



MEMO

TO: Design Team
FROM: Kate Hibner
SUBJECT: Barings Compass Centre – VT Design
OUR REF: MEM-01_BARINGS COMPASS CENTRE- VT Design rev B
DATE: 23 May 2024

The following information outlines the Vertical Transportation studies for the Barings Compass Centre development.

1. DESIGN CRITERIA

1.1 DESIGN STANDARDS, GUIDELINES AND BRIEFS

The following design guidelines and briefs have been considered in our advice for lift spatial requirements and traffic studies:

- National Construction Code 2022
- AS1735.1.1-3 – Lifts, Escalators and Moving Walks
- AS1735.12 Lifts, escalators and moving walks, Part 12: Facilities for persons with disabilities
- ISO 8100-32:2020 - Lifts for the transportation of persons and goods Part 32: Planning and selection of passenger lifts to be installed in office, hotel and residential buildings – This standard was used as a guide for traffic studies in residential towers.
- IHG Engineering Design Guidelines – This guide was used for spatial requirements and traffic studies in hotel tower.

1.2 PRIMARY CRITERIA

Primary criteria normally used for specifying and assessing lift performance are:

Population Density	The anticipated density of occupants/visitors in the building during peak periods, assessed by an allowance of a number persons per room for residential occupancy and hotel guests in the hotel peak periods, assessed by an allowance of a number of person per hotel room. .
Handling Capacity	Percentage of the building population capable of being transported by the lift system in a five-minute peak period.
Average Waiting Time (AWT)	Average Waiting Time is the period of time from when a passenger either registers a landing call, or joins a queue, until the responding lift begins to open its doors at the boarding floor

Population density and handling capacity are measures of the quantity of lift service, whilst the average waiting time is a measure of the quality of lift service.

2. DESIGN TARGET

2.1 RESIDENTIAL TOWERS TARGET

The design target was to meet the ISO 8100-32:2020 requirements:

Design Criteria	Metric	ISO 8100-32:2020
Population Density	Person per unit	Studio unit – 1.5
		1-bedroom unit – 1.8
		2-bedroom unit – 3.0
		3-bedroom unit – 4.0
Handling Capacity	%	7%
Average Waiting Time (AWT)	seconds	60s

2.2 HOTEL TARGET

The design target was to meet the IHG Engineering Design Guidelines requirements:

Design Criteria		Metric	IHG Engineering Design Guidelines
Population Density		Person per key	1.5 Persons/Key
Handling Capacity		%	17%
Average Waiting Time (AWT)		seconds	35s
Lift speed	Levels 13-22 served by passenger lift(s)	m/s	2.5m/s
	Levels 13-22 served by service lift(s)		2.5m/s
Min lift capacity	Passenger lift(s)	kg	1600 kg
	Service lift(s)		1800 kg
Entrances	Passenger lift(s)	mm	1200 x 2100
	Service lift(s)		1200 x 2100

3. Lift Arrangement

3.1 GENERAL ARRANGEMENT

The proposed lifts will be of the traction counterweighted type, an MRL (Machine Room Less) design.

This lift type does not require a machine room. A control panel is however required to be recessed into the front of the lift shaft adjacent to the landing doors on the highest level served by the lift. If the lift lobby on the top level is not protected from the external environment, the control panel is to be relocated one level below.

3.2 LIFT CONTROL SYSTEMS

This type of control system has been around for a long time, and it is common knowledge for passengers to use the up and down buttons.

