTMENT TYPE SA.07

INTERNAL AREA	= 114.7m ²
BALCONY AREA	= 14.3m ²
TOTAL AREA	= 129m ²



KEY - LEVELS 10 - 11

0 250mm 1250
1:50 A3 size



SERVICE APARTMENT TYPE SA.08

INTERNAL AREA	= 99.4m ²
BALCONY AREA	= 15.6m ²
TOTAL AREA	= 115m ²



KEY - LEVELS 10 - 11

0 250mm 1250
1:50 A3 size













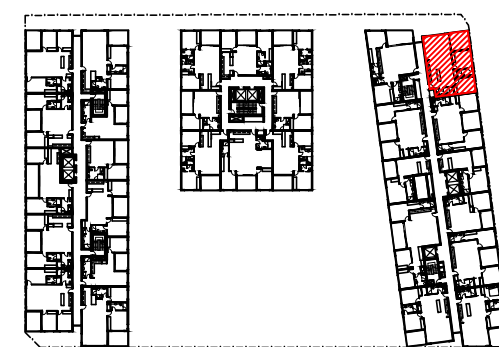
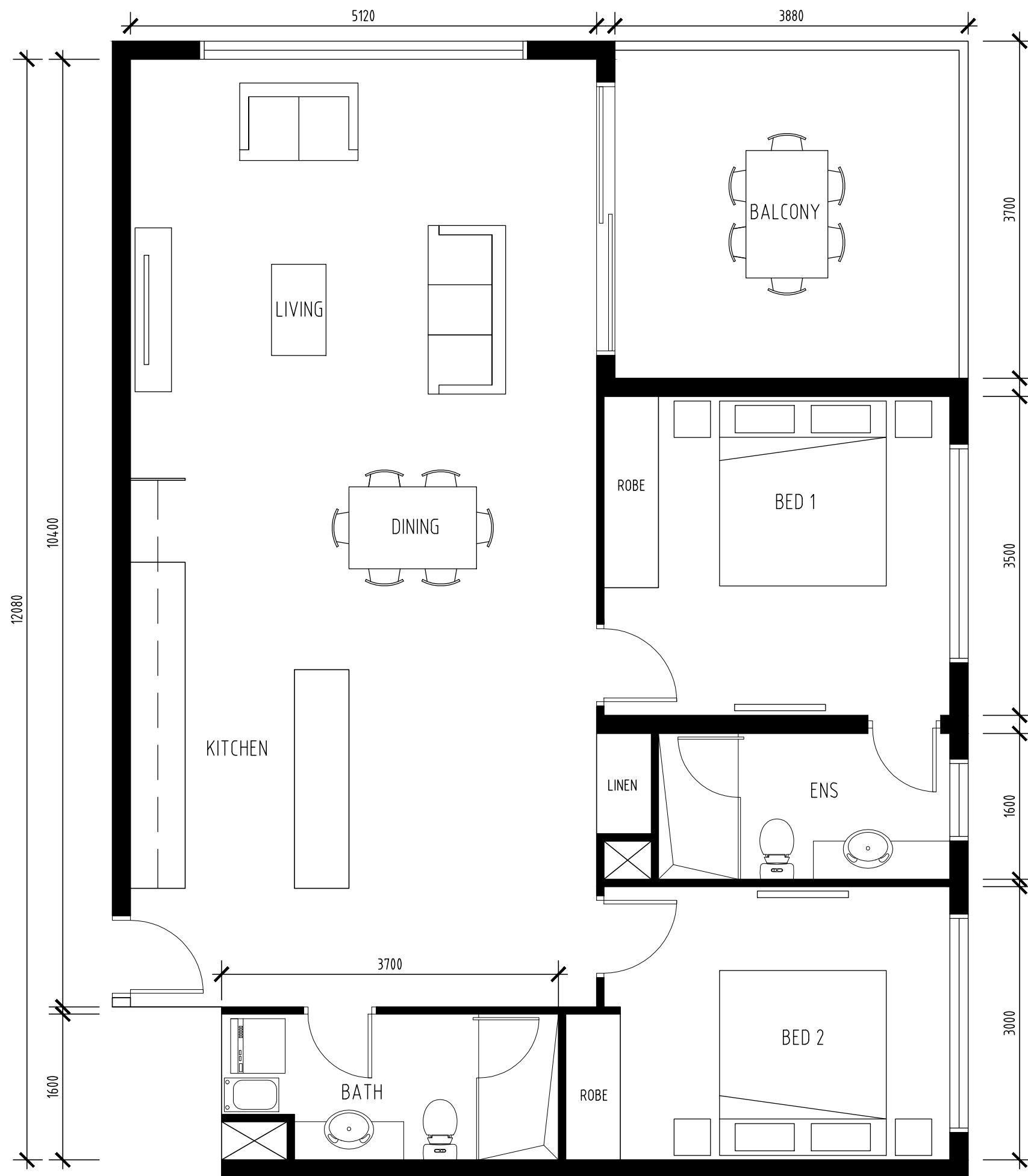






RESIDENCE TYPE 1.01

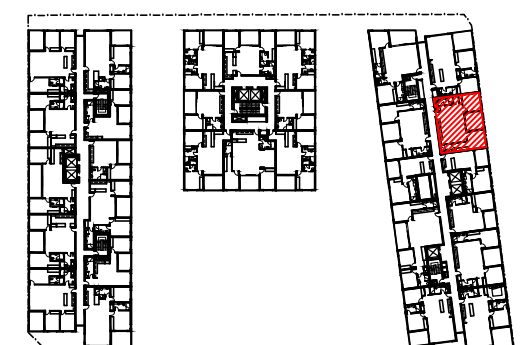
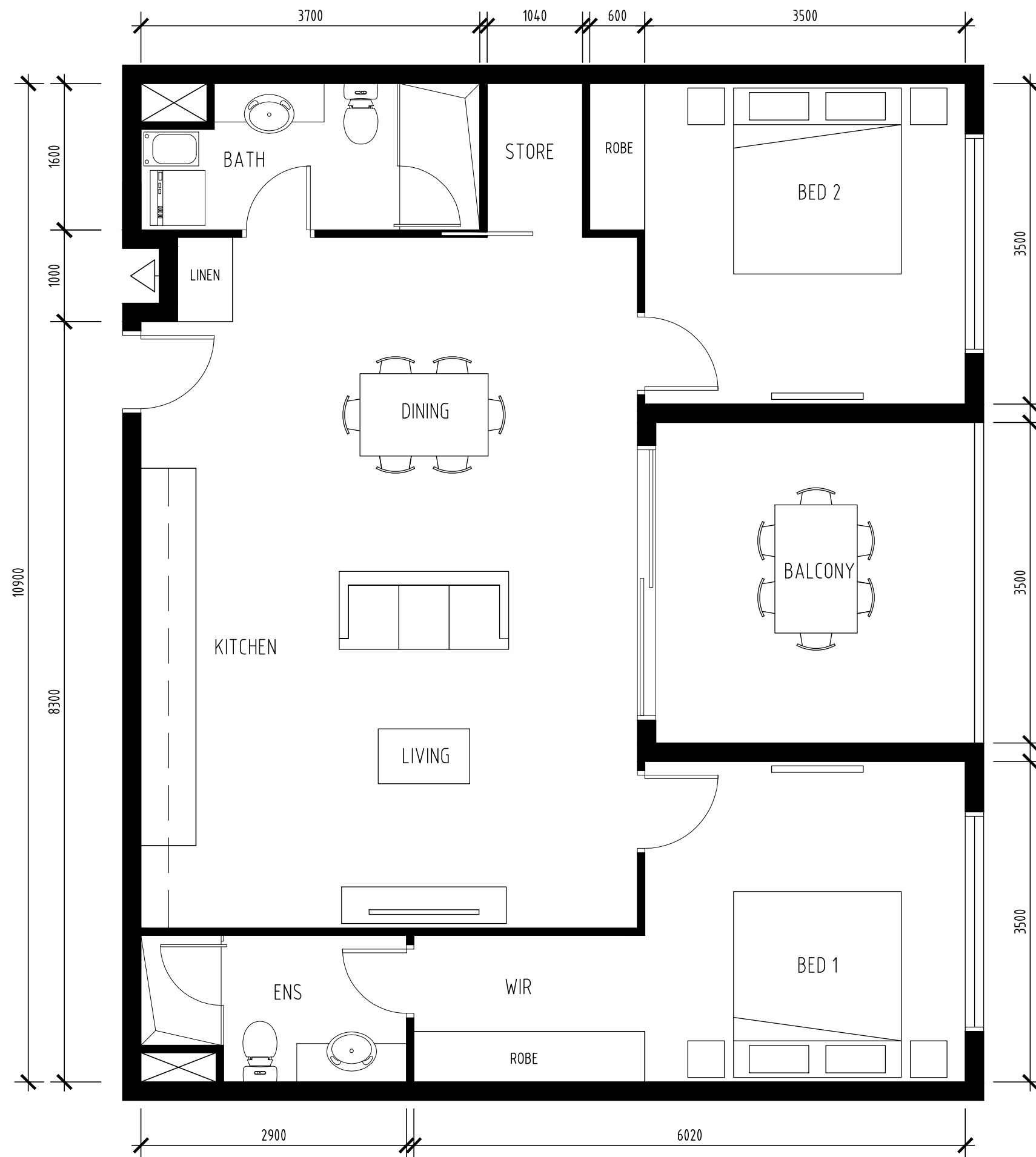
INTERNAL AREA	= 98.1m ²
BALCONY AREA	= 15.1m ²
TOTAL AREA	= 113.2m ²



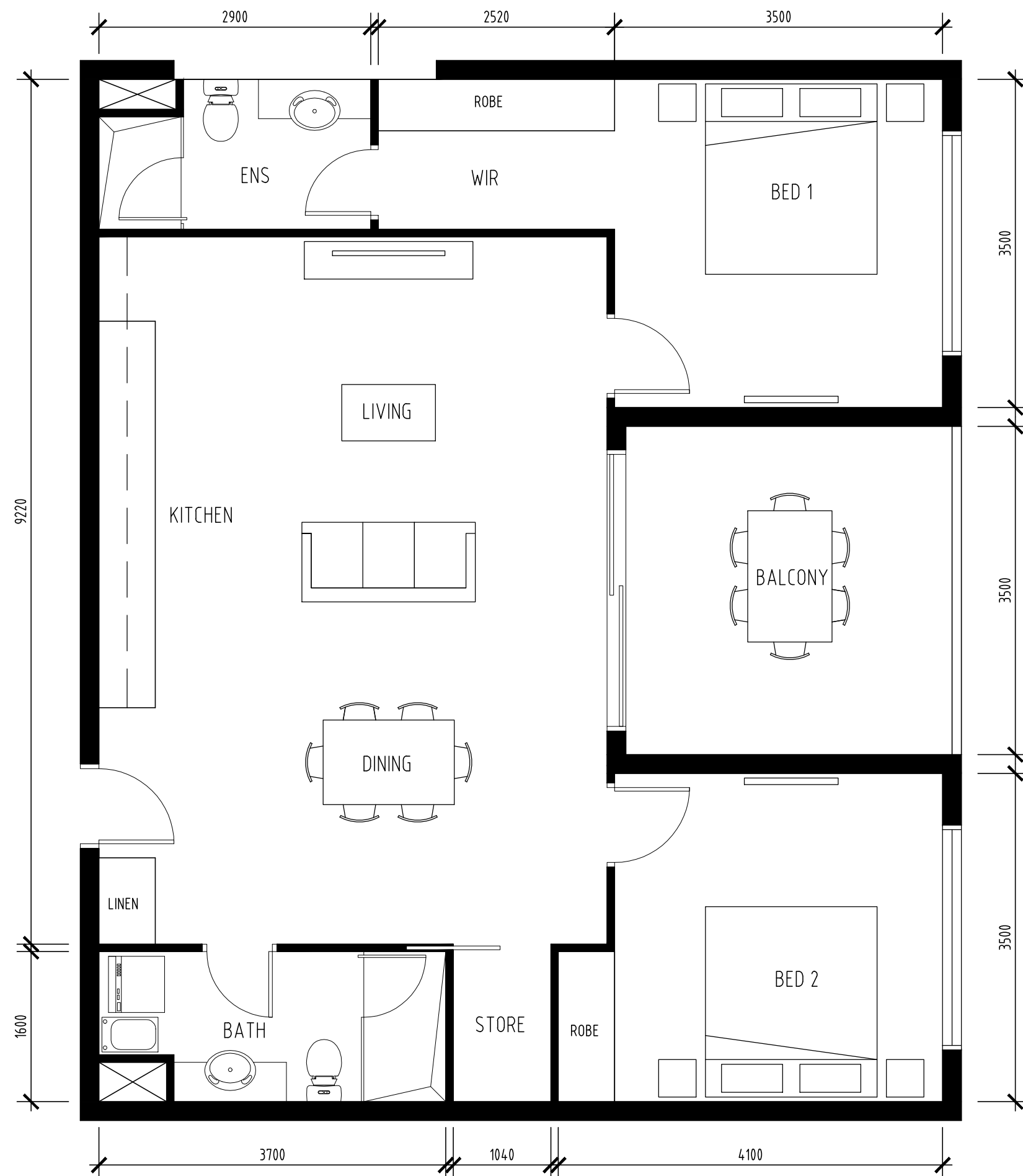
KEY - LEVELS 12 - 16

RESIDENCE TYPE 1.02 A

INTERNAL AREA	= 89.2m ²
BALCONY AREA	= 13.6m ²
TOTAL AREA	= 102.8m ²

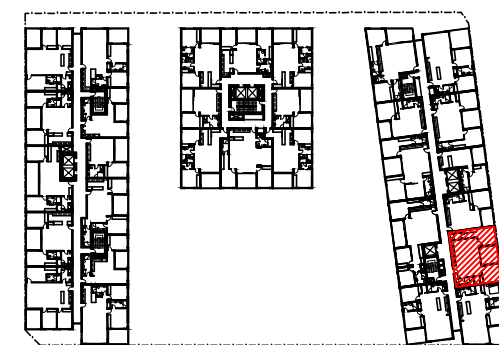


KEY - LEVELS 12 - 16

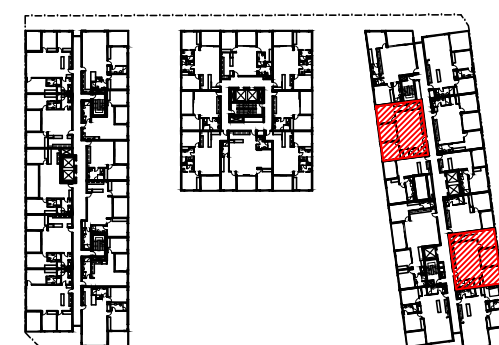


RESIDENCE
TYPE 1.02 B
TYPE 1.02 C (MIRRORED)

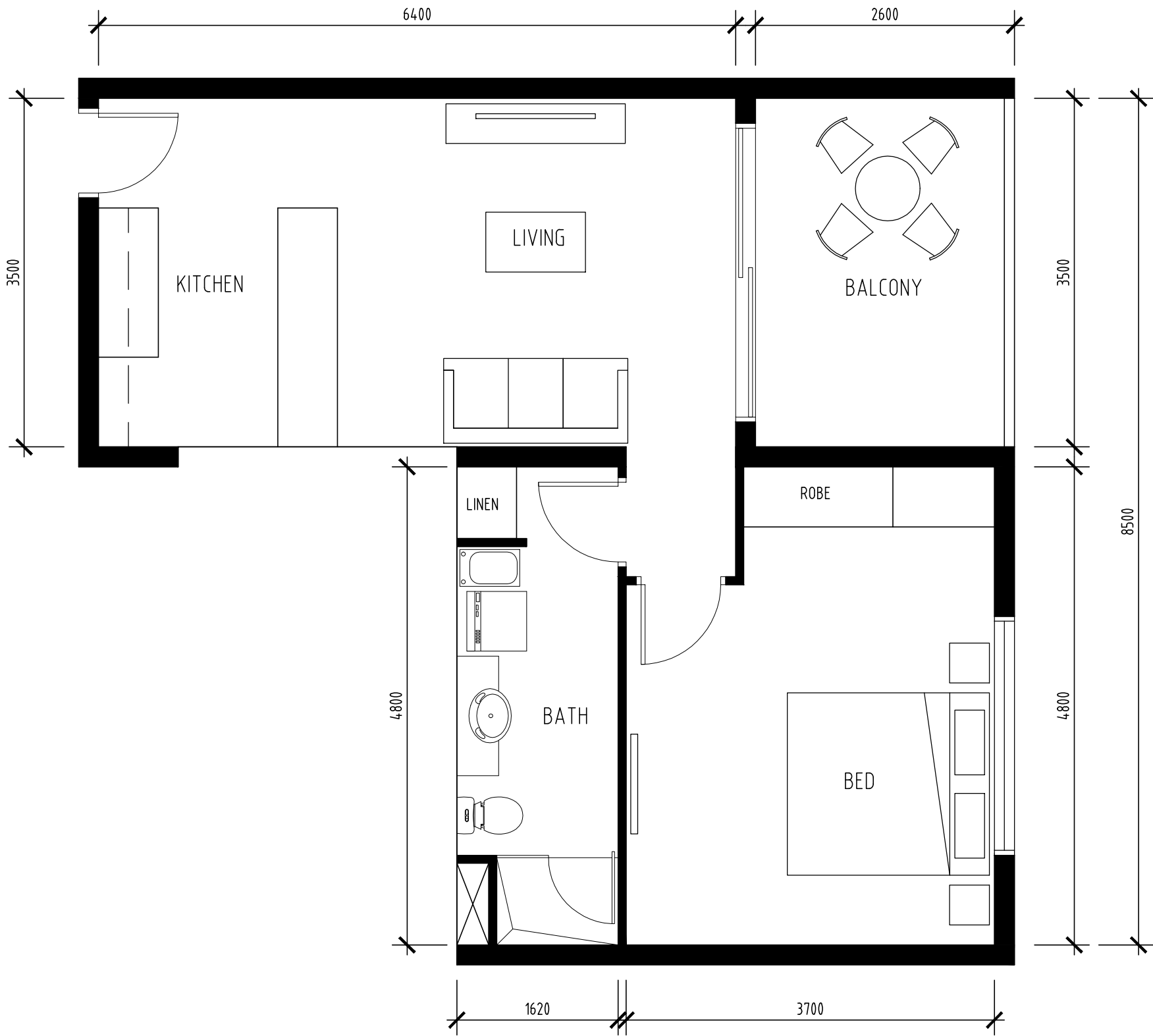
INTERNAL AREA	= 89.6m ²
BALCONY AREA	= 13.6m ²
TOTAL AREA	= 103.2m ²



KEY - LEVELS 13 - 16



KEY - LEVEL 12



RESIDENCE
TYPE 1.03 A
TYPE 1.03 B (MIRRORED)

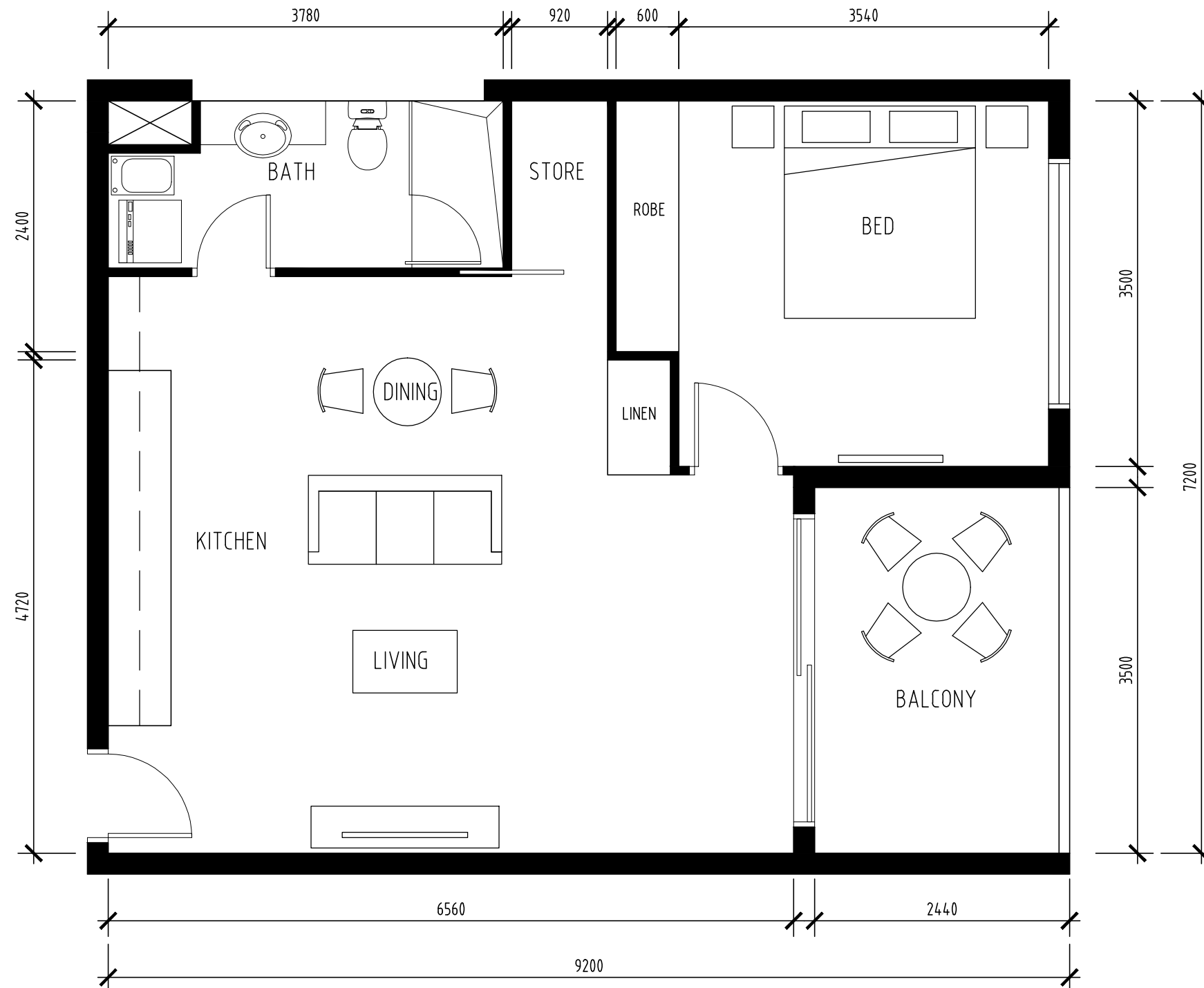
INTERNAL AREA	= 52m ²
BALCONY AREA	= 10m ²
TOTAL AREA	= 62m ²



