



ABN 48 612 666 172

Sydney | Brisbane | Melbourne

Level 23, 101 Miller St
North Sydney NSW 2060

PO Box 3
North Sydney NSW 2059
Ph (02) 94371000

CONSULTANTS ADVICE VERTICAL TRANSPORTATION

PROJECT NAME:	Five Ways, Crows Nest
PROJECT NUMBER:	230096
SUBJECT	Residential and Commercial Lifts Performance
DATE / REVISION	23 Feb 2024 / C

INTRODUCTION

JHA have been engaged to provide preliminary Vertical Transportation Services design for the new residential and commercial development at Five Ways, Crows Nest. The following Consultant's Advice provides information on the lift performance for the residential tower and the commercial levels.

LIFT PERFORMANCE ANALYSIS

LIFT TRAFFIC ANALYSIS SOFTWARE

Lift traffic analysis software used is Elevate™, Version 9.2.4, Dr Richard Peters, Peters Research.

REFERENCE DOCUMENTS

- CIBSE Guide D, 2020, The Chartered Institute of Building Services Engineers.
- A Guide to Office Building Quality, 3rd Edition, 2019, Property Council of Australia.
- Apartment Design Guide, July 2015, NSW Department of Planning and Environment.

DOCUMENTS PROVIDED

- Appendix 7 – Architectural Plans (DA-110 series), received 21/02/24
- Appendix 7A – Architectural Plans, received 21/02/24

BUILDING CONFIGURATION

In determining the efficiency of the proposed VT system, key data was drawn from the architectural drawings provided and compiled in the floor matrix

The Floor Matrix gives a clear and concise representation of each lift and its relationship within the building. Information provided is

- Grouping
- Floors served,
- Floor marking,
- Floor type,
- Finished Floor Level (FFL) for each floor,
- Floor-to-floor heights,
- Quantity of units and bedrooms on each level
- Calculated population on each level
- Car park spots in the basement levels

RESIDENTIAL TOWER

FLOOR MATRIX

Residential

Floor	Marking	ET	F1	F2	FFL	FTF	S	F	R	Use	BR-1	BR-2	BR-3	BR-4	T U	1B	2B	3B	4B	T P	MB	CP	CP	Total	%
30	21				168,200	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
29	20				165,100	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
28	19				162,000	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
27	18				158,900	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
26	17				155,800	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
25	16				152,700	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
24	15				149,600	3,100	X	F		Residential		6	3		9	-	18	12	-	30					
23	14				146,500	3,100	X	F		Residential	1	4	4		9	2	12	16	-	30					
22	13				143,400	3,100	X	F		Residential	3	6	2		11	5	18	8	-	31					
21	12				140,300	3,100	X	F		Residential	3	6	2		11	5	18	8	-	31					
20	11				137,200	3,100	X	F		Residential	3	6	2		11	5	18	8	-	31					
19	10				134,100	3,100	X	F		Residential	3	6	2		11	5	18	8	-	31					
18	9				131,000	3,100	X	F		Residential	3	6	2		11	5	18	8	-	31					
17	8				127,900	3,100	X	F		Residential	5	6	1		12	9	18	4	-	31					
16	7				124,800	3,100	X	F		Residential	5	6	1		12	9	18	4	-	31					
15	6				121,700	3,100	X	F		Residential	4	8			12	7	24	-	-	31					
14	5				118,600	3,100	X	F		Residential	4	8			12	7	24	-	-	31					
13	4				115,500	3,900	X	F		Residential	4	8			12	7	24	-	-	31					
12	3				111,600	3,600	X	F		Residential Podium	2	2			4	4	6	-	-	10					
11	2			NS	108,000	3,600				Commercial					-	-	-	-	-	-					
10	1	EE			104,400	3,600		E		Commercial					-	-	-	-	-	-					
9	M			NS	100,800	2,700				Commercial / Amenities					-	-	-	-	-	-					
8	G	ME			98,100	5,600	X		R	Main Entrance					-	-	-	-	-	-					80%
7	B1	AE	CP		92,500	3,400	X		R	Basement Car Parking					-	-	-	-	-	-					
6	B2	AE	CP	NS	89,100	3,000				Basement Car Parking					-	-	-	-	-	-					
5	B3	AE	CP	NS	86,100	3,000				Basement Car Parking					-	-	-	-	-	-					
4	B4	AE	CP		83,100	3,000	X		R	Basement Car Parking					-	-	-	-	-	-	41	27	27	5%	
3	B5	AE	CP		80,100	3,000	X		R	Basement Car Parking					-	-	-	-	-	-	41	27	27	5%	
2	B6	AE	CP		77,100	3,000	X		R	Basement Car Parking					-	-	-	-	-	-	40	26	26	5%	
1	B7	AE	CP		74,100		X		R	Basement Car Parking					-	-	-	-	-	-	40	26	26	5%	
Qty							25	19	6		40	114	37	-	191	72	342	148	-	560	-	162	106	106	

