

Memo



Memo Number	VT-001	Discipline	Vertical Transportation
Project Name	146 Arthur	Project Number	24054.14
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cc	Steven Cassells	Company	Neuron
From	Peter Flinn	Company	Collective Engineering
Date	19 February 2025		
Topic	Lift Traffic Analysis		

Introduction

A lift traffic analysis for the 146 Arthur Street development was performed to reflect the design status indicated by the architectural drawings dated February 2024.

The lift traffic analysis intends to demonstrate that the proposed lifting solution will produce good performance commensurate with industry practice.

The Development

The architectural drawings prepared by Wood Bagot propose a high-rise Build-to-Rent residential development comprising circa 400 apartments and 46 levels above ground.

The general building stacking comprises:

- Level 46 Rooftop plan
- Level 45 Rooftop amenities
- Level 44 to 2 Residential accommodation
- Level 1 Amenities | Retails
- Level G Main Entry | Amenities | Retail
- Level LG Amenities | Plant
- Level B1 Loading | Bike Parking | Waste | Retail
- Levels B2 to B4 Car Parking | Storage

A detailed development summary applicable to lift traffic is included in attachment A.

Lifting Strategy

The lifting strategy for the residential accommodation portion of the development comprises five passenger lifts. The five lifts serve all above-ground levels. Four of five lifts provide direct service to the basement levels 2 to 4. All five lifts are co-located and operate as part of a group.

Lifting performance suitable for a good quality residential building meeting and exceeding industry benchmark criteria is proposed.

Lift Traffic Results

Key lift traffic results for Handling Capacity (HC) and passenger Average Waiting Time (AWT) for the proposed lifting solution at 146 Arthur are summarised in the following table:

Lifting Solution	HC (%)	AWT (seconds)	NTT (seconds)
Criteria	7%	≤ 60	25 to 45
5 x 1350kg lifts at 4.0m/s	7%	32	35

The resultant AWT with 5 lifts at a rated speed of 4.0m/s results in an AWT of 32 seconds. The results indicated that 5 lifts at a minimum speed of 4.0m/s will provide a high-quality service suitable for the proposed development.

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Content

The following is included in this memorandum:

- Lift traffic analysis
 - Lift traffic design criteria
 - NSW ADG
 - Methodology
 - Assumptions
- Building data
- Lift Traffic Results

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Design Criteria

General

The proposed design criterion for passenger lift performance in residential buildings is based on that published in CIBSE Guide D and ISO 8100-32:2020(E). The key criteria are summarised in the following table:

Service Quality	HC (%)	AWT (s)	In / Out	NTT (s)
Reference Criteria				
ISO 8100-32:2020(E) - <i>Standard design</i>	≥ 7	≤ 60	50 / 50	25 to 45
- <i>luxury</i>		≤ 40		
CIBSE Guide D - <i>Standard</i>	≥ 6	≤ 60	50 / 50 15 / 85	25 to 45
- <i>Prestige</i>		≤ 40		
Proposed Criteria				
146 Arthur	7% AR	≤ 60	50 / 50	25 to 45

Definitions

Passenger Average Waiting Time (AWT)

Passenger Average Waiting Time is defined as the average period 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.

Handling Capacity (HC)

The Handling Capacity (or 5-minute Handling Capacity) is defined as the proportion of the total building population that the lift system can theoretically transport within five minutes at the peak time.

Nominal Travel Time (NTT)

The nominal travel time (seconds) is assessed by dividing the lift travel (top floor to bottom floor) by the rated lift speed.

References

CIBSE: The Chartered Institution of Building Services Engineers

CIBSE Guide D:2020: - Transportation systems in buildings

ISO 8100-32:2020(E): 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

NSW Apartments Design Guidelines

The following text is included within the NSW Apartment Design Guidelines:

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*

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2. For buildings of 10 storeys and over, the maximum number of apartments sharing a single lift is 40

Whilst the NSW ADG nominates the tipping point from one to two passenger lifts, it does not nominate the minimum lifting requirements for lifts in groups of two or more. For larger developments, we recommend that a lift traffic analysis be performed.

Methodology

A two-way lift traffic assessment with 50% incoming and 50% outgoing movements was carried out to align with the expected peak traffic conditions for the proposed residential building. The quality of service for any given lifting configuration was then assessed against the criteria nominated above.

Analysis Input & Assumptions

The following summarises the design inputs and assumptions made in carrying out the assessment.

Building

- Common areas and car parking are used by occupants of the building only
- Passenger lifts are used by residential building occupants and their guests only (no public use)
- Parking is for tower residents only. (i.e. no retail parking).
- One of the lifts will be used for combined goods / passenger movements
- Goods movements taking exclusive use of a lift are to occur during non-peak lifting times. Management via building manager
- Residential population estimated in accordance with CIBSE Guide D
- 0% absenteeism

Lift Dynamics

- Passenger loading / unloading times (seconds) : 1.0 / 1.0
- Door pre-open / open / close (s) : 0.0 / 1.8 / 2.9
- Passenger mass and area : 75kg / 0.3m²

Lift Traffic - Simulation

- Two-way traffic with 50% incoming and 50% outgoing movement.
- Entry bias as per attachment A with 85% entering and exiting the lift system via the ground floor
- 80% maximum lift car loading by load rating

Building Configuration

Refer attachment A

Lift Traffic Results

Results of the lift traffic simulation with the number of lifts and lift speed varied as inputs are summarised in the table below.

Lift Data			Performance			
No. of Lifts	Rating (kg)	Speed (m/s)	HC (%)	AWT (sec.)	ld.a (%)	NTT _G
C1: CIBSE Criteria			≥ 6			
				≤ 40		
C2: Criteria ISO 8100-32			≥ 7			
4	1600	3 -- --	7	73	38	47
5				39	22	
4	1350	-- 4 --	7	58	42	35
5				32	23	
4	1350	-- -- 5	7	57	36	28
5				28	22	

The selected lift solution with 5 x 1350kg lifts with a rated speed of 4.0m/s is indicated via **bold blue** text. Key findings from the analysis are summarised as follows:

- A five-lift solution provides a high level of amenity with inherent redundancy of service
- A lift speed of 4.0m/s is the minimum recommended to meet the Nominal Travel Time criteria

Enclosed: **Attachment A – Lift Basis of Design**

Notes & Assumptions

- Bike entry to bike store is not via the loading dock and not via the lifts
- On floor amenities on residential is for on floor residents
- One of the 5 lifts does not serve basement levels
- Building data based on Woods Bagot architectural drawings dated 9/2/24



Type of Apartment	Population (persons per apartment)			
	Studio	1-Bed	2-Bed	3-Bed
Prestige	1	1.5	2	3
Standard	1.5	1.8	3	4
Basic	2	2	4	6

Legend		
Lift Schematic		
◀		Opening - Front
	#	Stop No.
	▶	Opening - Rear
HR: x.xx		Headroom - Clear Height (m)
Pit: x.xx		Pit Depth (m)
LMR		Lift Motor Room

Abbreviations	
Ht.	Floor to Floor Height
RL	Relative Level
Ppl	Population

Lift Traffic	
	Entry Bias
85	85% at main terminal
5	5% at secondary terminal
0	destination floor
In.	Incoming (%)
Out.	Outgoing (%)
Int-f	Inter-floor (%)
HC	Handling Capacity (%)
AWT	Average Waiting Time (AWT)
ATT	Average Transit Time (ATT)
%ld.a	Car loading at main terminal