4. BUILDING POPULATION

4.1 RESIDENTIAL TOWER B

LEVEL	FACILITIES	F2F	CP	Studio	1B	2B	3B	NO OF APTS	POPULATION
Plant/Communal Roof	L 24								
Apartment	L 23	3.35		1	4	4		9	21
Apartment	L 22	3.15		1	4	4		9	21
Apartment	L 21	3.15		1	4	4		9	21
Apartment	L 20	3.15		1	4	4		9	21
Apartment	L 19	3.15		1	4	4		9	21
Apartment	L 18	3.15		1	4	4		9	21
Apartment	L 17	3.15		1	4	4		9	21
Apartment	L 16	3.15		1	4	4		9	21
Apartment	L 15	3.15		1	4	4		9	21
Apartment	L 14	3.15		1	4	4		9	21
Apartment	L 13	3.15		1	4	4		9	21
Apartment	L 12	3.15		1	4	4		9	21
Apartment	L 11	3.15		1	4	4		9	21
Apartment	L 10	3.15		1	4	4		9	21
Apartment	L 9	3.15		1	4	4		9	21
Apartment	L 8	3.15		1	4	4		9	21
Apartment	L 7	3.15		1	4	4		9	21
Apartment	L 6	3.15		1	4	4		9	21
Apartment	L 5	3.15		1	3	3	1	8	20
Retail/Childcare	L 4	5							
CP/Amenities	L 3	4.2							
CP/Amenities	L 2	3.15							
CP/Metro Store/Amenities	L 1	3.15							
Entrance/Retail	L 0	5							
Car park	B1	5	47						
Car park	B2	3.1	51						
Total				19	75	75	1	170	393

4.2 RESIDENTIAL TOWER C

LEVEL	FACILITIES	F2F	CP	Studio	1B	2B	3B	NO OF APTS	POPULATION
Plant/Communal Roof	L 24								
Apartment	L 23	3.35		2	3	3	1	9	21
Apartment	L 22	3.15		2	3	3	1	9	21
Apartment	L 21	3.15		2	3	3	1	9	21
Apartment	L 20	3.15		2	3	3	1	9	21
Apartment	L 19	3.15		2	3	3	1	9	21
Apartment	L 18	3.15		2	3	3	1	9	21
Apartment	L 17	3.15		2	3	3	1	9	21
Apartment	L 16	3.15		2	3	3	1	9	21
Apartment	L 15	3.15		2	3	3	1	9	21
Apartment	L 14	3.15		2	3	3	1	9	21
Apartment	L 13	3.15		2	3	3	1	9	21
Apartment	L 12	3.15		2	3	3	1	9	21
Apartment	L 11	3.15		2	3	3	1	9	21
Apartment	L 10	3.15		2	3	3	1	9	21
Apartment	L 9	3.15		2	3	3	1	9	21
Apartment	L 8	3.15		2	3	3	1	9	21
Apartment	L 7	3.15		2	3	3	1	9	21
Apartment	L 6	3.15		2	3	3	1	9	21
Apartment	L 5	3.15			2	3	2	7	21
Retail/Childcare	L 4	5						0	0
CP/Amenities	L 3	4.2						0	0
CP/Amenities	L 2	3.15						0	0
CP/Metro Store/Amenities	L 1	3.15						0	0
Entrance/Retail	L 0	5							
Car park	B1	5	47						
Car park	B2	3.1	51						
Total				36	56	57	20	169	406

4.3 HOTEL

LEVEL	FACILITIES	F2F	NO OF KEYS	POPULATION
Plant / Rooftop Bar	L 19	3.15		
Hotel	L 18	3.15	13	20
Hotel	L 17	3.15	13	20
Hotel	L 16	3.15	13	20
Hotel	L 15	3.15	13	20
Hotel	L 14	3.15	13	20
Hotel	L 13	3.15	13	20
Hotel	L 12	3.15	13	20
Hotel	L 11	3.15	13	20
Hotel	L 10	3.15	13	20
Hotel	L 9	3.15	13	20
Hotel	L 8	3.15	13	20
Hotel	L 7	3.15	13	20
Hotel	L 6	3.15	13	20
Bar / Function	L 5	3.15		
Hotel Lobby / Dining/Amenities	L 4	5		
Car park	L 3	4.2		
Car park /BOH	L 2	3.15		
Void	L 1	3.15		
Entrance/Retail	L 0	5		
Car park /EOT/BOH	B1	5		
Car park	B2	3.1		
Total			169	254

5. Traffic Study

5.1 PASSENGER LIFTS FOR RESIDENTIAL TENANTS

The residential tenants will have access to either 3 or 2 lifts for their use, depending on whether one lift is dedicated to goods movement.

The results of the traffic studies below illustrate the average wait times (AWT) during peak hours and compliance to ISO 8100-32 as well as the impact on wait times during goods transportation.

Calculation results:

TOWERS	NUMBER OF LIFTS	CAPACITY	SPEED	AWT	ISO 8100-32
Tower B	3	1600kg/21 passenger	2.5m/s	31.0s	Compliant
	2			82.3s	N/A
Tower C	3	1600kg/21 passenger	2.5m/s	31.8s	Compliant
	2			84.4s	N/A

A speed of 2.5m/s is adequate for a 23-storey residential building.