KEY - LEVELS 13 - 16



KEY - LEVEL 12

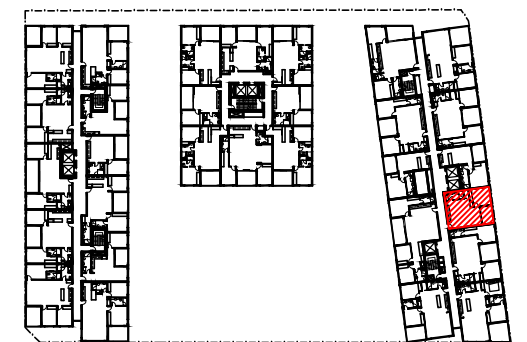


RESIDENCE
TYPE 1.04 A
TYPE 1.04 B (MIRRORED)

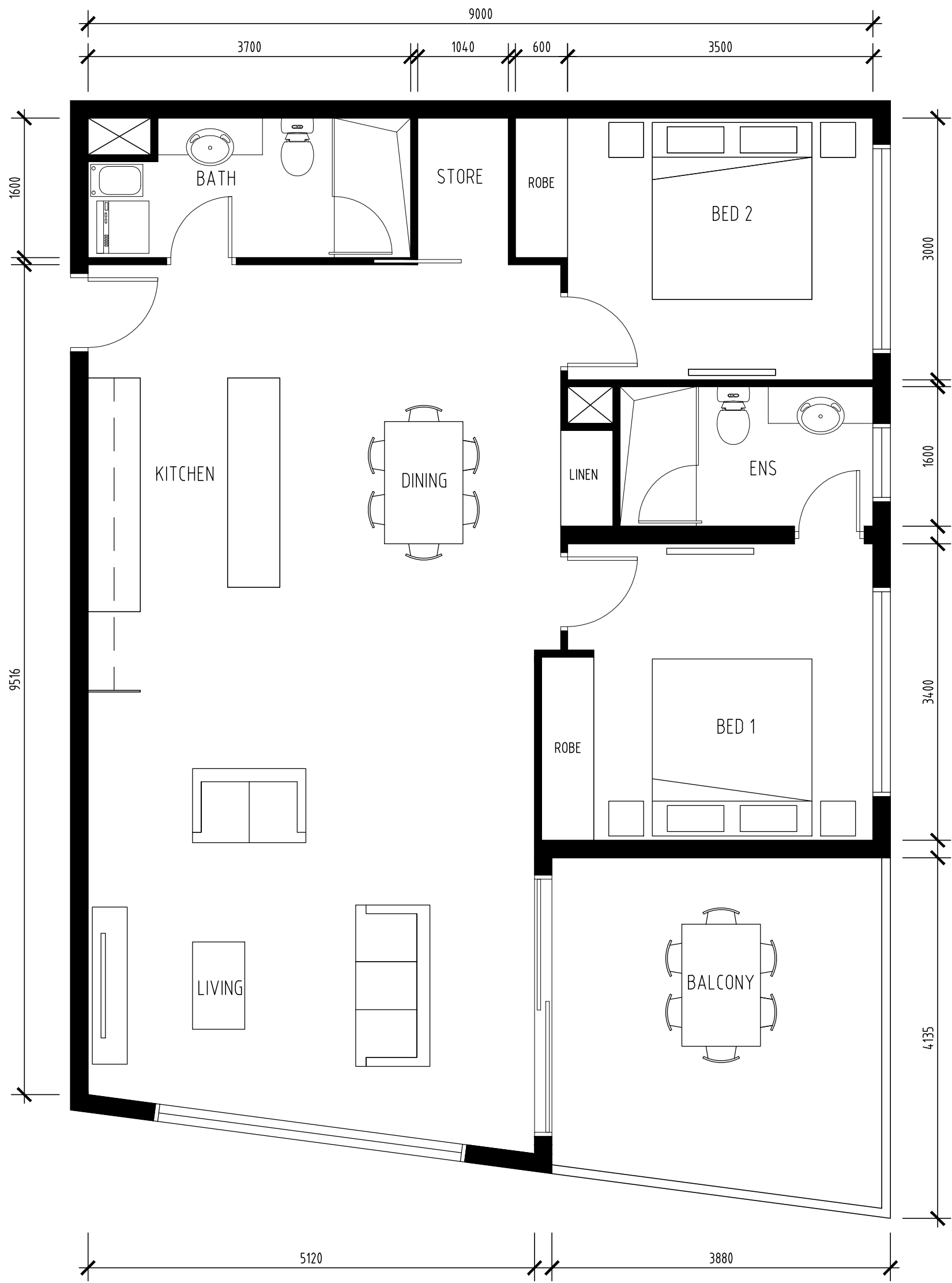
INTERNAL AREA	= 59.1m ²
BALCONY AREA	= 9.3m ²
TOTAL AREA	= 68.4m ²



KEY - LEVELS 13 - 16

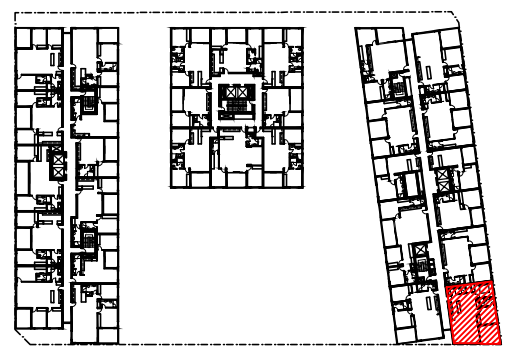


KEY - LEVEL 12

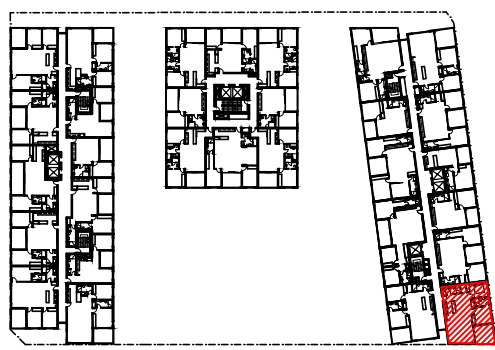


RESIDENCE
TYPE 1.05

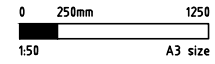
INTERNAL AREA	= 97m ²
BALCONY AREA	= 15.8 m ²
TOTAL AREA	= 112.8m ²

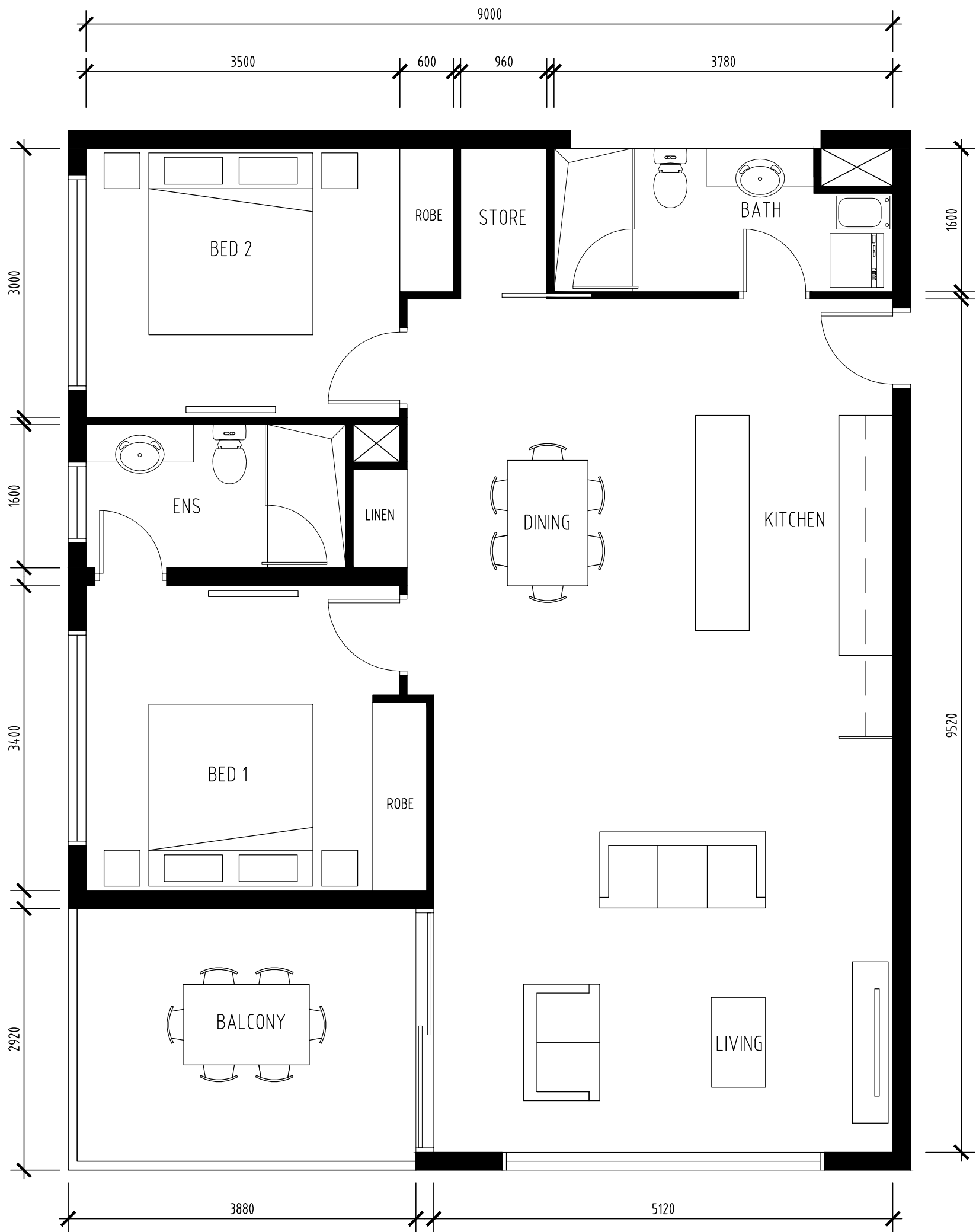


KEY - LEVEL 12



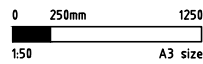
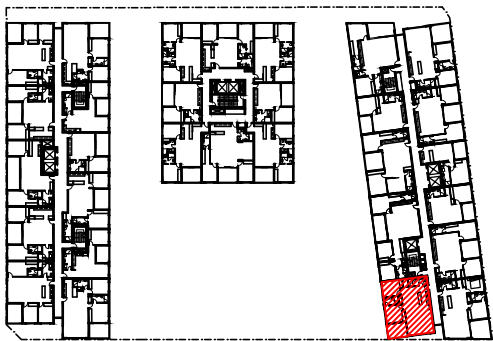
KEY - LEVELS 13 - 16

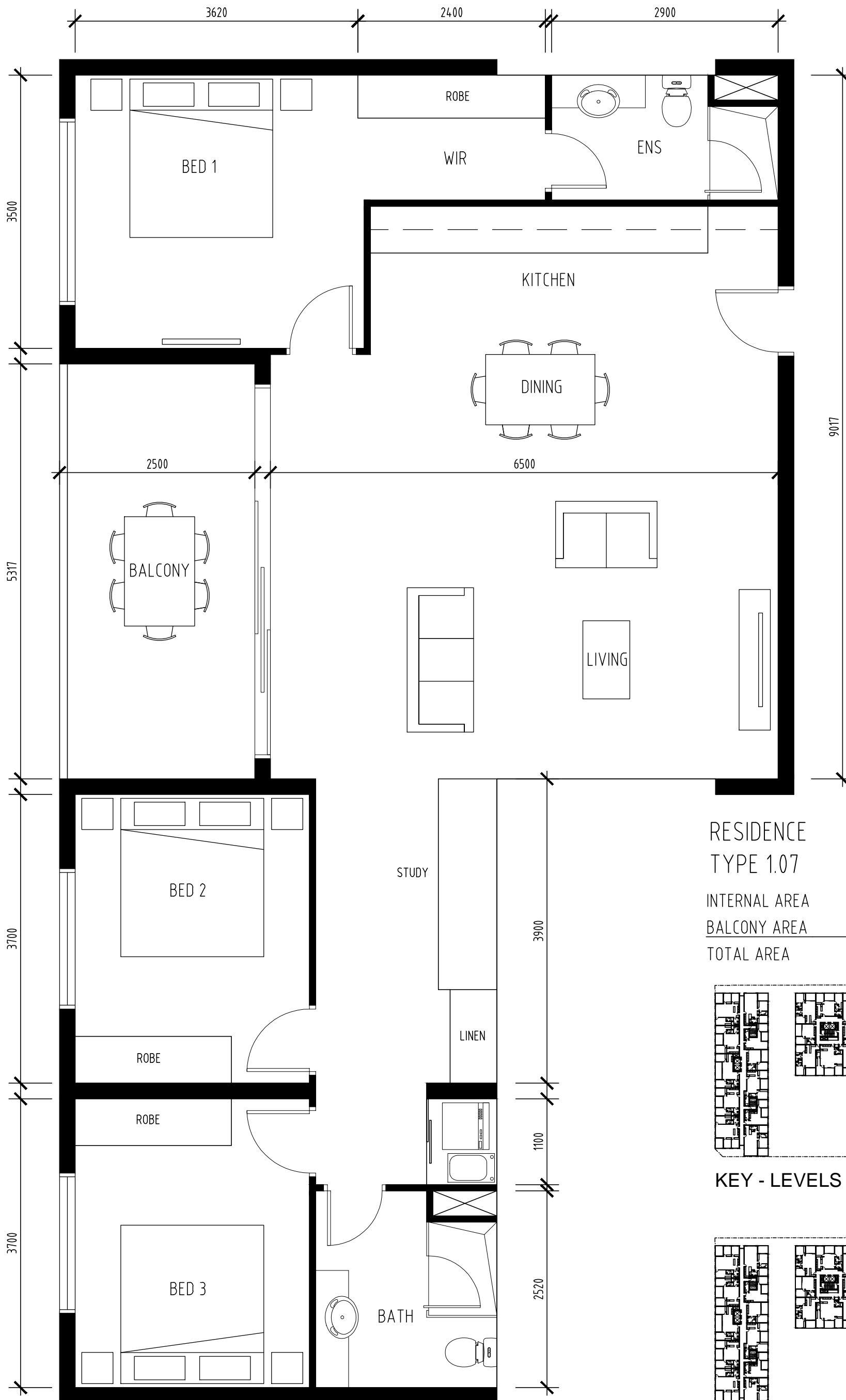




RESIDENCE
TYPE 1.06

INTERNAL AREA	= 94.7m ²
BALCONY AREA	= 12m ²
TOTAL AREA	= 106.7m ²





RESIDENCE TYPE 1.07

INTERNAL AREA	= 114.7m ²
BALCONY AREA	= 14.3m ²
TOTAL AREA	= 129m ²

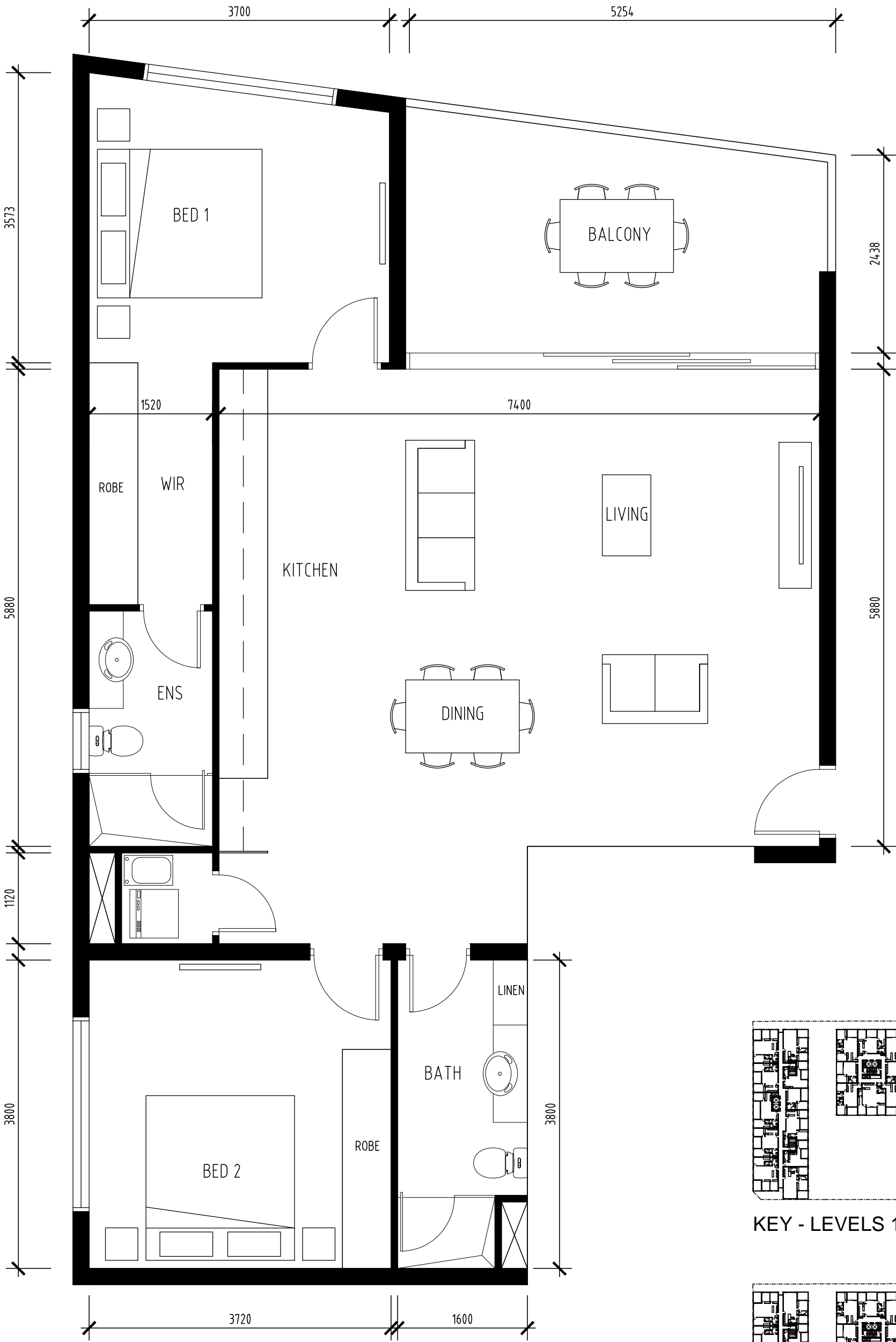


KEY - LEVELS 13 - 16



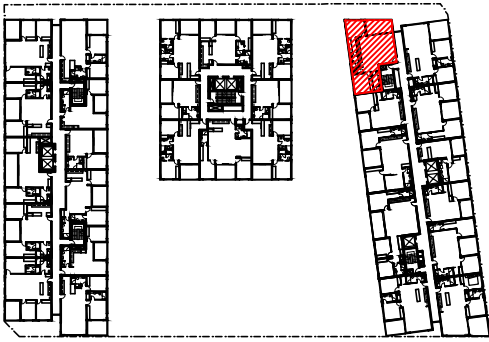
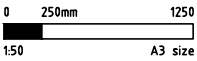
KEY - LEVEL 12