Residential Floor Matrix showing floors served, front and rear entrances, population distribution

Main Entrance	ME
Additional Entrance	AE
Emergency Exit	EE
Not Served	NS
Plant	PL
Suspended Pit	SP
Communal	CO
Car Parking	CP

Legend to colour codes in the floor matrix

CIBSE Guide D provides a guideline for calculating the population for a residential building which is based on the number of units and bedrooms on each level.

Table 3.12 Occupancy factors (persons) for residential buildings

Type	Luxury	Normal	Low income
Studio	1.0	1.5	2.0
1 bedroom	1.5	1.8	2.0
2 bedroom	2.0	3.0	4.0
3 bedroom	3.0	4.0	6.0

Therefore, the traffic simulations have used a calculated population of 560 people using the 'Normal' occupancy factor.

TRAFFIC ANALYSIS

This information is then used as a basis for the traffic analysis.

CIBSE Guide D provides a guideline for the criteria to be achieved for the two peak periods in residential buildings.

Table 4.3 Draft ISO recommendations for use with provisional ISO simulation method (ISO, 2015)

Building type and typical traffic mix	Typical range of required handling capacity (HCS) (%)	Typical range of required average waiting time (s)
Residential:		
— morning two-way (15 % incoming, 85 % outgoing)	6–8	30–65
— evening two-way (50 % incoming, 50 % outgoing)	6–8	30–65

LIFT SYSTEM PARAMETERS USED

Capacity	1,500 kg	1,500 kg
Rating	20 passengers	20 passengers
Car width	1,500 mm	1,500 mm
Car depth	2,100 mm	2,100 mm
Door width	1,100 mm	1,100 mm
Door type	2PC	2PC
Speed	3.0 m/s	2.0 m/s
Acceleration	1.0 m/s ²	0.8 m/s ²
Jerk	1.0 m/s ³	1.0 m/s ³
Start Delay	0.0 s	0.0 s
Door Open	1.8 s	1.8 s
Door Close	2.9 s	2.9 s
Pre-open	0.0 s	0.0 s
Dwell 1	3.0 s	3.0 s
Dwell 2	1.0 s	1.0 s
Loading Time	1.0 s	1.0 s
Unloading time	1.0 s	1.0 s
Stair Factor	0 %	0 %

RESULTS OF THE ANALYSIS

Parameter	Recommended	2 Lifts at 3 m/s	3 Lifts at 2 m/s
Morning	30s-65s	531s ✖	51s ✔
Evening	30s-65s	310s ✖	49s ✔

CONCLUSION FOR RESIDENTIAL TOWER

Based on the information drawn from the architectural drawings received and the floor matrix above, the preliminary three-lift design will provide an acceptable level of service, meets the recommended waiting times.

Note the NSW Apartment Design Guide recommends a maximum of eight (8) apartments on each level, see extract below.