Designating one lift for goods movement would lead to longer wait times. Therefore, scheduling deliveries outside peak building hours will optimise lift usage and improve the passenger experience. We recommend utilising all three lifts as shared goods-passenger lifts with increased car height to accommodate larger furniture.

5.2 HOTEL GUEST LIFTS

The hotel guests will have access to 3 lifts for their use. Traffic studies have been conducted to ensure compliance with the requirements detailed in the IHG Engineering Design Guidelines.

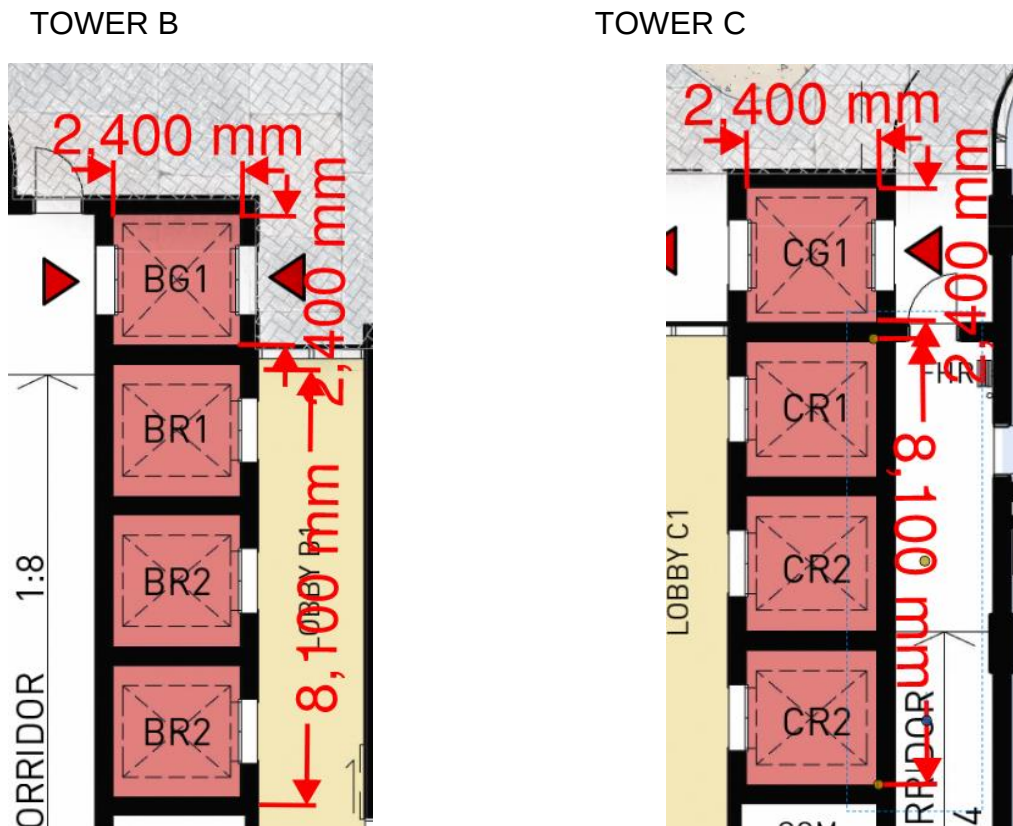
Calculation results:

TOWERS	NUMBER OF LIFTS	CAPACITY	SPEED	AWT	IHG ENGINEERING DESIGN GUIDELINES
Tower A	3	1600kg/21 passenger	2.5m/s	34.9s	Compliant

A speed of 2.5m/s is typically adequate for an 18- storey hotel building and meets the requirements of the IHG Engineering Design Guidelines.