0 250mm 1250
1:50 A3 size

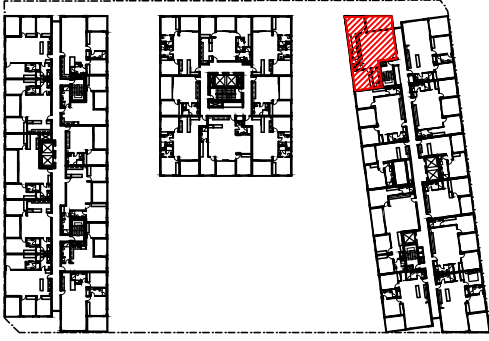


RESIDENCE
TYPE 1.08

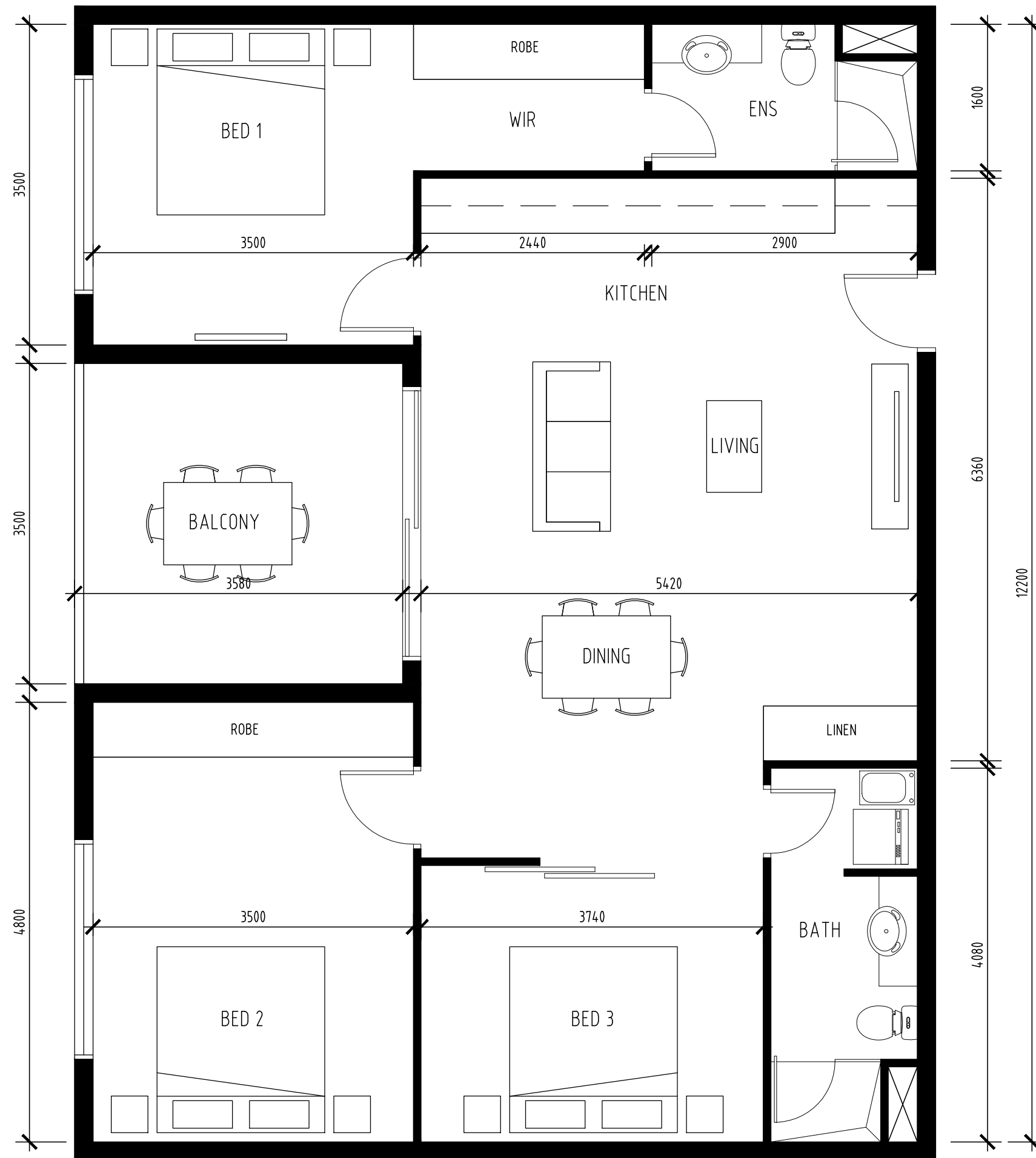
INTERNAL AREA = 99.4m²
BALCONY AREA = 15.6m²
TOTAL AREA = 115m²



KEY - LEVELS 13 - 16

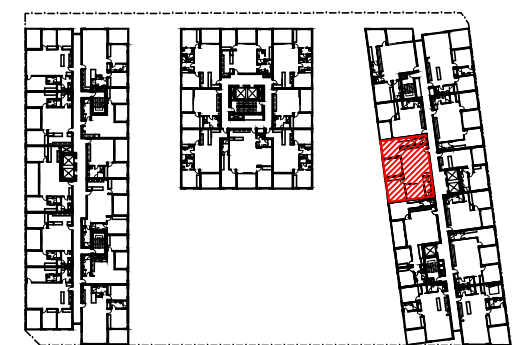


KEY - LEVEL 12

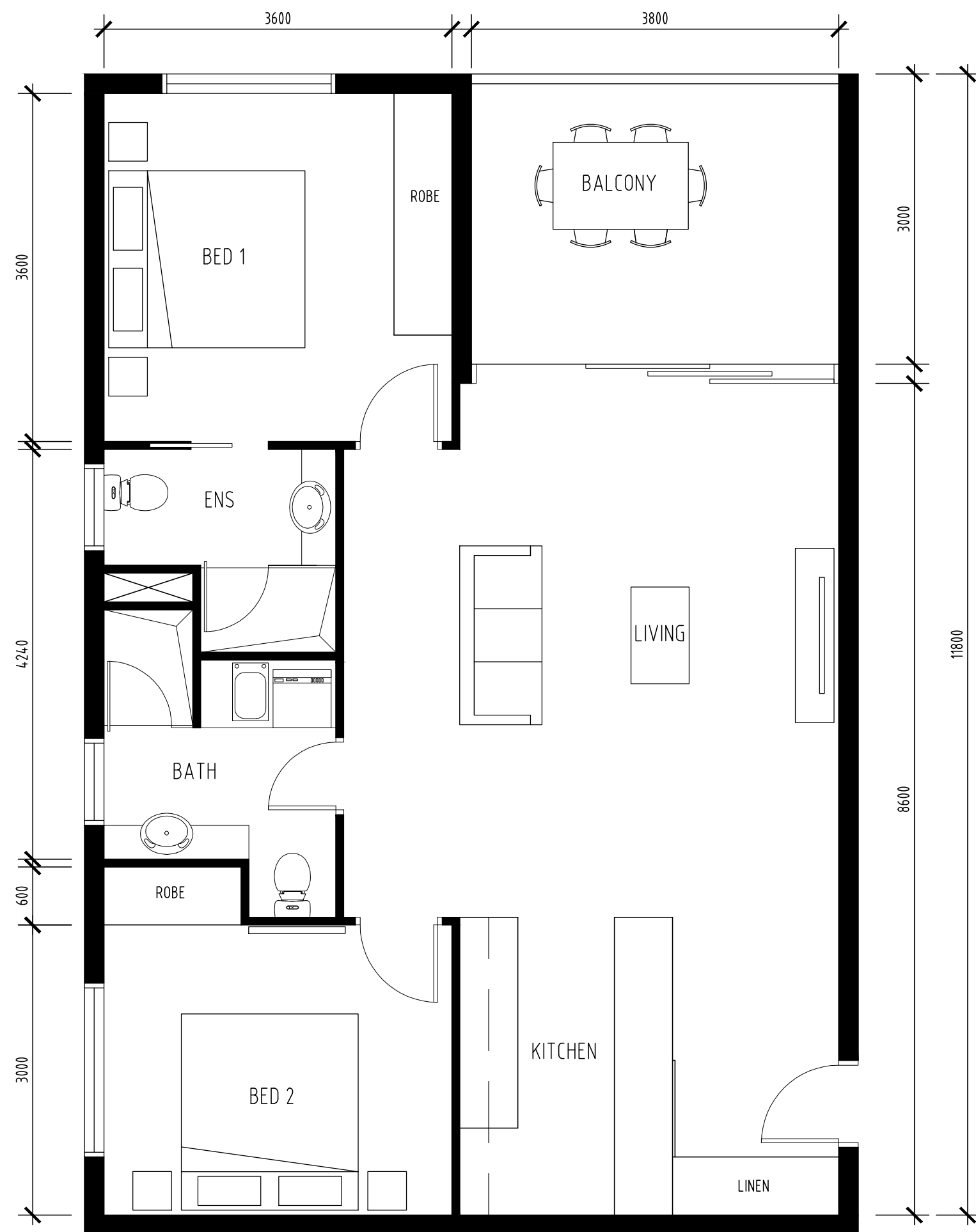


RESIDENCE TYPE 1.09

INTERNAL AREA	= 101.7m ²
BALCONY AREA	= 13.6m ²
TOTAL AREA	= 115.3m ²

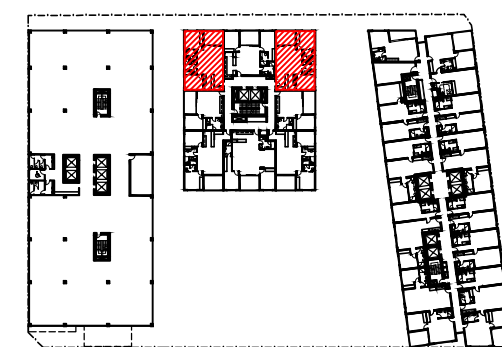


KEY - LEVELS 13 - 16



RESIDENCE
TYPE 2.01 A
TYPE 2.01 B (MIRRORED)

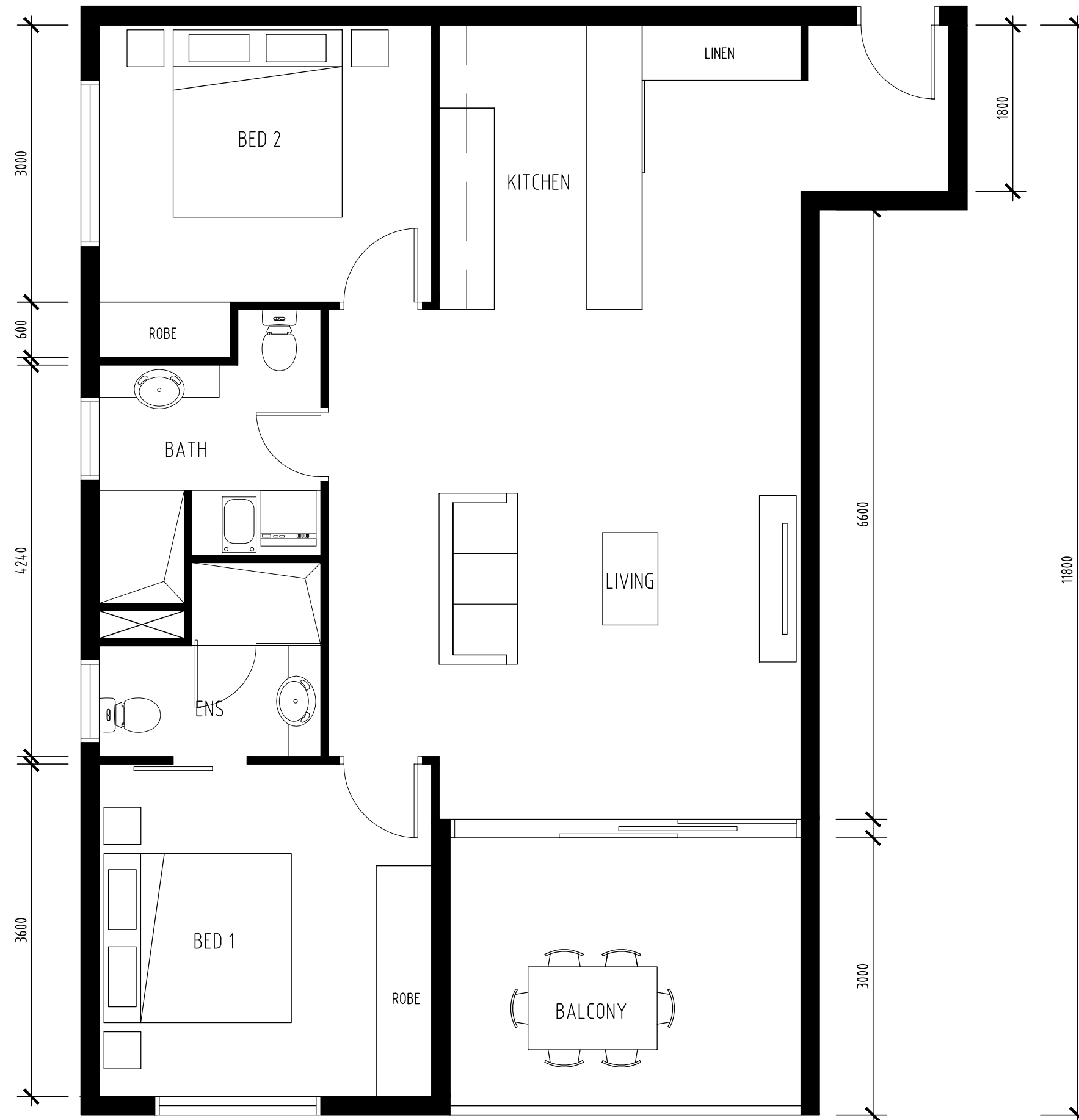
INTERNAL AREA	= 81.6 m ²
BALCONY AREA	= 12.4 m ²
TOTAL AREA	= 94 m ²



KEY - LEVELS 9 - 14

RESIDENCE
TYPE 2.01 C
TYPE 2.01 D (MIRRORED)

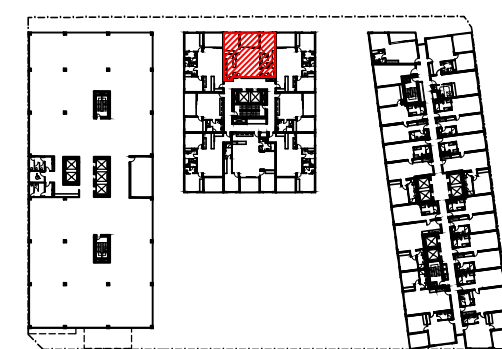
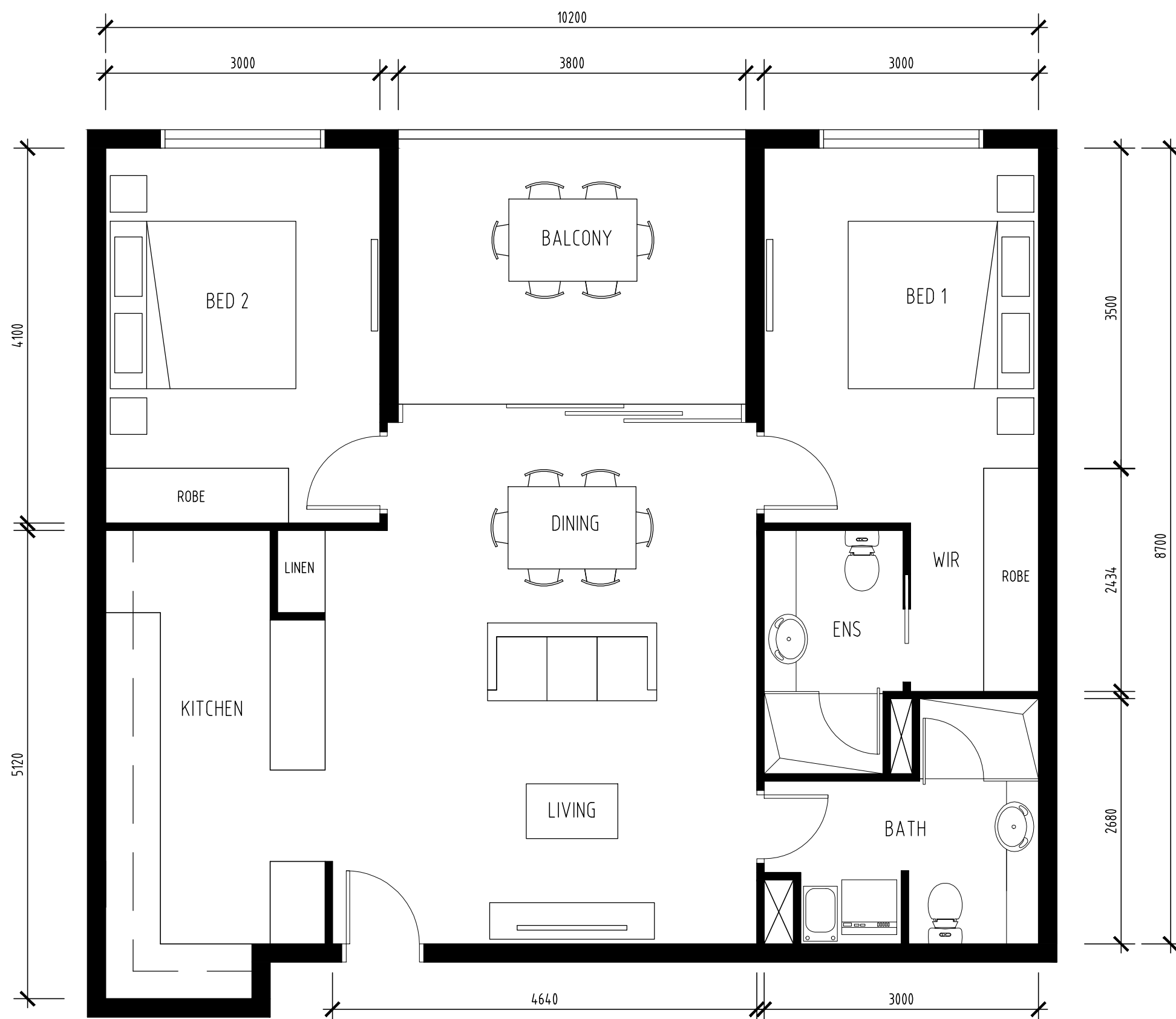
INTERNAL AREA	= 84.8 m ²
BALCONY AREA	= 12.4 m ²
TOTAL AREA	= 97.2 m ²



KEY - LEVELS 9 - 14

RESIDENCE TYPE 2.02

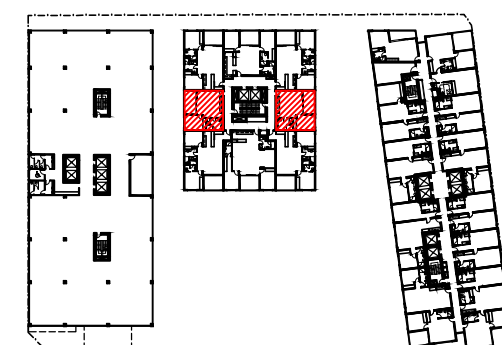
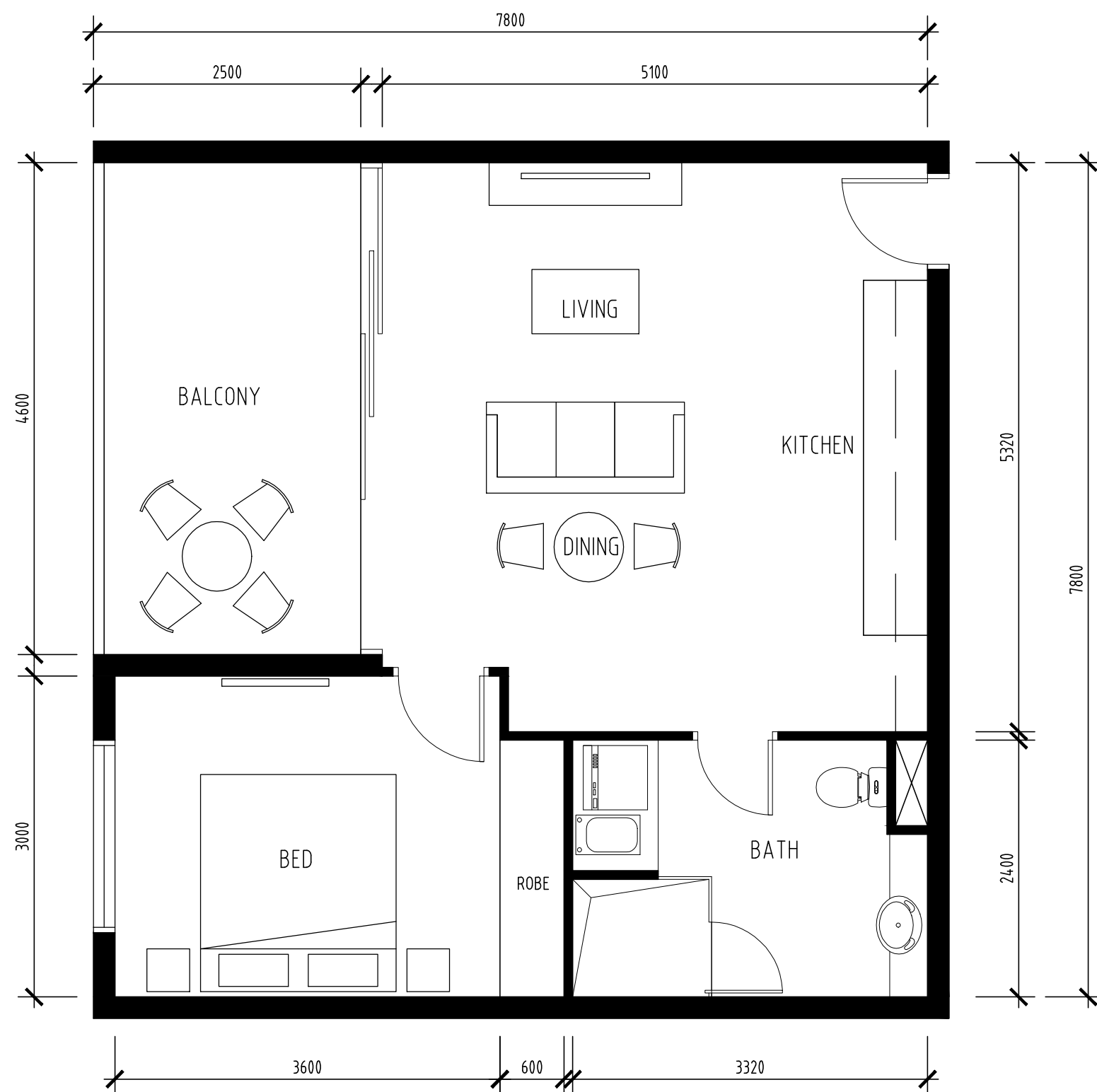
INTERNAL AREA	= 82.2 m ²
BALCONY AREA	= 12.4 m ²
TOTAL AREA	= 94.6 m ²