Any changes to the building configurations, population, or usage, the traffic analysis should be reassessed.

Objective 4F-1

Common circulation spaces achieve good amenity and properly service the number of apartments

Design criteria

1. The maximum number of apartments off a circulation core on a single level is eight
2. For buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is 40

COMMERCIAL LEVELS

FLOOR MATRIX

Floor	Marking	ET	F1	F2	FFL	FTF	S	F	R	FTF	Use		NLA	T P	MB	CP	CP	Total	%BP
						-								-					
						-								-					
7	2				108,000	3,600	X	F			Commercial	2,437	1,950	162					
6	1				104,400	3,600	X	F		✓	Commercial	2,425	1,940	162			-	-	
5	M				100,800	2,700	X	F		✓	Commercial / Amenities	860	688	57			-	-	
4	G	ME			98,100	5,600	X	F		✓	Ground			-			-	-	65%
3	B1	AE	CP		92,500	3,400	X	F		✓	Basement Car Parking			-		9	11	11	3%
2	B2	AE	CP		89,100	3,000	X	F		✓	Basement Car Parking			-		51	62	62	16%
1	B3	AE	CP		86,100		X	F		✓	Basement Car Parking			-		51	62	62	16%
						Qty	7	7	0			5,722	4,578	381	-	111	135	135	

Commercial Floor Matrix showing floors served, front and rear entrances, population distribution

Main Entrance	ME
Additional Entrance	AE
Emergency Exit	EE
Not Served	NS
Plant	PL
Suspended Pl	SP
Communal	CO
Car Parking	CP

Legend to colour codes in the floor matrix

Property Council of Australia (PCA) provides a guideline for calculating the population for a commercial building which is based on the NLA on each level. It assumes one (1) person per 12m² of NLA. Therefore, the traffic simulations have used a calculated population of 381 people.

TRAFFIC ANALYSIS

This information is then used as a basis for the traffic analysis.

The PCA CIBSE Guide D provides a guideline for the criteria to be achieved for the two peak periods in commercial buildings.

Lifts Code	Parameter	Unit	Grade A
E1	Car capacity	Number of persons	≥ 16
E2	Lateral vibration	mg	≤ 20
E3	Waiting time	Seconds during any five-minute period	Up peak ≤ 30 Lunch peak ≤ 40
E4	Handling capacity	%	Up peak ≥ 13 Lunch peak ≥ 11
E5	Goods lift	Number	≥ 1
E6	Goods lift	Capacity (kg)	≥ 1,400
Goods lift serve plant room			Yes

LIFT SYSTEM PARAMETERS USED

Capacity	1,400	kg
Rating	18	passengers
Car width	1,500	mm
Car depth	2,000	mm
Door width	1,100	mm
Door type	2PC	
Speed	1.0	m/s
Acceleration	0.6	m/s ²
Jerk	0.8	m/s ³
Start Delay	0.0	S
Door Open	1.7	S
Door Close	2.7	S
Pre-open	0.0	S

Dwell 1	3.0	S
Dwell 2	2.0	S
Loading Time	1.0	S
Unloading time	1.0	S
Stair Factor	0	%

RESULTS OF THE ANALYSIS

Parameter	Recommended	2 Lifts
Morning	≤30s	28s ✓
Lunch	≤40s	28s ✓

CONCLUSION FOR COMMERCIAL LEVELS

Based on the information drawn from the architectural drawings received and the floor matrix above, the preliminary two-lift design will provide an acceptable level of service.

The PCA Grade A requires a dedicated goods lift if the total building NLA is >30,000m². As this building's NLA is less therefore a dedicated goods lift is not required and can be shared with the passenger lifts. Note that during goods lift operation, only two passenger lifts will be available and their performance will be affected, especially during peak periods.

Any changes to the building configurations, population, or usage, the traffic analysis should be reassessed.

Yours sincerely,



George Petropoulos

Vertical Transportation Services