6. LIFT SPATIAL REQUIREMENTS

6.1 LIFTS FOR RESIDENTIAL TENANTS



Passenger residential lifts:

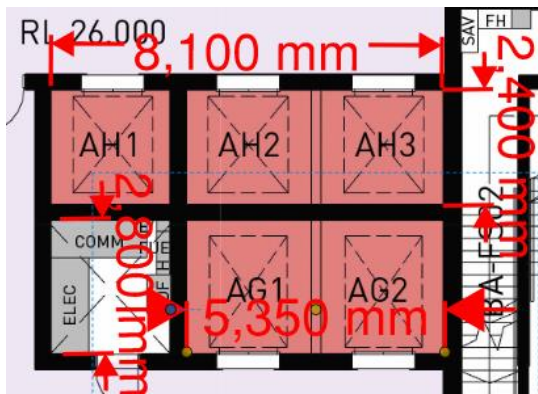
The current shaft sizes of 8100mm(W) x 2400mm(D) can accommodate three lifts with a capacity of 1600kg/21 passengers and cars with dimensions of 1650mm(W) x 2000mm(D). This capacity is sufficient for transporting furniture and white goods. The cars dimensions are also suitable for the movement of persons with limited mobility and stretchers.

Goods lift in Tower B and C:

The current shaft size of 2400mm(W) x 2400mm(D) can accommodate a lift with a capacity of 1275kg/17 passengers and a car with dimensions of 1600mm(W) x 1800mm(D). This capacity is considered small for goods transportation. The car dimensions are suitable for the movement of persons with limited mobility, but the depth is not sufficient to fit a stretcher. Both residential lifts and the goods lift have the same shaft depths; however, due to the requirement for the goods lift to have dual openings, additional space is needed in the shaft for the extra doors. The current shaft depth would need to increase to 2600mm to accommodate a 2000mm car depth, enabling stretcher transport.

We recommend that any goods lift should have a minimum capacity of 1600kg, therefore the shaft should increase to a minimum size of 2600mm(W) x 2600mm(D) to fit cars with dimensions of 1700mm(W) x 2000mm(D) and 1200mm wide doors.

6.2 LIFTS FOR HOTEL



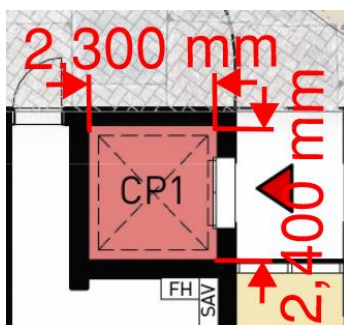
Guest lifts:

The current shaft sizes of 8100mm(W) x 2400mm(D) can accommodate three lifts with a capacity of 1600kg/21 passengers and cars with dimensions of 1650mm(W) x 2000mm(D) and 1200mm wide doors, as per IHG Engineering Design Guidelines.

Hotel BOH lifts:

The current shaft sizes of 5350mm(W) x 2800mm(D) can accommodate two lifts with a capacity of 1800kg/24 passengers and 1200mm wide doors, as per IHG Engineering Design Guidelines.

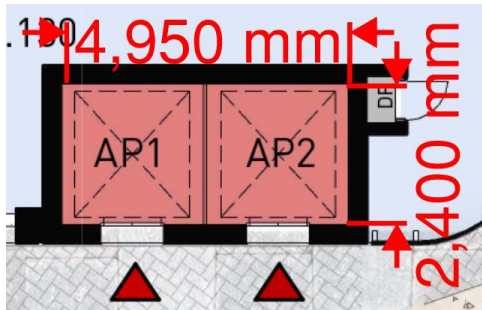
6.3 PODIUM LIFTS



Podium lift in Tower C:

The current shaft size of 2300mm(W) x 2400mm(D) can accommodate a lift with a capacity of 1350kg/18 passengers and a car with dimensions of 1500mm(W) x 2000mm(D). The car dimensions are suitable for the movement of small goods and persons with limited mobility and are sufficient to fit a stretcher. It should be noted that a deeper pit (approx. 1700mm) will be required since the lift is not to solid earth, which would significantly reduce the usable space underneath the lift pit.

The lift car dimensions need to be reviewed to ensure that the lift is sized to accommodate the heaviest and largest items that will be transported.