KEY - LEVELS 9 - 14

RESIDENCE
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TYPE 2.03 B (MIRRORED)

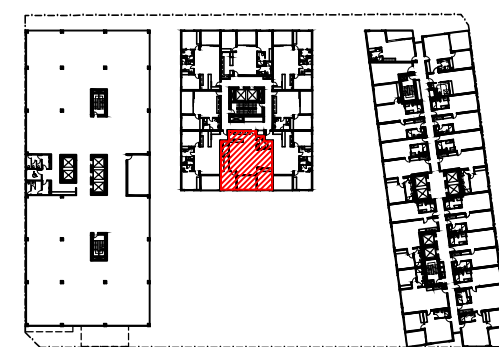
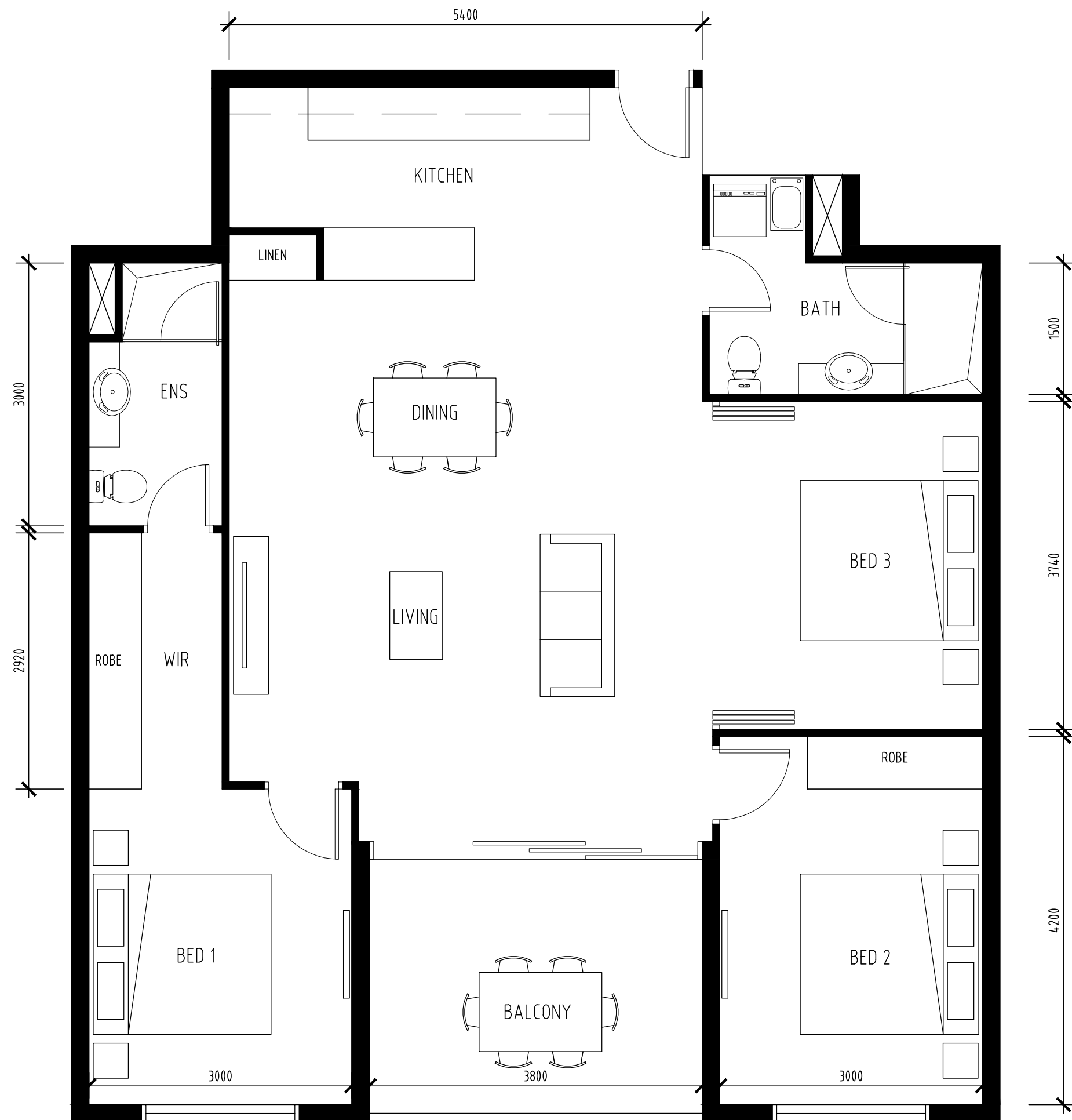
INTERNAL AREA	= 50.7 m ²
BALCONY AREA	= 12.4 m ²
TOTAL AREA	= 63.1 m ²



KEY - LEVELS 9 - 14

RESIDENCE TYPE 2.04

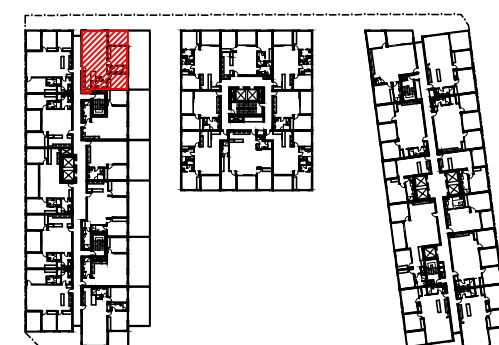
INTERNAL AREA	= 103 m ²
BALCONY AREA	= 12.4 m ²
TOTAL AREA	= 115.4 m ²



KEY - LEVELS 9 - 14

RESIDENCE TYPE 3.01 WITH TERRACE

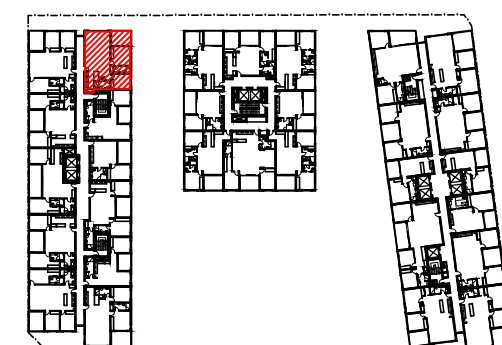
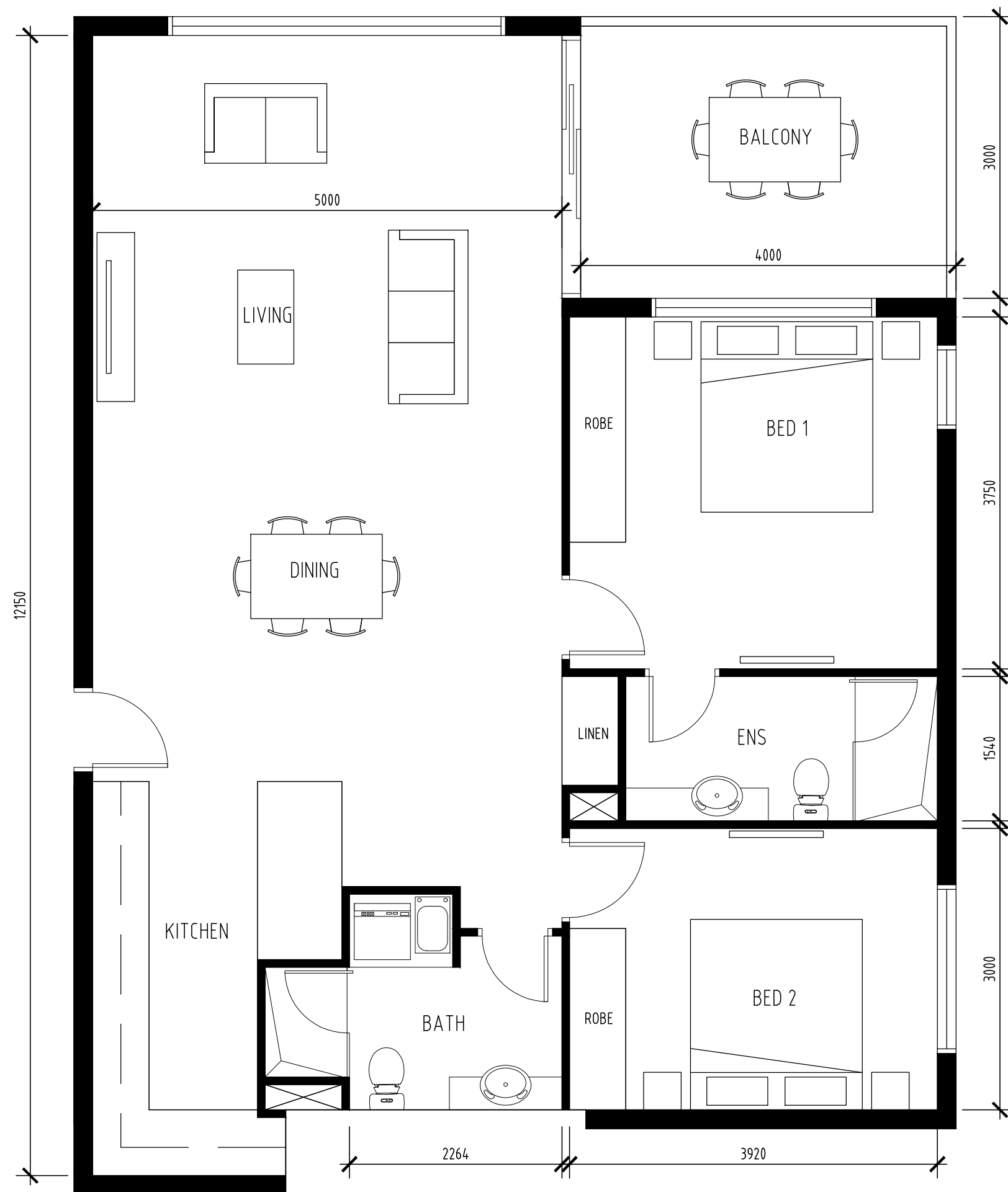
INTERNAL AREA	= 97.7 m ²
BALCONY AREA	= 12.7 m ²
TERRACE AREA	= 48.5 m ²
TOTAL AREA	= 158.9 m ²



KEY - LEVEL 10

RESIDENCE TYPE 3.01

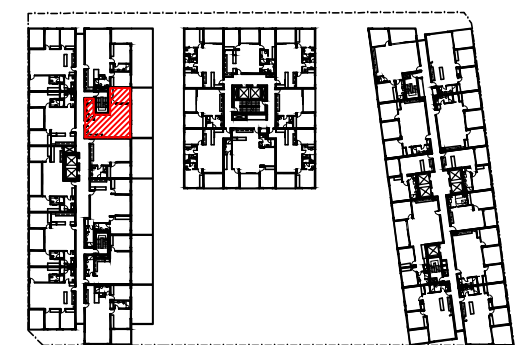
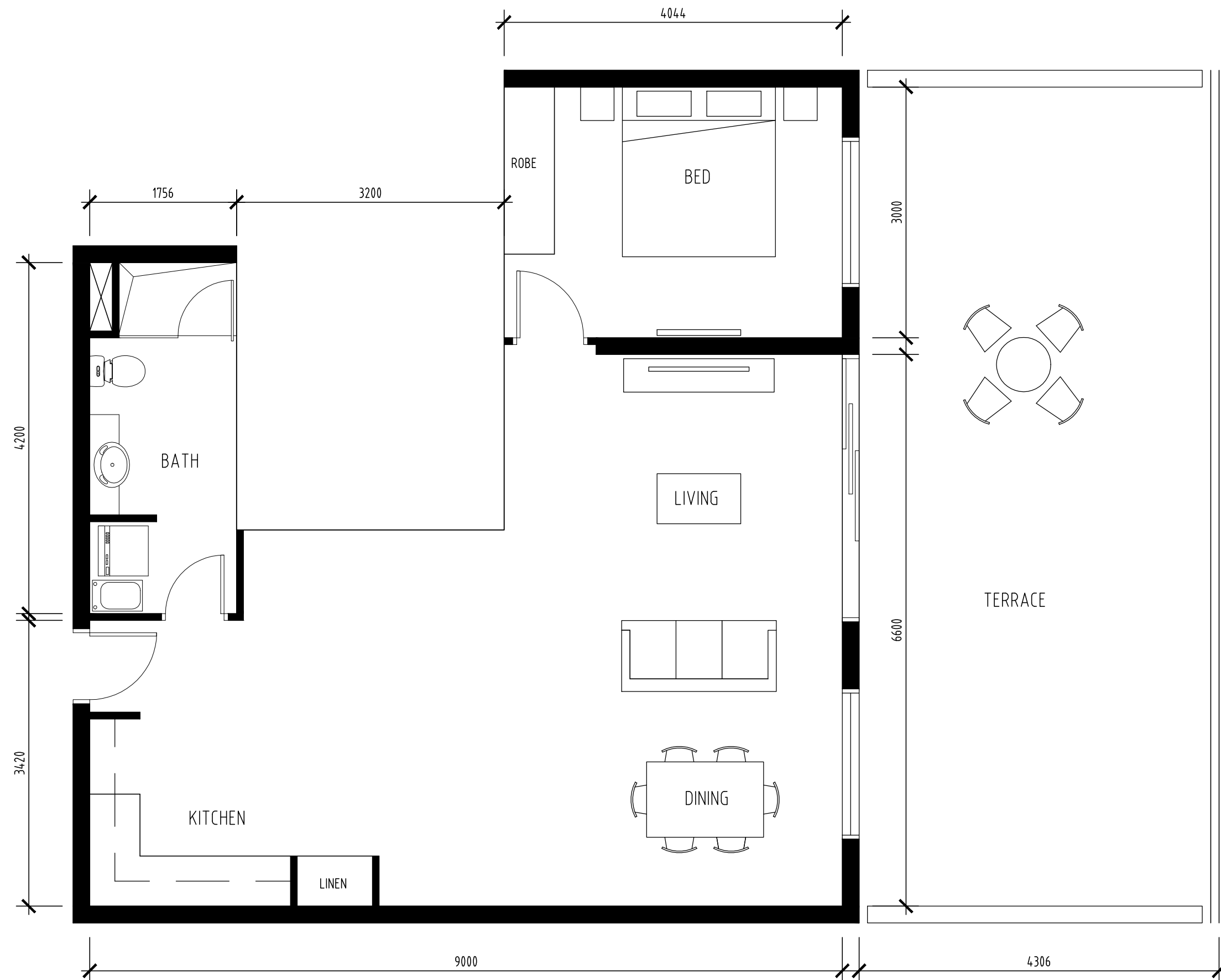
INTERNAL AREA	= 97.7 m ²
BALCONY AREA	= 12.7 m ²
TOTAL AREA	= 110.5 m ²



KEY - LEVELS 11 - 14

RESIDENCE TYPE 3.02 WITH TERRACE

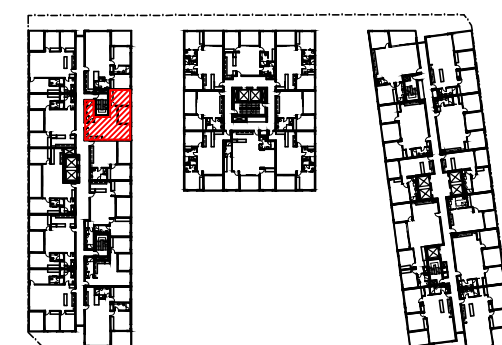
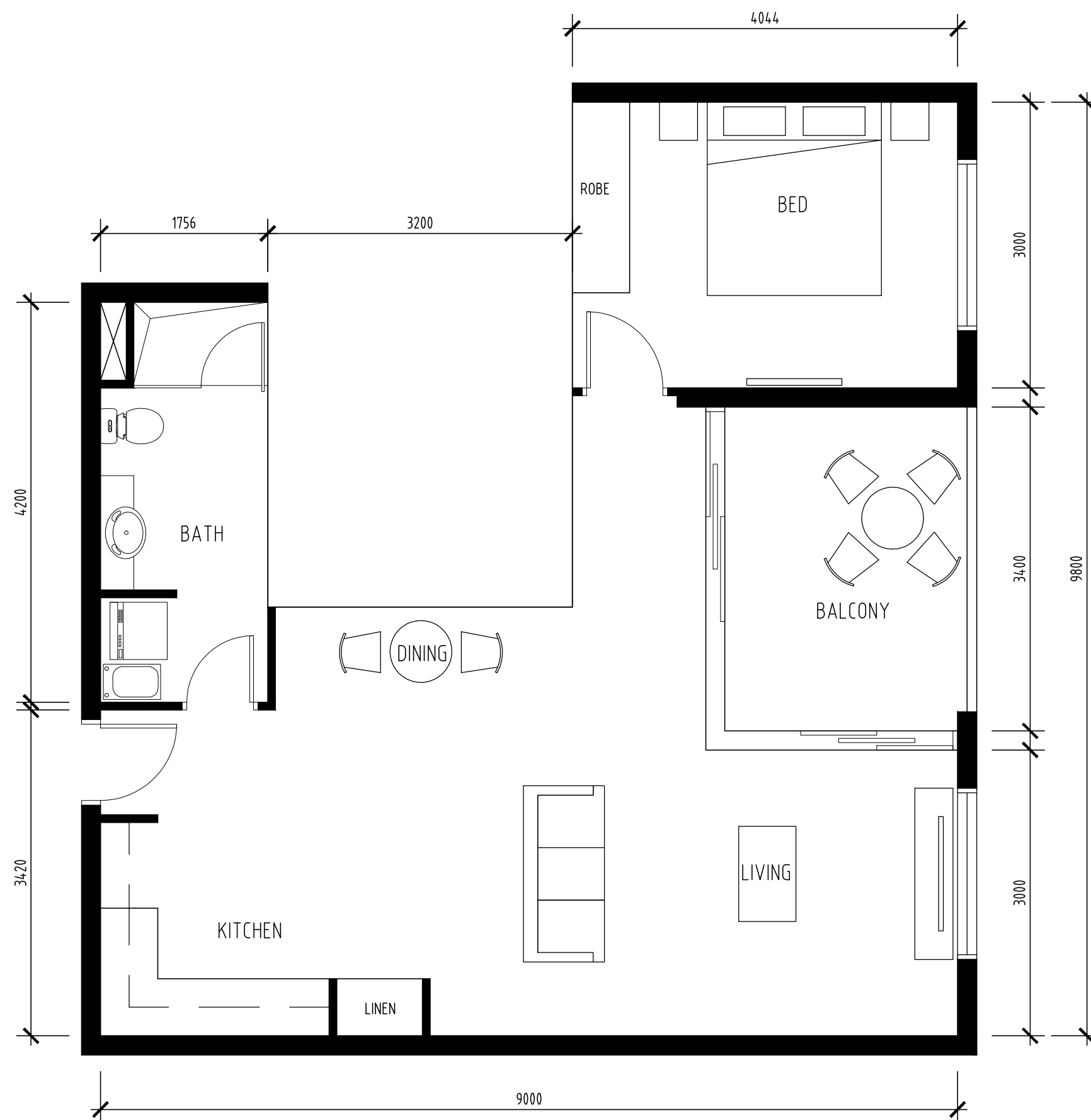
INTERNAL AREA	= 71.7 m ²
TERRACE AREA	= 41.2 m ²
TOTAL AREA	= 112.9 m ²



