



15 February 2017

Elizabeth Goodall
Development Manager, Barangaroo South
Level 14, Tower Three, International Towers Sydney
Exchange Place, 300 Barangaroo Avenue,
Barangaroo NSW 2000 Australia

Dear Elizabeth,

**Re: Response to Department of Planning Apartment Design Guide
Vertical Transportation Objectives – One Sydney Harbour Lift System &
Performance**

The *Apartment Design Guide* (June 21015) (ADG) sets the below objective regarding vertical transport performance:

*Objective 4F-1
For buildings of 10 storeys and over, the maximum number of apartments
sharing a single lift is 40.*

The ADG criteria has been created for medium rise buildings of approximately 10-20 storeys that often would not have vertical transportation design carried out and therefore can be considered general guidance for the provision of lifts in those types of buildings. As part of the planning regime for the One Sydney Harbour Towers, lift servicing has been compared to commensurate buildings internationally, with the proposed lift provisioning providing equal or better performance than those benchmarked against (as further described below). Furthermore on completion, Towers R4A and R4B will stand at RL 250 and RL 210 respectively, equating to two of the tallest residential towers in NSW and considerably taller than buildings with which the ADG objective is based upon.

Calculating the lift performance in each of the towers (R4A, R4B and R5) with respect to the Objective 4F- 1 of the Apartment Design Guidelines results in the following outcomes;

Tower	Number of apartments	Number of Lifts	Ratio
R4A	327	6	1:55
R4B	297	6	1:50
R5 (On Market)	112	2	1:56

R5 (KWH)	39	2	1:20
-----------------	----	---	------

However when designing significant apartment towers the lift provisions need to be designed by a Vertical Transportation Engineer to lift industry accepted design criteria.

The lift engineering for the project has been carried out by Lendlease Design Vertical Transport Design Services and we confirm lift performance of the proposed lifts is commensurate with international global standards.

Lift Design Criteria

The international guides for Vertical transportation design are the Chartered Institution of Building Services Engineers (CIBSE) Guide D or The Vertical Transportation Handbook (Strakosch). Additionally Lendlease Apartments have company benchmarks for luxury residential apartments which is higher than those of CIBSE and Strakosch.

The target performance levels in each of these guides is as follows:

Target Performance Levels						
Apartment Type	LL Apart	CIBSE Luxury	CIBSE Normal	CIBSE Low Income	Strakosch Downtown	Strakosch Development
Interval (sec)	<60	45-50	50-60	60-70	40-60s	50-90s
Balanced 2-Way Handling Capacity (%)	10%	8%	6% to 8%	5% to 7%	5-7%	6-7%

Definition of Terms

The following definitions are important to provide background information to understand the way in which lifting systems are designed and measured in terms of quality and performance.

Two Way Traffic – This is where the dominant traffic flow is to and from the main floor of the building, the main floor is the primary entry and exit from the lifting system, in this case “Ground Floor”.

Handling Capacity - This is the percentage of the buildings population that can be transported in a five minute period, with the car load at no more than 80% of the cars designated capacity.

Average Interval – This is the average period of time between successive car departures from the main lobby.

Populations for a residential building are defined by the expected bedroom occupancy and are adjusted for the apartment building quality

	Occupancy Ratios					
Apartment Type	Lendlease Design	Luxury	Normal	Low Income	Downtown	Development
Studio	1.5	1.0	1.5	2.0	1.5-1.75	1.75-2.0
1 Bedroom	1.5	1.5	1.8	2.0	1.5-1.75	1.75-2.0
2 Bedroom	3.0	2.0	3.0	4.0	3.0-3.5	3.5-4.0
3 Bedroom	4.5	3.0	4.0	6.0	4.5-5.25	5.25-6.0

Traffic Studies

The design for each rise of the building were applied to Elevate (V8.22) using the general analysis mode and the results are presented below.

Building R4A

Low Rise serving Ground and level 1 to 37

3 x 18 passenger lift @ 5.0m/s

Average Interval 57.9sec for a 10% HC (two way)

High Rise serving Ground and level 38 to 68

3 x 18 passenger lift @ 7.0m/s

Average Interval 59.8sec for a 10% HC (two way)

Each rise extends to basement for carpark pickups

Building R4B

Low Rise serving Ground and level 1 to 29

3 x 18 passenger lift @ 3.0m/s

Average Interval 45.4sec for a 10% HC (two way)

High Rise serving Ground and level 30 to 56

3 x 18 passenger lift @ 6.0m/s

Average Interval 44.9sec for a 10% HC (two way)

Each rise extends to basement for carpark pickups

Building R5 (On Market)

Low Rise serving Ground and level 1 to 26

2 x 18 passenger lift @ 4.0m/s

Average Interval 60.3sec for a 9% HC (two way)

This rise extends to basement for carpark pickups

Building R5 (KWH)

Low Rise serving Ground and level 1 to 13

2 x 18 passenger lift @ 2.0m/s

Average Interval 13.0sec for a 10% HC (two way)

Passenger Lift Provisions

Lift Type and Capacity

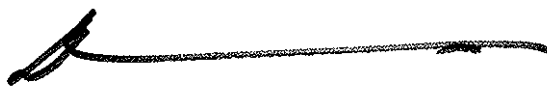
- The passenger lifts in all Lendlease apartment buildings are a minimum of 17 person with car dimensions 1400mm wide x 2000mm deep x 2500mm high (clear internal) to allow for the requirements of the BCA DDA provisions, stretcher capabilities and movement of furniture such as king sized beds
- Additionally one lift in each rise of R4A and R4B has been increased to 21 person (1600w x 2000d) to provide additional space for larger furniture and building plant
- Doors are at a minimum 1100mm wide x 2100 high
- Group collective operational control
- Lifts are designed to comply with the requirements of the SAA Lift Code AS1735, Workcover Authority and the NCC.
- Lifts will incorporate facilities for persons with a disability to comply with AS1735 Part 12 (NCC Compliance)

Conclusions

Although not in strict adherence to the ratio in the Apartment Design Guide, the results demonstrate that the One Sydney Harbour vertical transport provisions result in commensurate or greater performance than international benchmarks for luxury apartments. Given the height of the buildings and high speed with which the lifts will operate, the inconsistency with the Apartment Design Guide Objective 4F-1 should not be taken to correlate to poor amenity outcomes for residents.

Should you require further information please don't hesitate to contact me.

Yours Sincerely

A handwritten signature in black ink, appearing to be "Ian S. Robinson", followed by a horizontal line.

Ian S. Robinson
Specialist Project Engineer – Vertical Transportation, Design
Lend Lease Building Pty Ltd
Australia

cc: Gregory Smith Lend Lease Apartments