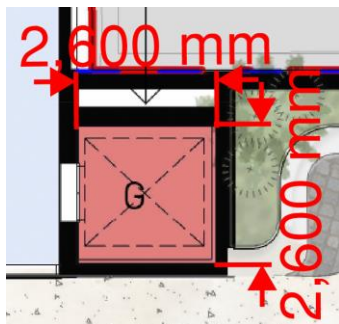


Podium lifts in Tower A:

The current shaft size of 4950mm(W) x 2400mm(D) can accommodate lifts with a capacity of 1500kg/20 passengers and a car with dimensions of 1600mm(W) x 2000mm(D). The car dimensions are suitable for the movement of goods and persons with limited mobility and are sufficient to fit a stretcher. It should be noted that a deeper pit (approx.1700mm) will be required since these lifts are not to solid earth, which would significantly reduce the usable space underneath the lift pit.

The lift car dimensions need to be reviewed to ensure that the lift is sized to accommodate the heaviest and largest items that will be transported.

6.4 METRO GOODS LIFT



Metro goods lifts:

The current shaft size of 2600mm (W) x 2600mm (D) can accommodate a lift with a capacity of 1600kg/21 passengers and a car with dimensions of 1700mm (W) x 2000mm (D). The car dimensions are suitable for the movement of goods and persons with limited mobility and are sufficient to fit a stretcher. Due to the requirement for this lift to have dual openings, additional space is needed in the shaft for the extra doors. It should be noted that a deeper pit (approx.1700mm) will be required since the lift is not to solid earth, which would significantly reduce the usable space underneath the lift pit.

These lift car dimensions need to be reviewed to ensure that the lift is sized to accommodate the heaviest and largest items that will be transported.

6.5 LIFT SPATIAL REQUIREMENTS

The spatial requirements for the proposed lifts are summarised in the table below.

LIFTS	BR1-BR3 CR1-CR3 Residential Passenger Lifts	BG1 & CG1 Goods Lifts in Towers B & C	AP1 & AP2 Podium lifts in Tower A	CP1 Podium lift in Tower C	AH1-AH3 Hotel Guest Lifts	AG1 & AG2 Hotel BOH Lifts	G Metro goods lifts
Number of lifts	3 in Tower B & 3 in Tower C	1 in Tower B & 1 in Tower C	2	1	3	2	1
Overall Shaft width	8100mm*	2400mm	4950mm*	2300mm	8100mm*	5350mm*	2600mm
Shaft depth	2400mm	2400mm	2400mm	2400mm	2400mm	2800mm	2600mm
Car width***	1650mm	1600mm	1600mm	1500mm	1650mm	1600mm	1700mm
Car depth***	2000mm	1800mm	2000mm	2000mm	2000mm	2300mm	2000mm
Car height	2700mm	2700mm	2500mm	2500mm	2750mm	3000mm	2700mm
Door width	1200mm - 2 panel centre opening – Single	1100mm - 2 panel centre opening – Dual	1100mm - 2 panel centre opening – Single	1000mm - 2 panel centre opening – Single	1200mm - 2 panel centre opening – Single	1200mm - 2 panel centre opening – Single	1200mm - 2 panel centre opening – Dual
Pit depth	2400mm	1400mm	1700mm	1700mm	2400mm	2450mm	1700mm
Top overrun	5400mm	4400mm	4400mm	4400mm	5450mm	6000mm	4400mm
Capacity Kg	1600kg / 21 Persons	1275kg / 17 Persons**	1500kg / 20 Persons	1350kg / 18 Persons	1600kg / 21 Persons	1800kg / 24 Persons	1600kg / 21 Persons**
Speed	2.5m/s	1.0m/s	1.0m/s	1.0m/s	2.5m/s	2.5m/s	1.0m/s
Design	MRL	MRL	MRL	MRL	MRL	MRL	MRL

* 150mm allowed for trimmer beams.

** Preliminary goods lift capacity. Goods lift should be sized based on the heaviest and the largest items that will be transported.

*** Typical shaft size to accommodate standard finishes



7. CONCLUSIONS

Based on the traffic study results provided in this document, the lifts in all buildings demonstrate good performance, with waiting times below the expectations outlined in ISO 8100-32:2020.

Regarding the current shaft sizes, all are suitable to fit NCC and DDA compliant lifts, with car dimensions designed to accommodate the movement of persons with limited mobility.

Passenger residential lifts are adequate for transporting furniture and white goods.

While the capacity of goods lifts in Tower B and C may be considered small for goods transportation, if they are designed based on the largest and heaviest items that will be transported, they will be designed sufficient for this project.

Hotel Guest and BOH lifts are as per IHG Engineering Design Guidelines