KEY - LEVEL 10

RESIDENCE TYPE 3.02

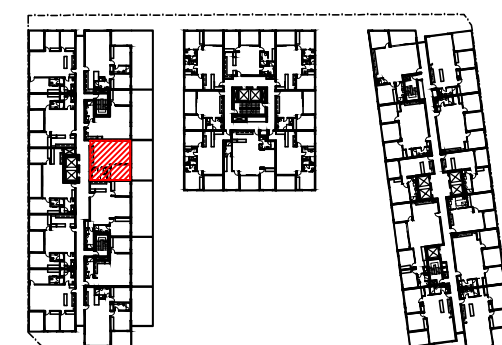
INTERNAL AREA	= 61.9 m ²
BALCONY AREA	= 9.8 m ²
TOTAL AREA	= 71.7 m ²



KEY - LEVELS 11 - 14

RESIDENCE
TYPE 3.03 WITH TERRACE

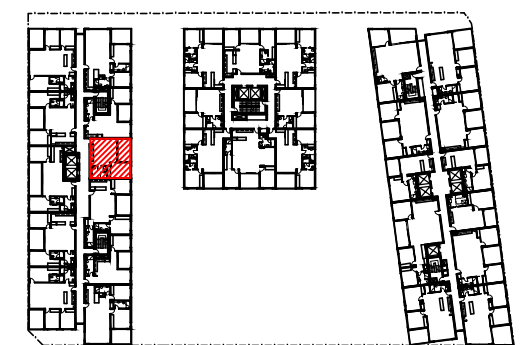
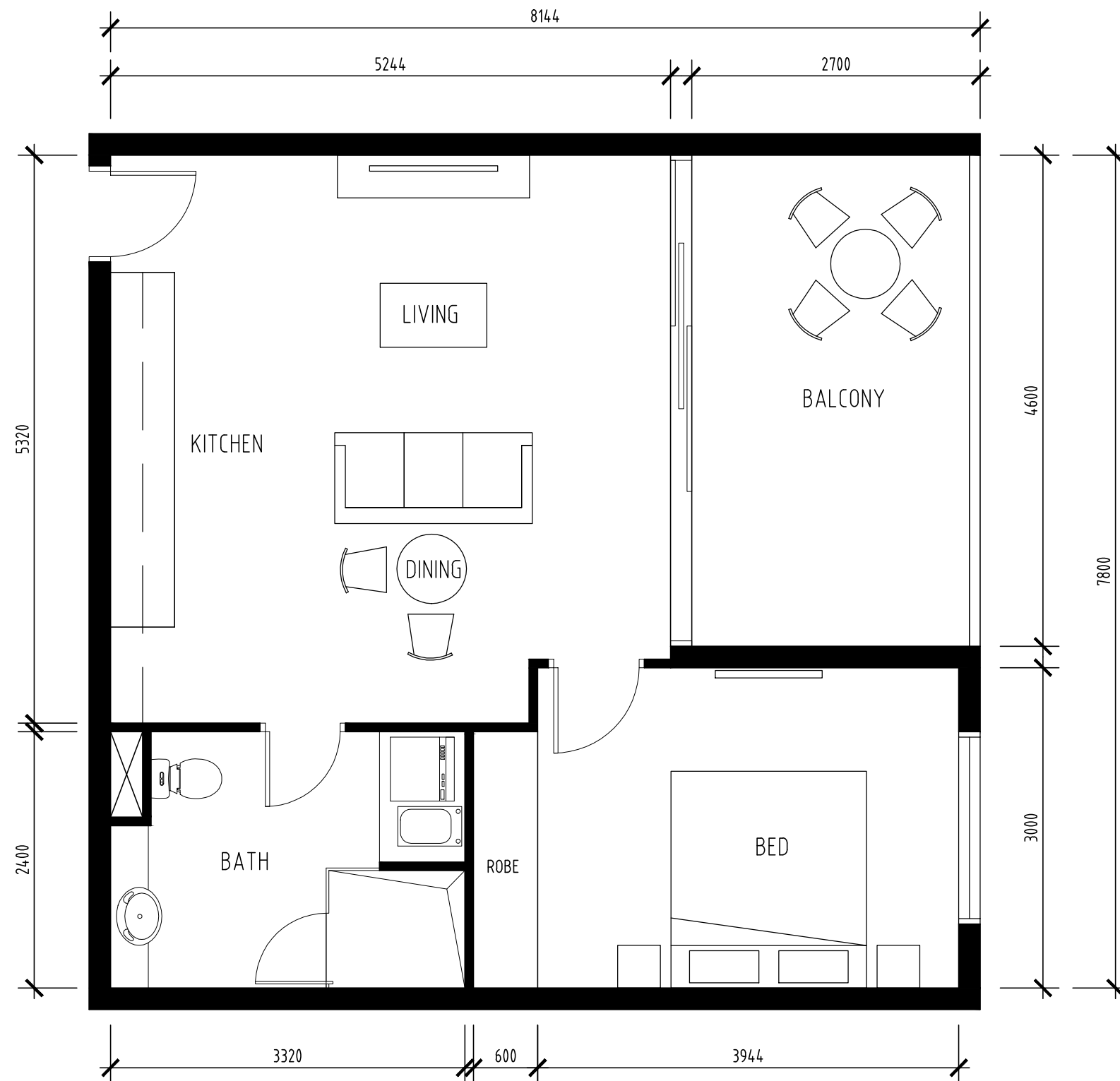
INTERNAL AREA	= 65.9 m ²
TERRACE AREA	= 32.8 m ²
TOTAL AREA	= 98.7 m ²



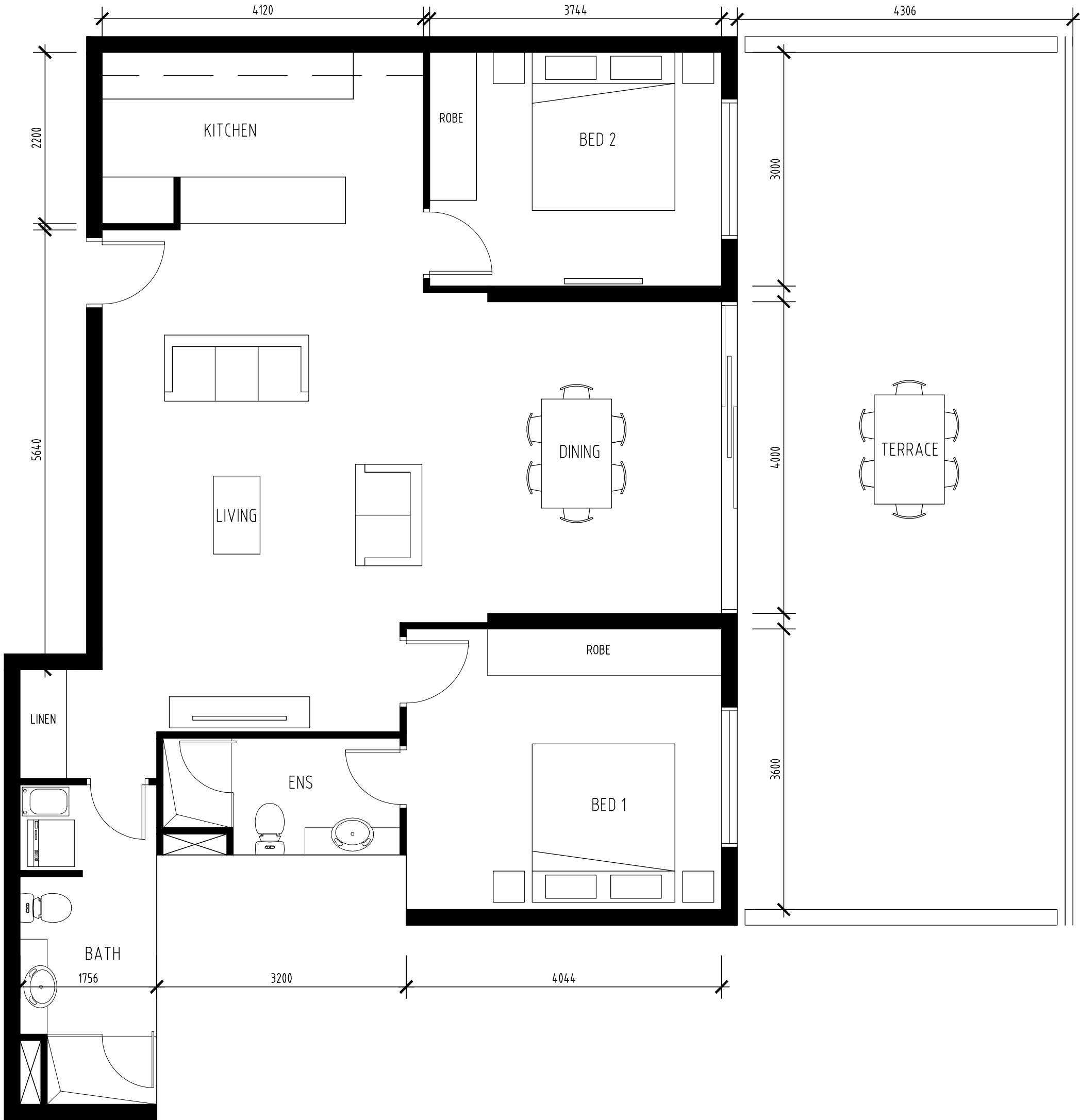
KEY - LEVEL 10

RESIDENCE TYPE 3.03

INTERNAL AREA	= 52.5 m ²
BALCONY AREA	= 13.4 m ²
TOTAL AREA	= 65.9 m ²



KEY - LEVELS 11 - 14

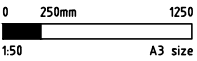


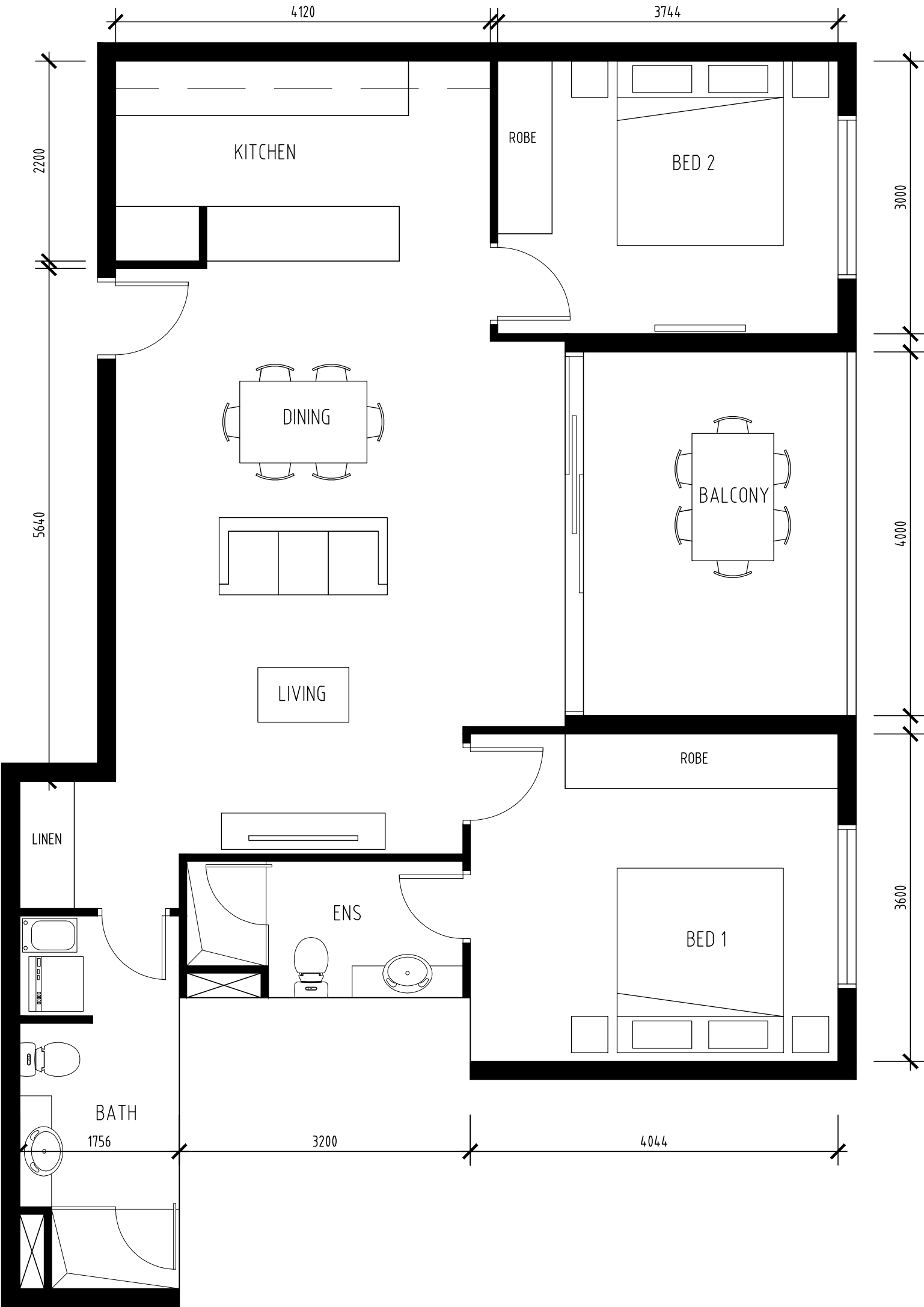
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INTERNAL AREA	= 97.8 m ²
TERRACE AREA	= 46.2 m ²
TOTAL AREA	= 144 m ²



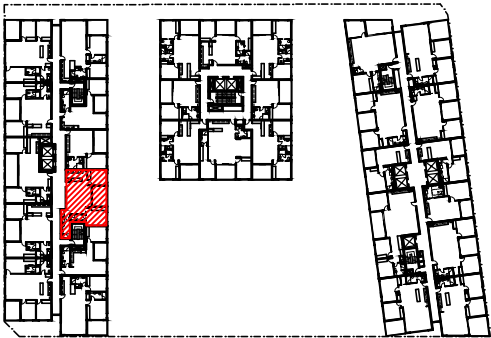
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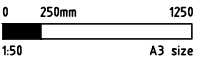


RESIDENCE
TYPE 3.04

INTERNAL AREA	= 84.8 m ²
BALCONY AREA	= 13 m ²
TOTAL AREA	= 97.8 m ²

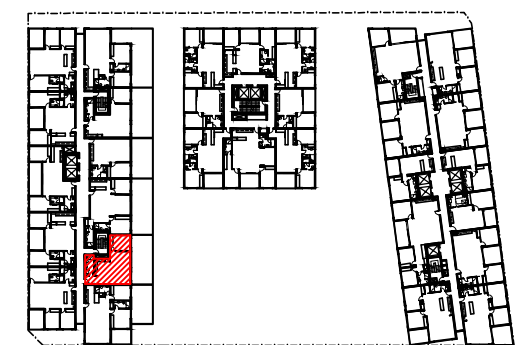
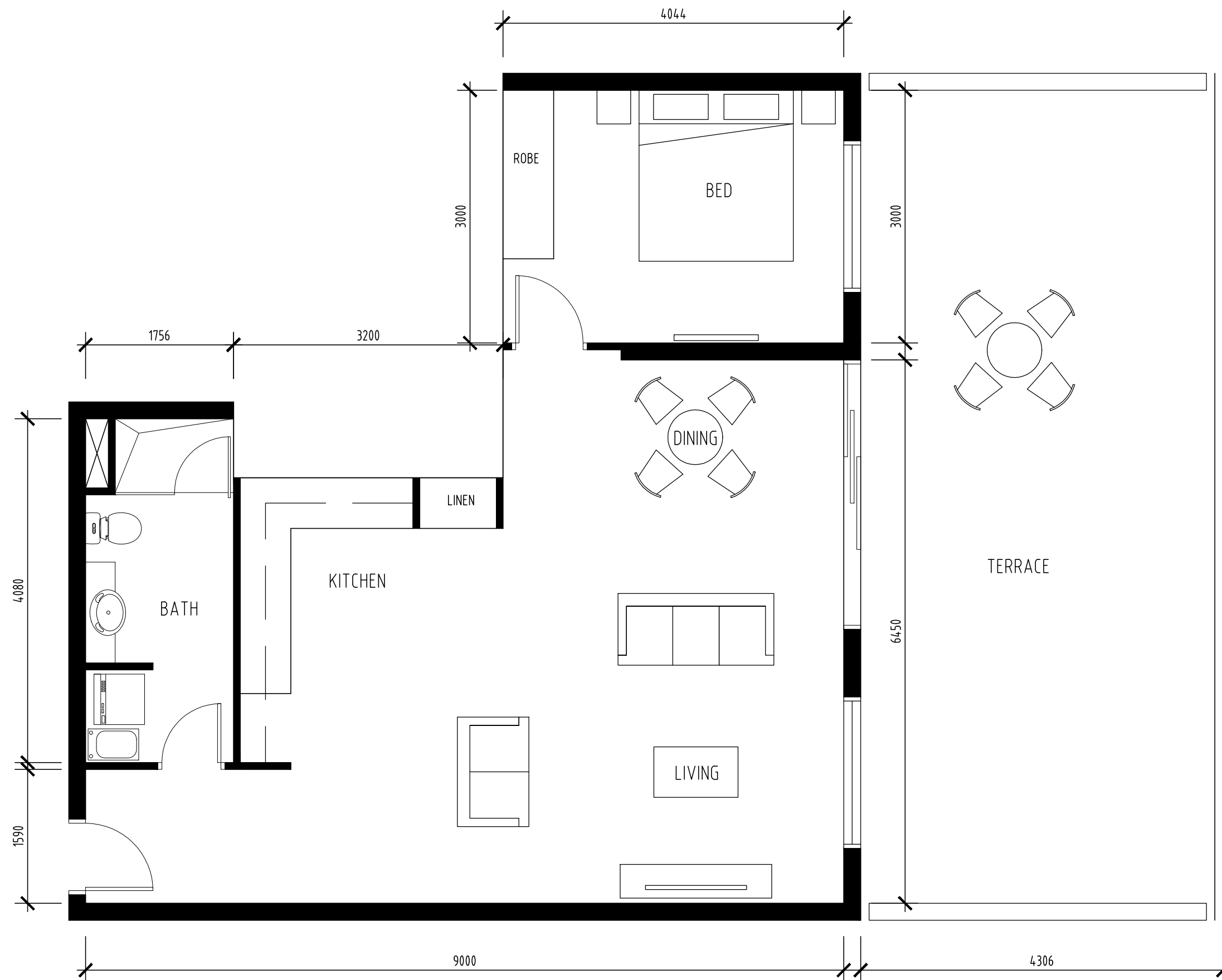


KEY - LEVELS 11 - 14



RESIDENCE TYPE 3.05 WITH TERRACE

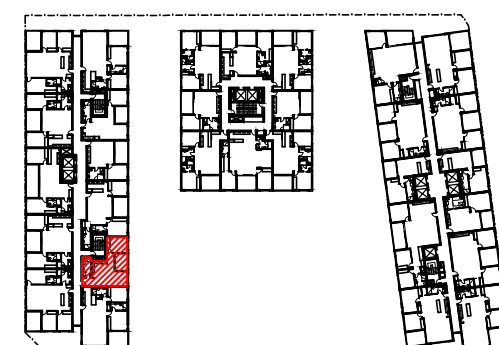
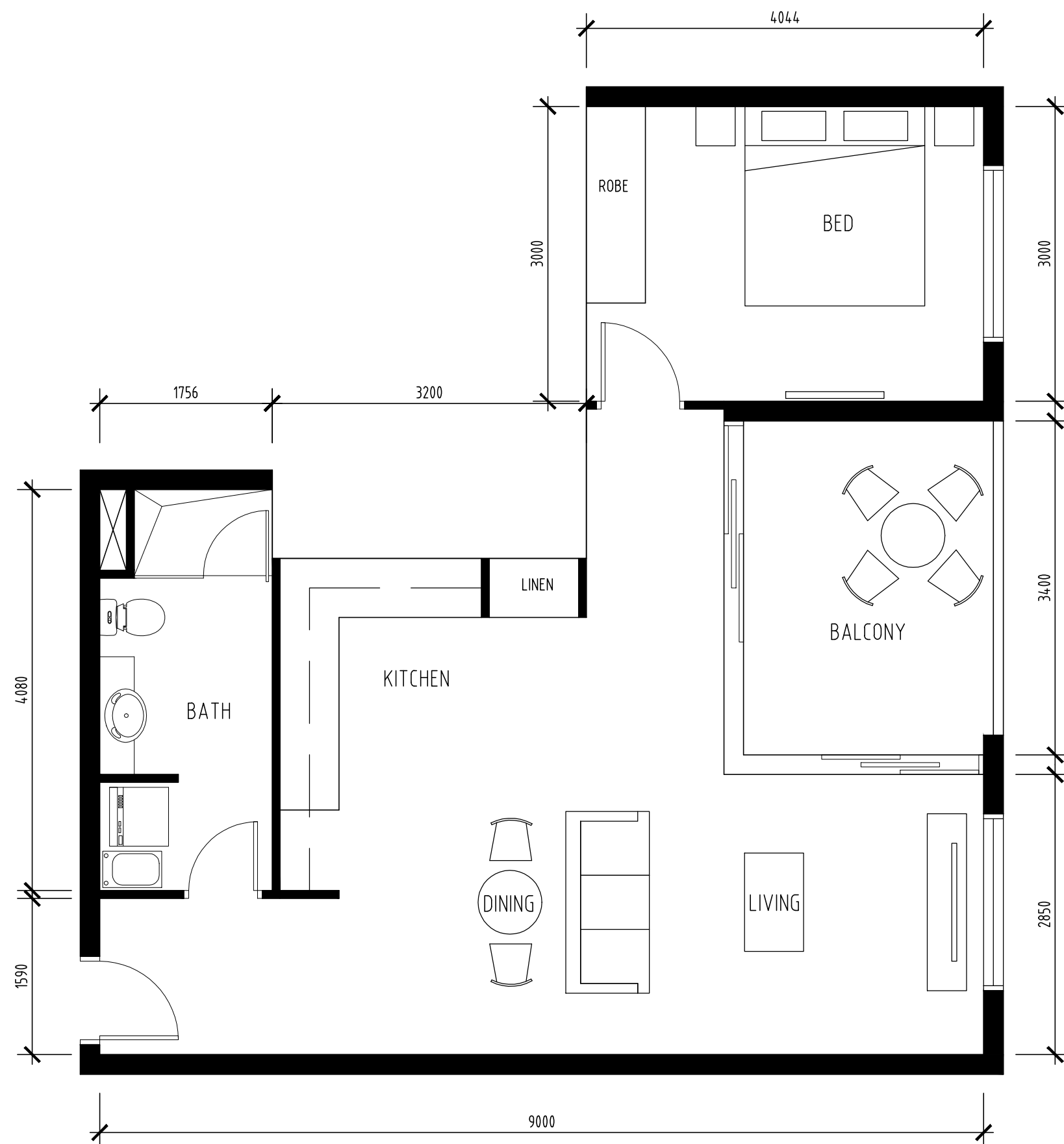
INTERNAL AREA	= 69.2 m ²
TERRACE AREA	= 40.5 m ²
TOTAL AREA	= 109.7 m ²



KEY - LEVEL 10

RESIDENCE TYPE 3.05

INTERNAL AREA	= 59.4 m ²
BALCONY AREA	= 9.8 m ²
TOTAL AREA	= 69.2 m ²

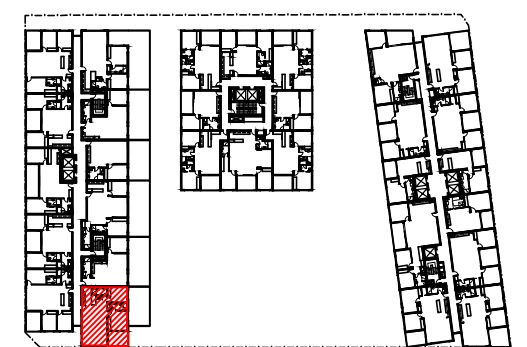


KEY - LEVELS 11 - 14



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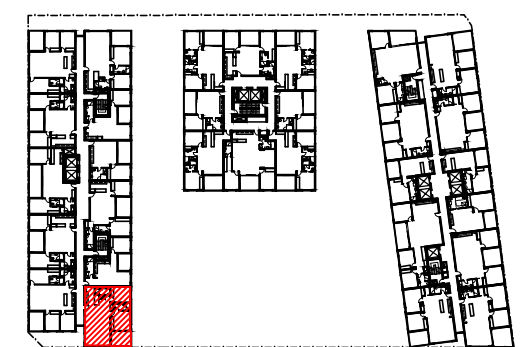
INTERNAL AREA	= 98 m ²
BALCONY AREA	= 12.7 m ²
TERRACE AREA	= 31.8 m ²
TOTAL AREA	= 142.5 m ²



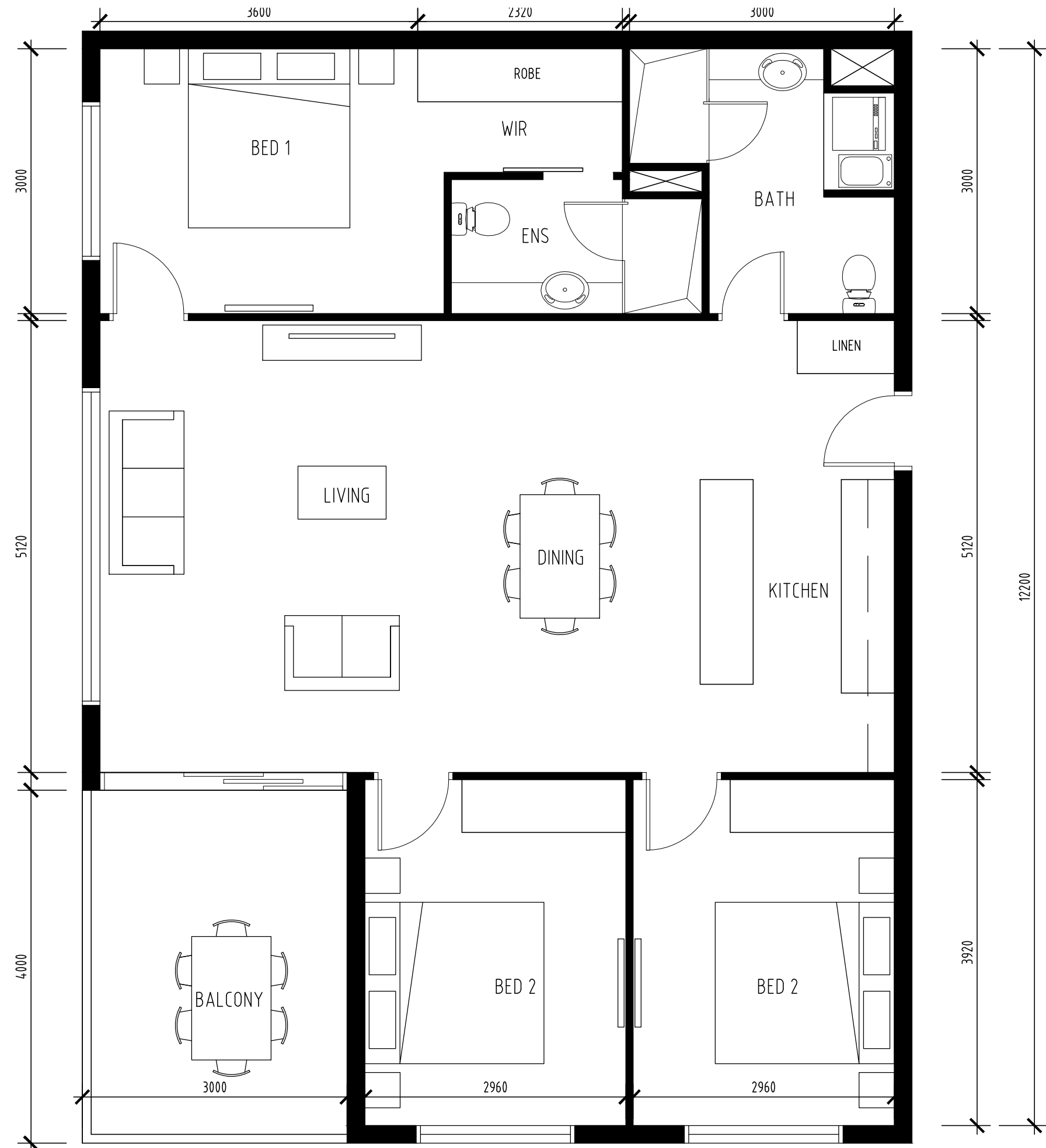
KEY - LEVEL 10

RESIDENCE TYPE 3.06

INTERNAL AREA	= 98 m ²
BALCONY AREA	= 12.7 m ²
TOTAL AREA	= 110.7 m ²

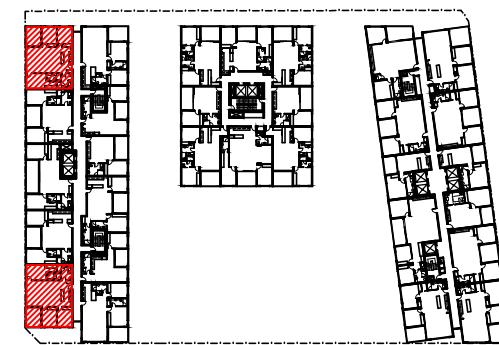


KEY - LEVELS 11 - 14

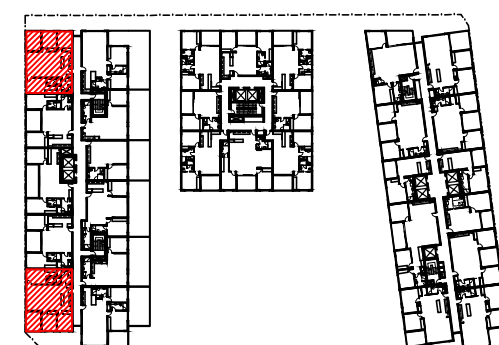


RESIDENCE
TYPE 3.07 A
TYPE 3.07 B (MIRRORED)

INTERNAL AREA	= 103.5 m ²
BALCONY AREA	= 12.7 m ²
TOTAL AREA	= 116.2 m ²



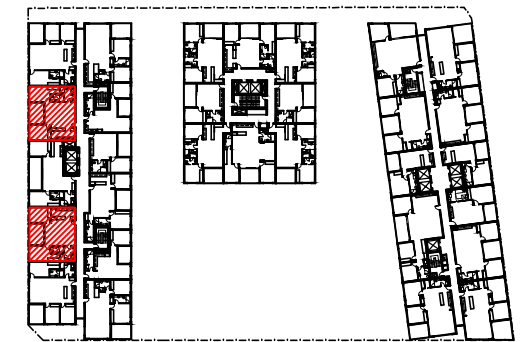
KEY - LEVELS 11 - 14



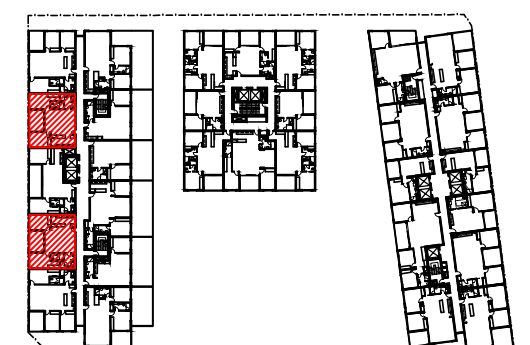
KEY - LEVEL 10

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TYPE 3.08 B (MIRRORED)

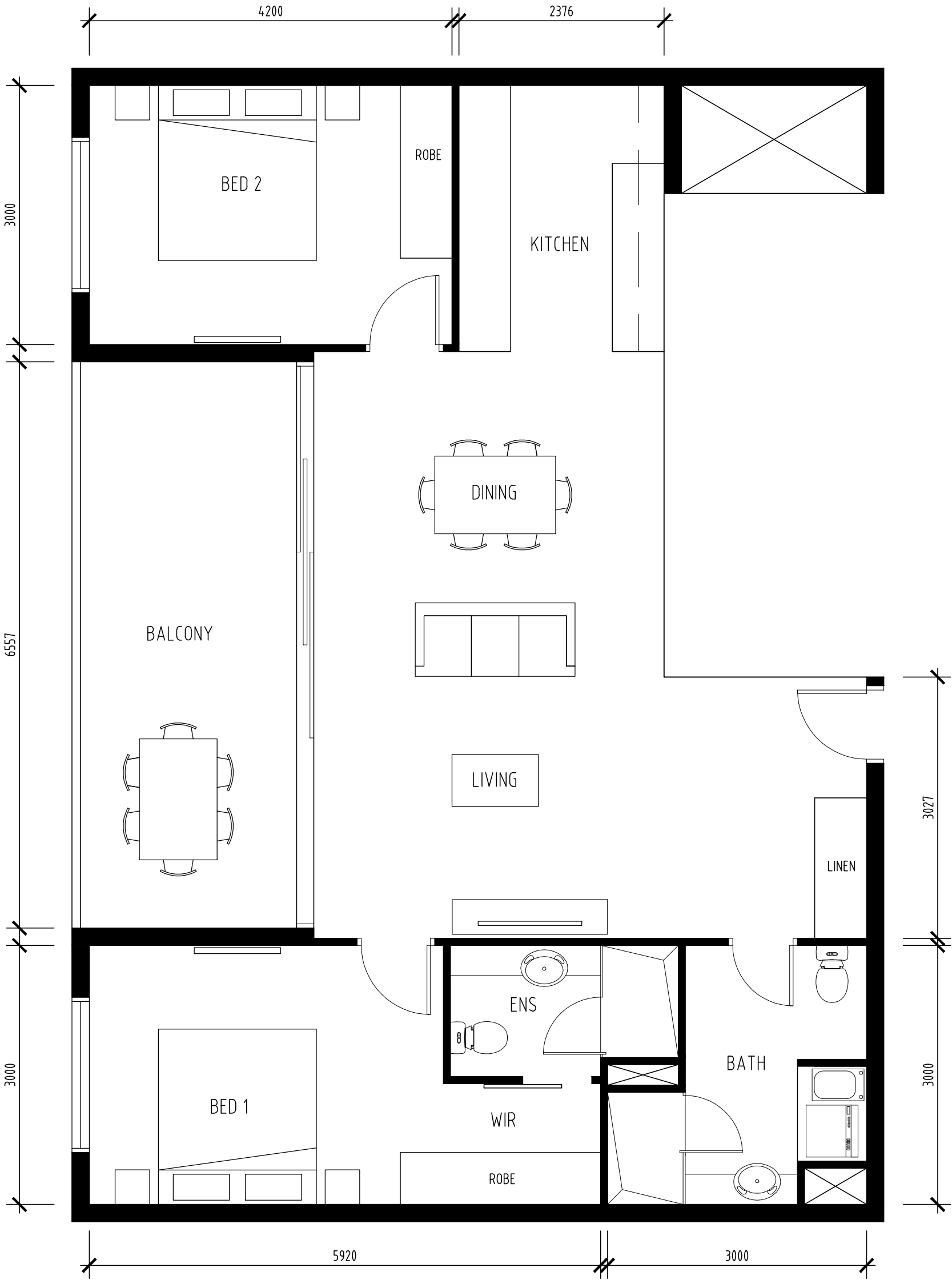
INTERNAL AREA	= 86.8 m ²
BALCONY AREA	= 13.7 m ²
TOTAL AREA	= 100.4 m ²



KEY - LEVELS 11 - 14

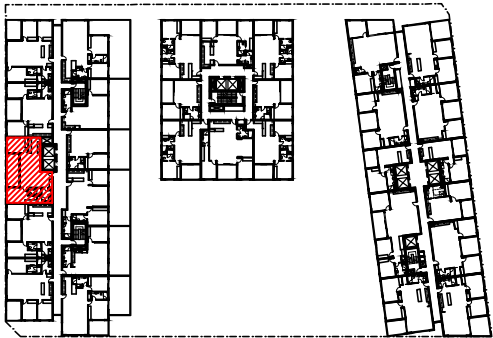


KEY - LEVEL 10



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TYPE 3.09

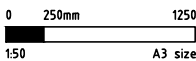
INTERNAL AREA	= 90.4 m ²
BALCONY AREA	= 18.2 m ²
TOTAL AREA	= 108.6 m ²



KEY - LEVEL 10



KEY - LEVELS 11 - 14





Randazzo Properties & PNL Development Pty Ltd

**MIXED USE DEVELOPMENT
LOTS 10026 (PROPOSED LOT 12825A) AND 9635
TOWN OF PALMERSTON**

TRAFFIC AND PARKING REPORT

March 2015

14-0343

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Rev A	26 March 2015	Final report	BNW
Rev B	26 March 2015	Title page, footer, Executive summary, page 2	BNW

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EXECUTIVE SUMMARY

MFY has been engaged to undertake a traffic assessment for the proposed mixed use development at Lots 10026 (Proposed Lot 12825A) and 9635 Town of Palmerston.

The proposal comprises residential apartments, offices, a motel with ancillary areas and retail components, as well as associated car parking levels to service the uses. Specifically, the development comprises the following yields:

- 166 residential units;
- a motel with 168 guest rooms and 22 studio (serviced) apartments;
- 5,835 m² of office floor area; and
- 5,985 m² of retail floor area.

A total of 582 parking spaces are proposed to service the residents, staff and visitors associated with the development.

This report contains methodology and results relating to the traffic impact assessment of the proposed development. A review of parking, access and circulation layouts and requirements has been undertaken by other consultancy firms. The report has been prepared in accordance with Austroads *“Guide to Traffic Management – Part 12: Traffic Impacts of Developments”*.

The traffic that is expected to be generated by the proposed development will be distributed via the adjacent road network. Analysis of future conditions at the key surrounding intersections identifies that the existing intersection layouts would accommodate future volumes at the 2025 design horizon year (with no infrastructure upgrades required).



1.0 PROPOSED DEVELOPMENT

The subject site comprises approximately 6,060 m² of land adjacent Palmerston Circuit, Palmerston, between Koullias Lane and The Boulevard. Figure 1 provides a locality plan indicating the position of the subject site and the adjacent local road network.



Figure 1: Locality plan and study area

1.1 BACKGROUND DEVELOPMENT

The subject site is currently occupied by off-street car parking on approximately half of the site, with the remaining portion being vacant.

1.2 DESCRIPTION OF ON-SITE DEVELOPMENT

1.2.1 LAND USE AND INTENSITY

The proposed development comprises the following uses:

- 166 residential units (comprising a total of 303 bedrooms);
- a motel with 168 guest rooms, 22 studio (serviced) apartments and ancillary areas (offices, reception);
- 5,835 m² of office floor area; and
- 5,985 m² of retail/restaurant floor area.



The plans prepared by Jackman Gooden Architects indicate that 582 car parking spaces will be provided over six parking levels. Access to the site will be provided via a private two-way laneway connecting Palmerston Circuit and Hillson Street. Pedestrian connections to the adjacent frontages/boundaries will also be provided.

1.2.2 LOCATION

The subject site is located within the Palmerston CBD, bounded by Palmerston Circuit to the north-west and north-east, The Boulevard to the south-east and Hillson Street to the south-west.

The Palmerston CBD comprises a variety of land uses with a number of significant developments proposed or in construction. The subject development is one of a range of current developments and proposals contributing to the future progression and expansion of the CBD area.

1.2.3 ZONING

The site is located within a Central Business (CB) zone of the Northern Territory Planning Scheme (NTPS). According to the NTPS, the primary purpose of this zone is to provide for a diversity of activities including administrative, judicial, professional, office, entertainment, cultural, residential, retail and other business activities with a commitment to the separation of incompatible activities.

1.2.4 PHASING AND TIMING

Subject to planning approvals and other relevant considerations, it is anticipated that construction will be undertaken in the following stages:

- Stage 1 – construction commenced end of 2015 with an 18 month construction period;
- Stage 2 – construction commenced end of 2018 with a 12 month construction period; and
- Stage 3 – construction commenced end of 2020 with an 18 month construction period.

This report provides a traffic assessment based on the full development (i.e. Stages 1 through to 3).



2.0 EXISTING AREA CONDITIONS

2.1 STUDY AREA

2.1.1 AREA OF INFLUENCE

The study area is illustrated on Figure 1 above and includes the subject site, the Palmerston CBD, its road network and the wider arterial road network.

2.1.2 AREA OF SIGNIFICANT TRANSPORTATION IMPACT

The broader road network, including Roystonea Avenue, University Drive, Temple Terrace and Chung Wah Terrace, has been assessed as part of the Palmerston CBD Master Plan Traffic Assessment (prepared by i3 Consultants). It is understood that the development yields assumed for the subject site in the Master Plan project are higher than those associated with the current proposal. Therefore, these roads and associated intersections in close proximity to the subject site have not been reassessed as part of the proposal, as it is considered that the findings of the Master Plan assessment are still relevant.

The traffic generation of the proposed development is expected to have greatest impact on the roads immediately surrounding the site, which are generally two-lane, two-way in nature. Detailed traffic assessments have, therefore, been undertaken of the impact on the intersections of Palmerston Circuit/Koullias Lane, Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access and Palmerston Circuit/Hillson Street. Additionally these intersections were not assessed in detail in the Master Plan assessment.

2.2 STUDY AREA LAND USE

2.2.1 EXISTING LAND USES

A mix of residential and commercial (retail/office) developments surround the subject site, including a multi-storey mixed use development to the south of the site, and a Bunnings hardware store to the north-east. The Palmerston Bus Interchange is located to the immediate east of the site.

2.2.2 EXISTING ZONING

The study area is generally zoned Central Business (CB), however, small areas of public open space (PS Zone) are located to the immediate south-west of Frances Drive and The Boulevard. Figure 2 illustrates the zoning for the study area, which is predominantly Central Business within the Palmerston CBD area.



Figure 2: Study area zoning

2.2.3 ANTICIPATED FUTURE DEVELOPMENT

It is understood that Council-owned land adjacent The Boulevard is to be redeveloped for civic and other uses. As part of this, consideration is being given to relocation of the existing bus interchange to the east of the site. It is understood that bus movements may in future be accommodated at a number of on-street stops within the CBD rather than a dedicated interchange. Council are also in the process of upgrading The Boulevard which has resulted in the removal of the roundabout at the western intersection of The Boulevard/Palmerston Circuit. It is understood that a future stage of the upgrade is likely to result in the realignment of the eastern section of Palmerston Circuit to result in the removal of the existing eastern roundabout and construction of a new T-intersection at the eastern Palmerston Circuit/The Boulevard intersection.

Additionally, a new retail centre is under construction to the east of the developing residential area, on the eastern side of Roystonea Avenue.

2.3 SITE ACCESSIBILITY

2.3.1 AREA ROADWAY SYSTEM

The road network immediately surrounding the site comprises local streets under the care and control of the City of Palmerston, connected primarily by roundabouts. Additionally, sub-arterial roads to the north-east (Roystonea Avenue) and south-west (Chung Wah Terrace), and collector roads to the north-west (University Avenue) and south-east (Temple Terrace) form the wider road network associated with the site.



Palmerston Circuit comprises a two-lane, two-way carriageway of 6.5 m width, which accommodates on-street parking on the western side of the road between The Boulevard and Frances Drive. The road is subject to the general urban speed limit of 50 km/h.

The Boulevard generally comprises a two-lane, two-way single carriageway road of 6.5 m width, except for the section of road between Palmerston Circuit and Roystonea Avenue, which comprises dual lanes in each direction separated by a 2 m wide median. The road is subject to the general urban speed limit of 50 km/h, except for the section between the start and end of Palmerston Circuit, which is signposted at 40 km/h. Work has recently commenced on Stage 1 of an upgrade to The Boulevard. The works comprise removal of the existing (south-western) roundabout at its intersection with Palmerston Circuit and widening of the road to provide increased on-street parking and improved pedestrian facilities. Stage 1 is being undertaken between Chung Way Terrace and Frances Drive, with future stages anticipated to extend the remaining length of The Boulevard to the north-east.

Hillson Street generally comprises a two-lane, two-way single carriageway road which provides access to adjacent car parking areas associated with the subject site and Palmerston Recreation Centre. The north-western section of the road incorporates a split roundabout by which vehicles continuing along Hillson Street travel around the eastern half in a two-lane, two-way fashion. The western half of the roundabout, therefore, does not carry any through traffic on Hillson Street but instead provides access to the Palmerston Recreation Centre (from the north only). In the vicinity of The Boulevard, Hillson Street consists of an approximately 7.0 m width. The road is subject to the general urban speed limit of 50 km/h.

Frances Drive generally comprises a two-way, 5.2 m wide carriageway. Between Palmerston Circuit and The Boulevard the road is designated as a shared zone (i.e. pedestrians have priority over vehicle movements) and is subject to a posted speed limit of 10 km/h. Between Palmerston Circuit and University Avenue the road is 10 m wide, comprising two lanes with a central median, and is subject to the general urban speed limit of 50 km/h.

Koullias Lane is a two-way connector road of 10 m in width and comprises two lanes separated by a 1.0 m wide median. The road is subject to the general urban speed limit of 50 km/h.

2.3.2 TRAFFIC VOLUMES AND CONDITIONS

Surveys conducted by MFY on Thursday, 20 June 2013 obtained peak traffic volumes at the following intersections:

- Palmerston Circuit/Koullias Lane; and
- Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access.



This data has been extrapolated to the current year (2015) using a 3% growth factor, which is a conservative rate allowing for other development within the Palmerston CBD. A review of seasonal variation in traffic volumes adjacent the site has also been undertaken. Table 1 illustrates the two closest monthly data counts for the subject site. The Temple Terrace counter was removed in 2009 due to construction, however, it is still considered to provide a reasonable indication of seasonal variation on Temple Terrace.

Table 1: Seasonal adjustment factors for Roystonea Avenue and Temple Terrace counters

	Roystonea Avenue (UDVDP015)		Temple Terrace (UDVDP024)	
	Volume	Factor	Volume	Factor
Jan	17,951	1.10	7,300	1.28
Feb	19,019	1.04	8,558	1.09
Mar	19,214	1.03	8,345	1.12
Apr	19,457	1.01	9,262	1.01
May	20,747	0.95	9,391	1.00
Jun	20,821	0.95	9,647	0.97
Jul	20,354	0.97	9,402	1.00
Aug	19,885	0.99	10,353	0.90
Sep	20,307	0.97	10,341	0.91
Oct	19,883	0.99	9,923	0.94
Nov	20,515	0.96	10,072	0.93
Dec	18,539	1.06	8,665	1.08
AADT	19,727		9,365	
Average factor for June			0.96	

The average seasonal adjustment factor has been applied to the traffic movements recorded at the four subject intersections. Figures 3 and 4 illustrate the seasonally adjusted traffic movements occurring at the four roundabouts surveyed, during the am and pm peak hours.

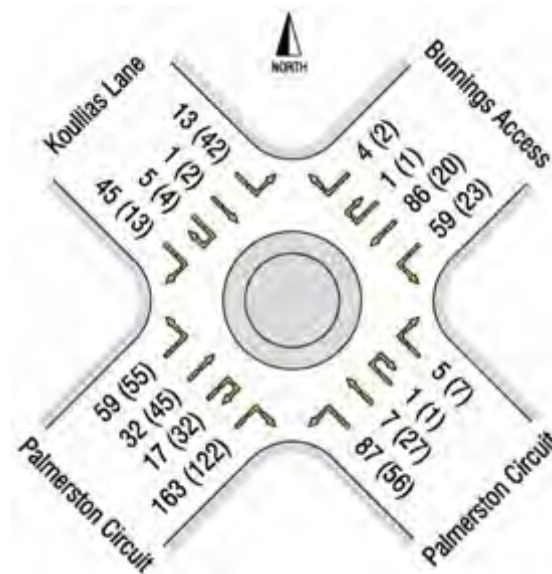


Figure 3: 2015 seasonally adjusted peak hour traffic movements at the Palmerston Circuit/Koullias Lane intersection [am/(pm)]

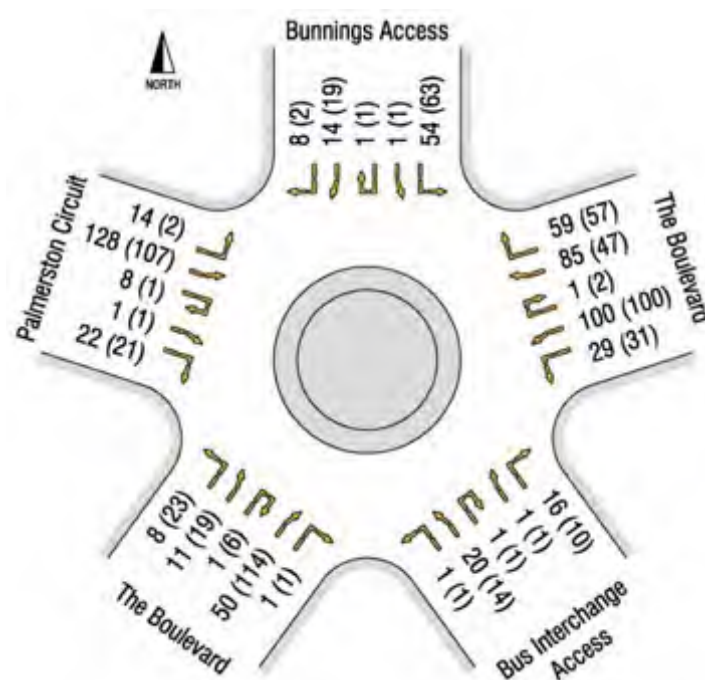


Figure 4: 2015 seasonally adjusted peak hour traffic movements at the Palmerston Circuit/The Boulevard/Bus Interchange access intersection [am/(pm)]

On-site observations of the above intersections identified that all operate with a high level of service, with minimal queuing and delays on all approaches.

In addition to the above surveyed intersection, spot counts were also undertaken in early February 2015 of the intersection of Hillson Street and The Boulevard. Utilising previous survey data for adjacent intersections and the spot counts, estimated (2015)



peak hour counts for the intersection of Hillson Street and The Boulevard have been extrapolated as identified in Figure 5.

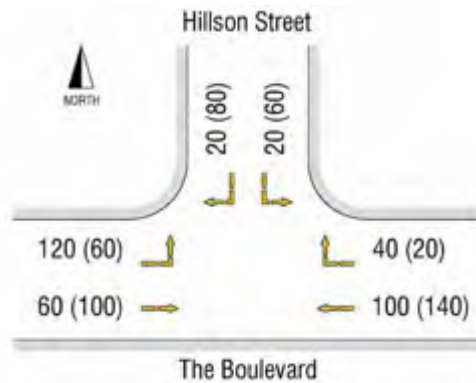


Figure 5: 2015 am and (pm) seasonally adjusted peak hour traffic movements at The Boulevard/Hillson Street intersection

2.3.3 TRANSIT SERVICE

The Palmerston Bus Interchange is situated to the immediate east of the subject site, with bus routes connecting to major facilities and suburbs of Palmerston, as well as localities within the wider region including Darwin and Casuarina.

Bus routes servicing the Palmerston Interchange and the number of services are detailed in Table 2 as follows:

Table 2: Bus routes servicing the Palmerston Interchange

Route	Number of services
Route 8 (Palmerston/Darwin)	11 am services and 16 pm services
Route 9 (Palmerston/Casuarina)	12 am services and 14 pm services
Route 16 (Palmerston/Mindil Beach Market)	2 pm services (Thursday only)
Route 17 (Mindil Beach Market/Palmerston)	2 pm services (Thursday only)
Route 28 (Palmerston/Darwin)	3 am services
Route 28 (Palmerston/Humpty Doo Park & Ride)	3 pm services
Route 70 (Palmerston/Moulden/Palmerston)	10 am services and 18 pm services
Route 71 (Palmerston/Woodroffe/Palmerston)	11 am services and 18 pm services
Route 72 (Palmerston/Rosebery/Palmerston)	10 am services and 18 pm services
Route 73 (Palmerston/Charles Darwin Uni./Palmerston)	11 am services and 18 pm services
Route 74 (Palmerston/Health Precinct/Palmerston)	7 am services and 6 pm services
Route 76 (Palmerston/Bakewell Primary/Palmerston)	6 am services and 6 pm services
Route 77 (Palmerston/Forrest Parade/Palmerston)	9 am services and 13 pm services
Route 440 (Palmerston/Humpty Doo Park & Ride)	2 am services and 2 pm services (excluding Sunday)
Route 445 (Palmerston/Coolalinga/Humpty Doo)	5 pm weekday services and 2 pm Saturday services)



Route	Number of services
Route 446 (Palmerston/Bees Creek)	3 pm weekday services and 3 pm Saturday services)
Route 447 (Palmerston/Humpty Doo Park and Ride)	4 pm weekday services and 2 pm Saturday services)
Route OL1 (Palmerston/Darwin/Casuarina)	7 am services and 7 pm services
Route OL2 (Palmerston/Casuarina/Darwin)	7 am services and 7 pm services

2.3.4 PEDESTRIANS AND BICYCLISTS

Footpaths are provided on the roads surrounding the subject site. Cyclist movements are generally accommodated within the carriageway on the surrounding roads (i.e. share with vehicles), albeit cyclists can also utilise the footpath network.



3.0 PROJECT TRAFFIC

3.1 SITE TRAFFIC

3.1.1 TRIP GENERATION

The NSW Roads and Maritime Services (RMS) (formerly Roads and Traffic Authority (RTA)) “*Guide to Traffic Generating Developments*” (the RTA Guide) provides trip generation rates for a variety of land uses, including those proposed. The RTA Guide and its most recent revision in August 2013 “*Guide to Traffic Generating Developments – Technical Direction – Updated Traffic Surveys*” (TDT 2013/04a) identify the following peak hour rates relevant to the subject proposal:

- High density residential – 0.21 trips per bedroom;
- Motel – 0.4 trips per unit;
- Office – 1.6 trips per 100 m² GFA; and
- Restaurant – 5.0 trips per 100 m² GFA.

In addition, surveys conducted by MFY have indicated a rate of 7.5 to 9.0 trips per 100 m² floor area is appropriate for assessment of the retail components similar to that proposed. Given that the breakdown of generic retail to restaurant/café use is not yet known, an average rate of 7.5 trips per 100 m² has been applied to the retail/restaurant components.

Table 3 illustrates the forecast peak hour trips on the basis of the above rates.

Table 3: Forecast peak hour trip generation

Development use	Quantity	Peak hour trip generation rate	Peak hour trips
Apartments (high density residential)	303 bedrooms	0.21 per unit	64
Motel (units)	168 suites	0.4 per suite	67
Motel (serviced apartments)	22 suites	0.4 per suite	9
Office	5,835 m ²	1.6 per 100 m ² GFA	93
Retail/restaurant	5,985 m ²	7.5 per 100 m ²	449
Total			682

On the basis of the above, approximately 682 peak hour movements could be generated by the subject development. Notwithstanding this, it is considered that the peaks for the various components would not directly coincide. Furthermore, there would also be a proportion of shared trips associated with the various land use



components (i.e. residents and office workers who attend a restaurant/café on the site) which would further reduce the theoretical generation. Nevertheless, the assessment provides a “worst case” scenario of these peaks coinciding.

3.1.2 TRIP DISTRIBUTION

The following assumptions have been adopted in relation to am and pm directions of flows for trips generated by each component:

- Residential – 20% in/80% out in the am and 70% in/30% out in the pm;
- Motel – 20% in/80% out in the am and 60% in/40% out in the pm;
- Office – 80% in/20 % out in the am and vice-versa in the pm;
- Retail – 50% in/50% out for both the am and pm; and
- Restaurant – 50% in/50% out for both the am and pm.

Additionally it has been assumed that 30% of peak retail trips will occur in the am peak period (with 100% for the pm peak period).

On the basis of the forecast trips for each component and other trip attractors/generators in the broader region, a distribution of the traffic volume generated by the proposed development has been undertaken. This takes into account that the majority of peak hour private vehicle trips associated with the development will be generated by the office and retail components, with other components generating relatively low peak hour volumes.

Figure 6 illustrates the forecast trip distribution for external trips associated with the site.

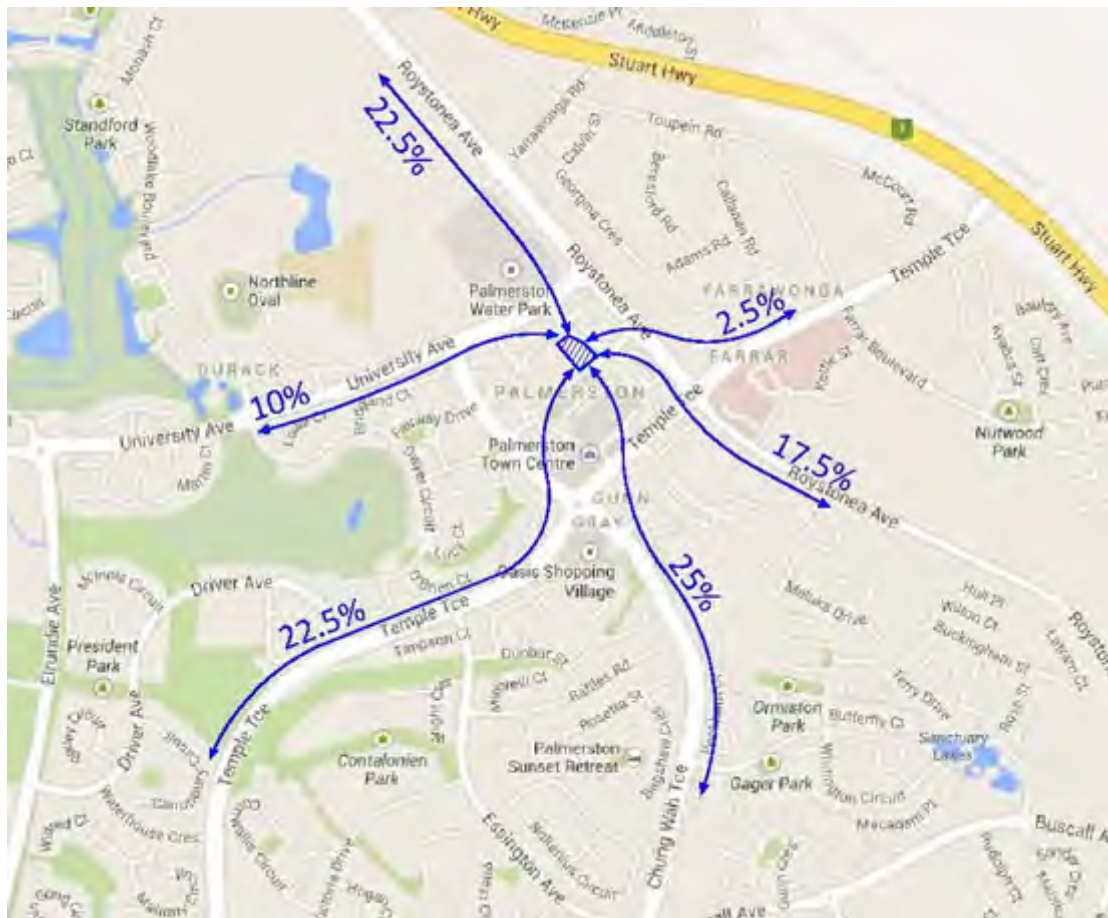


Figure 6: Forecast external trip distribution from subject site

3.1.3 MODAL SPLIT

The above traffic generation rates include general consideration of the proportion of motor vehicle use for users associated with the site. In reality, the trip generation rates are expected to be conservative, as Darwin has higher levels of walking and cycling (i.e. for journey to work trips) than other Australian capital cities, and the site has a relatively high level of public transport accessibility.

3.1.4 TRIP ASSIGNMENT

Based on the above forecasts, trip assignment has been undertaken the intersections of Palmerston Circuit/Koullias Lane, The Boulevard/Palmerston Circuit/Palmerston Bus Interchange, Hillson Street/The Boulevard, the site laneway/Hillson Street and the site laneway/Palmerston Circuit. Figures 7, 8 and 9 illustrate the additional movements assigned to the associated intersections.

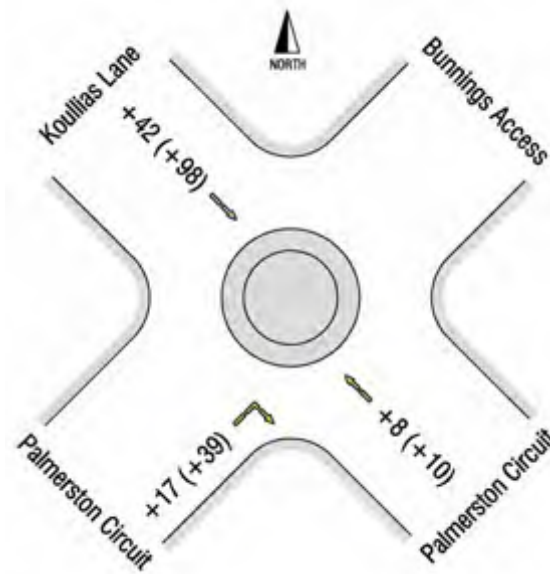


Figure 7: Additional peak hour traffic movements at the Palmerston Circuit/Koullias Lane intersection [am/(pm)]

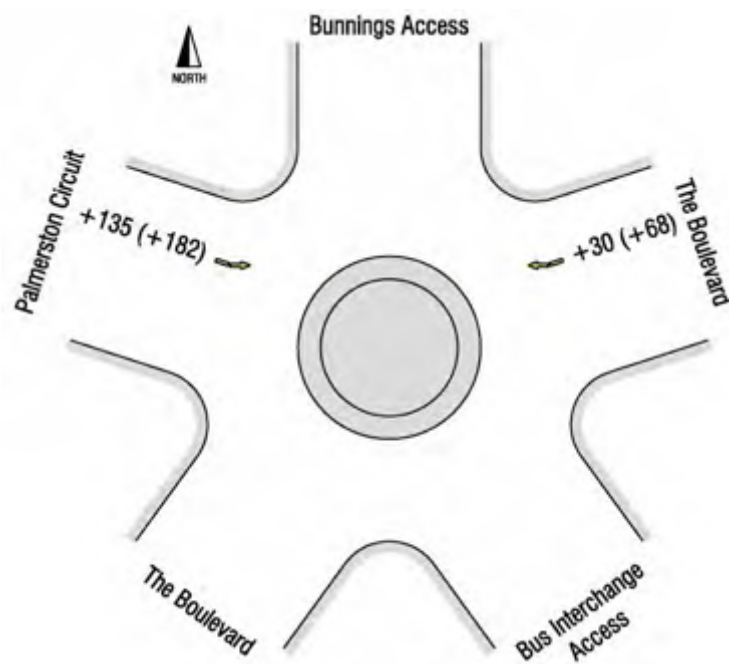


Figure 8: Additional peak hour traffic movements at the at the Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access intersection [am/(pm)]

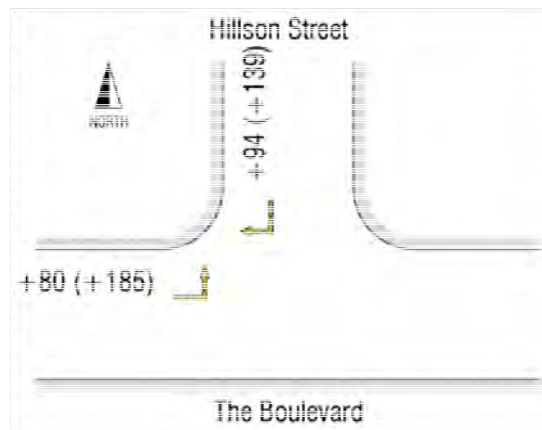


Figure 9: Additional peak hour traffic movements at the at The Boulevard/Hillson Street intersection [am/(pm)]

3.2 THROUGH TRAFFIC

The seasonally adjusted existing traffic volumes at the subject intersections have been extrapolated to a future “base” horizon year. Typically, annual growth rates on road networks are in the order of 1.5% to 2.0%. However, given the potential surrounding developments and future CBD land use intensification, a higher growth rate of 3.0% per annum has been applied. A ten year design horizon has been selected for assessment of the proposal (i.e. 2025).

Figures 10, 11 and 12 illustrate the “base” case future traffic volumes (i.e. without the proposed development) at the subject intersections.

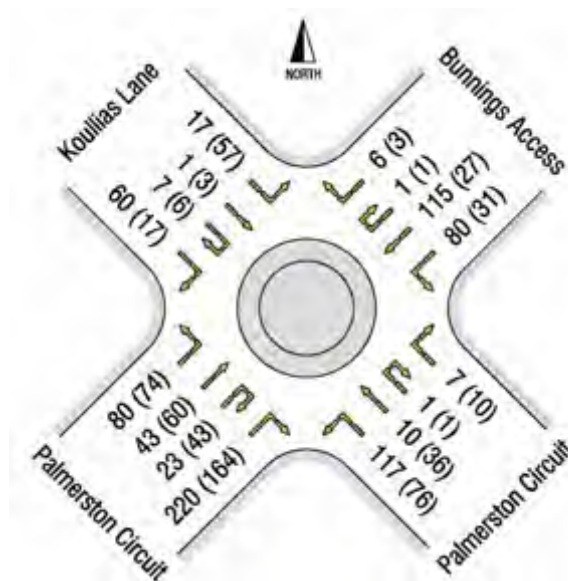


Figure 10: 2025 design year base case peak hour volumes at the Palmerston Circuit/Koullias Lane intersection [am/(pm)]

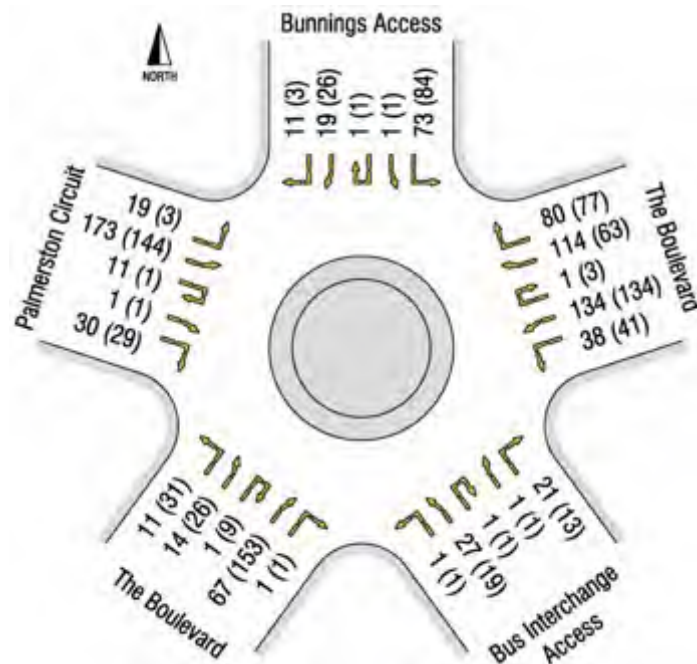


Figure 11: 2025 design year base case peak hour volumes at the Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access intersection [am/(pm)]

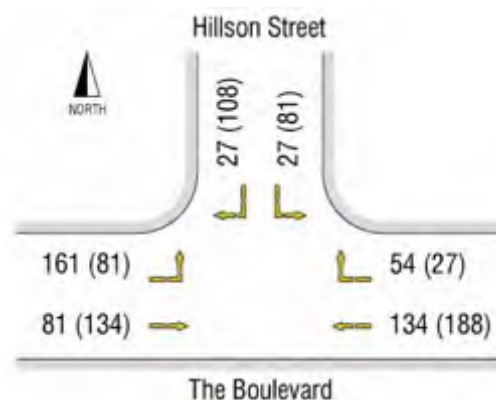


Figure 12: 2025 design year base case peak hour volumes at The Boulevard/Hillson Street intersection [am/(pm)]

3.3 TOTAL TRAFFIC

Figures 13, 14 and 15 illustrate the forecast future traffic volumes at the subject intersections for the 2025 design year, including the volumes associated with the development. The volumes for the intersection of The Boulevard/Hillson Street include consideration of a reduction in turning movements currently generated by the existing car park on the subject site (which will be removed in the event the proposal is constructed). In reality there would also be reductions in the future movements identified at the other assessed intersections as a result of the removal of the existing car park, however to provide a conservative assessment such volumes have not been removed from the analysis.

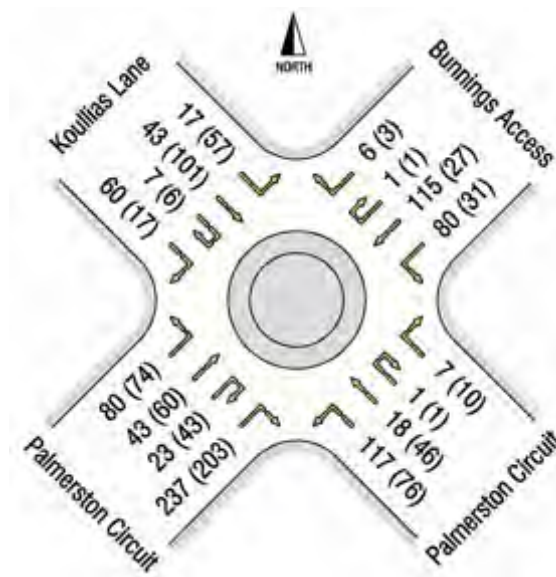


Figure 13: Forecast future (base case plus development) peak hour volumes at the Palmerston Circuit/Koullias Lane intersection [am/(pm)]

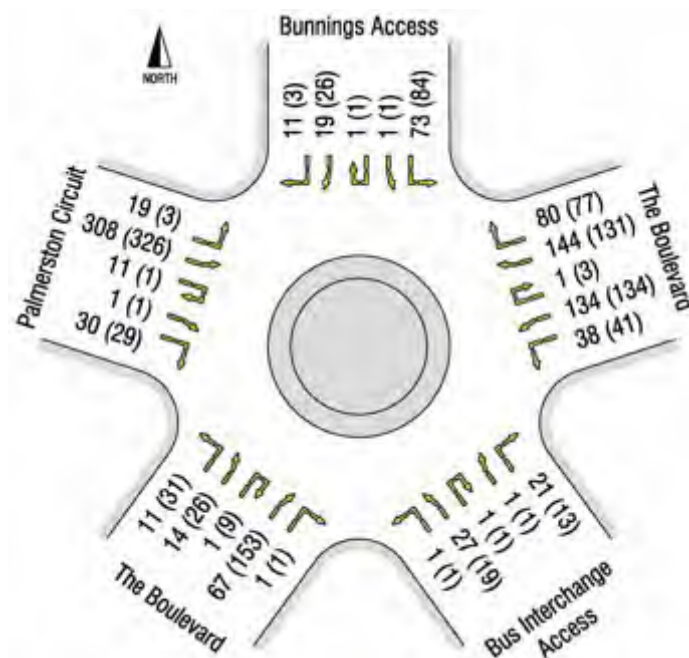


Figure 14: Forecast future (base case plus development) peak hour volumes at the Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access intersection [am/(pm)]

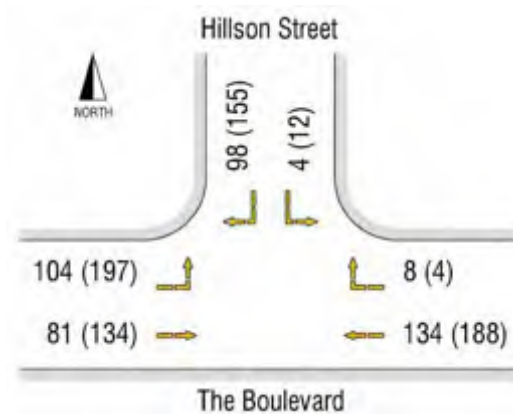


Figure 15: Forecast future (base case plus development) peak hour volumes at The Boulevard/Hillson Street intersection [am/(pm)]

Figures 16 and 17 illustrate the total forecast at the two site access points (namely the private laneway access points on Hillson Street and Palmerston Circuit).

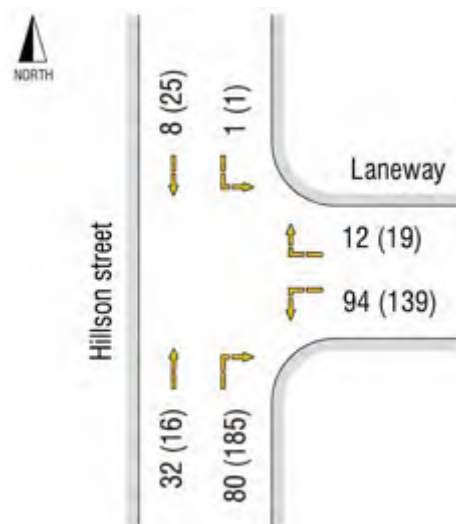


Figure 16: Forecast future (base case plus development) peak hour volumes at the Hillson Street access point [am/(pm)]

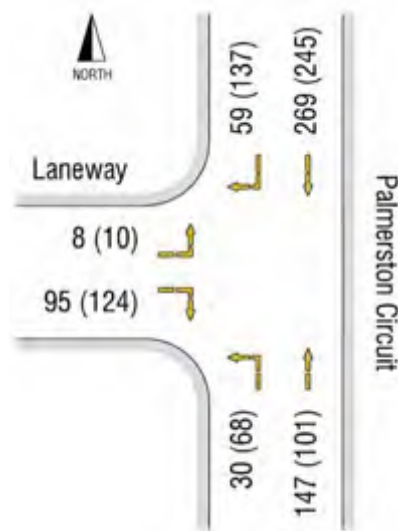


Figure 17: Forecast future (base case plus development) peak hour volumes at the Palmerston Circuit access point [am/(pm)]



4.0 TRANSPORTATION ANALYSIS

4.1 SITE ACCESS

Access for the site will be provided via a two-way crossover on Palmerston Circuit and a two-way crossover on Hillson Street. An internal access road will link to the access points to the external road network, as well as the internal car park connection.

4.2 CAPACITY AND LEVEL OF SERVICE

SIDRA intersection modelling software has been utilised to analyse capacity and level of service at the proposed site access points and the key adjacent intersections. Detailed output from the SIDRA analyses are provided in Appendix A; the following sections provide a summary of key findings from the analysis.

4.2.1 PRIVATE LANEWAY ACCESS/PALMERSTON CIRCUIT

The performance of the private laneway access point on Palmerston Circuit for the design year (following completion of development) is summarised in Table 4.

Table 4: Future (base case plus development) performance indicators for Palmerston Circuit/site access intersection

Site access	am			pm		
	Degree of Saturation	Level of Service (worst movement)	Average delay	Degree of Saturation	Level of Service (worst movement)	Average delay
2025 Future – Development	0.27	C	4.6	0.37	C	6.7

4.2.1.1 Total Traffic

The SIDRA analysis indicates that the intersection of the private laneway access with Palmerston Circuit will adequately accommodate the traffic associated with the development in the design year, with minimal delays expected. The analysis also indicates that a 95th percentile queue of up to two vehicles would be experienced at the site access roadway. However this is considered unlikely in reality as the peaks of the residential, motel, office and retail components of the proposal are unlikely to coincide.

4.2.2 PRIVATE LANEWAY ACCESS/HILLSON STREET

The performance of the private laneway access point on Palmerston Circuit for the design year (following completion of development) is summarised in Table 5.



Table 5: Future (base case plus development) performance indicators for Palmerston Circuit/site access intersection

Site access	am			pm		
	Degree of Saturation	Level of Service	Average delay	Degree of Saturation	Level of Service	Average delay
2025 Future – Development	0.10	A	7.1	0.16	A	7.8

4.2.2.1 Total Traffic

The SIDRA analysis indicates that the intersection of the private laneway with Hillson Street will adequately accommodate the traffic associated with the development in the design year, with minimal delays expected. The analysis also indicates that a 95th percentile queue of up to one vehicle would be experienced at the site access roadway. However this is considered unlikely in reality as the peaks of the residential, motel, office and retail components of the proposal are unlikely to coincide.

4.2.3 PALMERSTON CIRCUIT/KOULLIAS LANE

The performance of the Palmerston Circuit/Koullias Lane intersection for the existing (2015 seasonally adjusted), base case (2025 based on 3% growth) and total (2025 base case with development volumes) traffic scenarios is summarised in Table 6.

Table 6: Performance indicators for Palmerston Circuit/Koullias Lane intersection

Palmerston Circuit/Koullias Lane	am			pm		
	Degree of Saturation	Level of Service	Average delay (sec)	Degree of Saturation	Level of Service	Average delay (sec)
2015 Existing	0.18	A	5.9	0.18	A	6.6
2025 Future – No Development	0.25	A	6.2	0.25	A	6.4
2025 Future – Development	0.27	A	6.2	0.28	A	6.6

4.2.3.1 Existing Conditions

The SIDRA analysis (as summarised in Table 6) indicates that the Palmerston Circuit/Koullias Lane intersection currently operates with a worst Level of Service of 'A' and Degree of Saturation of 0.18 in the am peak hour, and a worst Level of Service of 'A' and Degree of Saturation of 0.18 in the pm peak hour. As observed on-site, queuing and delays are minimal.

4.2.3.2 Background Conditions

The background conditions relate to the extrapolated design year "base case".



As indicated in Table 6, the intersection will adequately accommodate the volumes associated with the design year base case, with minimal delays experienced and a worst Level of Service of 'A'.

4.2.3.3 Total Traffic

For the future scenario of the design year volumes plus the development volumes, Table 6 indicates that the intersection will operate with minimal delays experienced and a worst Level of Service of 'A'. It is, therefore, considered that the intersection will adequately accommodate the associated volumes.

4.2.4 PALMERSTON CIRCUIT/THE BOULEVARD/PALMERSTON BUS INTERCHANGE ACCESS

The performance of the Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access intersection for the existing (2015 seasonally adjusted), base case (2025 based on 3% growth) and total (2025 base case with development volumes) traffic scenarios is summarised in Table 7.

Table 7: Performance indicators for Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access intersection

Palmerston Circuit/The Boulevard/Bus Interchange access	am			pm		
	Degree of Saturation	Level of Service	Average delay (sec)	Degree of Saturation	Level of Service	Average delay (sec)
2015 Existing	0.16	A	8.3	0.15	A	7.6
2025 Future – No Development	0.22	A	8.6	0.21	A	7.9
2025 Future – Development – T-intersection	0.37	A	6.6	0.41	B	6.9

4.2.4.1 Existing Conditions

The SIDRA analysis (as summarised in Table 7) indicates that the Palmerston Circuit/The Boulevard/Palmerston Bus Interchange Access intersection currently operates with a worst Level of Service of 'A' and Degree of Saturation of 0.16 in the am peak hour, and a worst Level of Service of 'A' and Degree of Saturation of 0.15 in the pm peak hour. As observed on-site, queuing and delays are minimal.

4.2.4.2 Background Conditions

As indicated in Table 7, the intersection will adequately accommodate the volumes associated with the design year base case, with minimal delays experienced and a worst Level of Service of 'A'.



4.2.4.3 Total Traffic

It is understood that as part of the potential redevelopment of the CBD area, Council will be undertaking a conversion of this intersection to a T-intersection (with the access to the bus interchange site relocated). A SIDRA analysis has been undertaken for this configuration based on the future scenario of design year volumes plus volumes associated with the subject development. The analysis indicates that the intersection in this form would accommodate the associated traffic demand, with Degrees of Saturation of 0.37 and 0.41 in the am and pm peak hours respectively, and a worst Level of Service of 'B' experienced. Additionally, the 95th percentile queues indicated by the analysis will be adequately contained within the road network. In particular, the section of The Boulevard between Roystonea Avenue and Palmerston Circuit will accommodate the identified 95th percentile queue for the north-eastern approach to the intersection, with no impact being posed from the queue to the nearby intersection at Roystonea Avenue. The proposed development will, therefore, not prevent the future realignment of the existing Palmerston Circuit/The Boulevard/ Palmerston Bus Interchange access intersection from a capacity perspective.

4.2.5 HILLSON STREET/THE BOULEVARD

The performance of The Boulevard/Hillson Street intersection for the existing (2015 seasonally adjusted), base case (2025 based on 3% growth) and total (2025 base case with development volumes) traffic scenarios is summarised in Table 8.

Table 8: Performance indicators for The Boulevard/Hillson Street intersection.

The Boulevard/Hillson Street	am			pm		
	Degree of Saturation	Level of Service	Average delay (sec)	Degree of Saturation	Level of Service	Average delay (sec)
2015 Existing	0.10	A	5.1	0.18	B	4.7
2025 Future – No Development	0.14	B	5.3	0.25	B	5.0
2025 Future – Development	0.12	B	4.9	0.22	B	5.7

4.2.5.1 Existing Conditions

The SIDRA analysis (as summarised in Table 8) indicates that The Boulevard/Hillson Street intersection currently operates with a worst Level of Service of 'A' and Degree of Saturation of 0.10 in the am peak hour, and a worst Level of Service of 'B' and Degree of Saturation of 0.18 in the pm peak hour. As observed on-site, queuing and delays are minimal.



4.2.5.2 Background Conditions

As indicated in Table 8, the intersection will adequately accommodate the volumes associated with the design year base case, with minimal delays experienced and a worst Level of Service of 'B'.

4.2.5.3 Total Traffic

For the future scenario of the design year volumes plus the development volumes, Table 8 indicates that the intersection will operate with minimal delays experienced and a worst Level of Service of 'B'. It is, therefore, considered that the intersection will adequately accommodate the associated volumes.



5.0 IMPROVEMENT ANALYSIS

5.1 IMPROVEMENTS TO ACCOMMODATE EXISTING TRAFFIC

The SIDRA analyses identify that the existing traffic volumes are adequately accommodated on immediate intersections surrounding the subject site.

5.2 IMPROVEMENTS TO ACCOMMODATE BACKGROUND TRAFFIC

The SIDRA analyses for the design year identify that the traffic volumes associated with the proposed development will be adequately accommodated on the surrounding road network.

5.3 ADDITIONAL IMPROVEMENTS TO ACCOMMODATE SITE TRAFFIC

The SIDRA analyses for the subject intersections have identified that traffic volumes associated with both the development and natural growth in the design year will be adequately accommodated without the need for road or intersection upgrades. In addition, should the roundabout of Palmerston Circuit/The Boulevard/Palmerston Bus Interchange access be realigned to a T-intersection, the traffic volumes will still be adequately accommodated at the intersection and on the associated approaches.

5.4 EVALUATION

As highlighted above, the trips generated by the proposed development will be adequately accommodated on the subject intersections without the need for road infrastructure upgrades.



6.0 FINDINGS

6.1 SITE ACCESSIBILITY

The proposed development will generate up to approximately 370 trips in the am peak hour and 685 trips in the pm peak hour. Such a volume will be readily accommodated at the site access point and subject intersections.

6.2 TRANSPORTATION IMPACTS

It is considered that the traffic generation associated with the proposal will generally have minimal impact on the subject intersections in terms of capacity and Level of Service.

6.3 NEED FOR ANY IMPROVEMENTS

It is considered that no transport infrastructure upgrades are required to accommodate the trips associated with the proposed development.



APPENDIX A

SIDRA RESULTS

