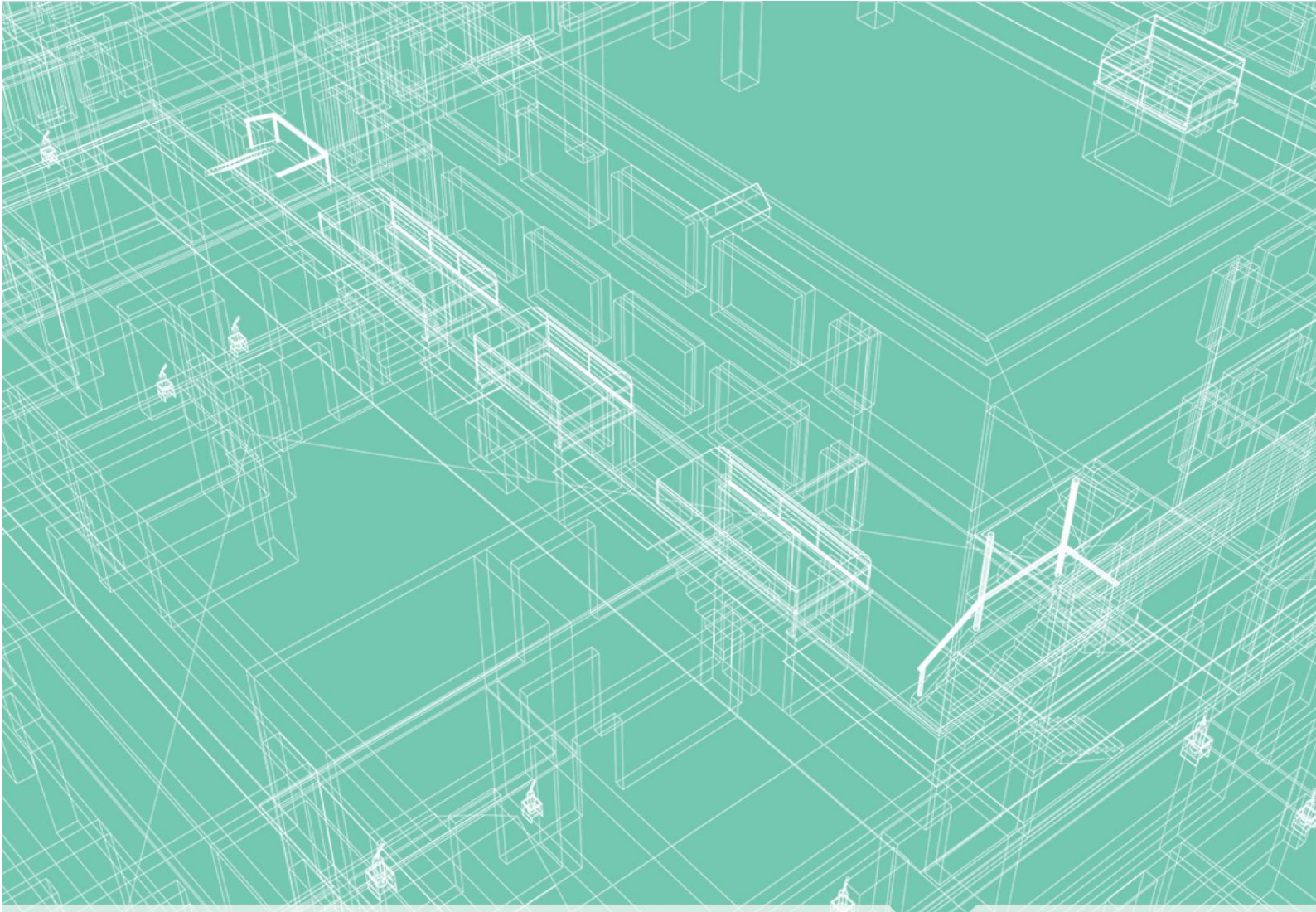

SSDA REPORT

MOSMAN HIGH SCHOOL MAJOR UPGRADE

VERTICAL TRANSPORTATION SERVICES

JHA

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1 INTRODUCTION

1.1 GENERAL

JHA Engineers have been engaged by Multiplex to provide the design of Vertical Transportation services for the proposed Mosman High School development located at 745 Military Road, Mosman.

The document is designed to achieve a summarised, succinct and coherent written description detailing information on the lighting strategy to be implemented to the new Building G. The document will also identify the recommended lighting levels and specific requirements as per Australia Standards & EFSG requirements and will be used a guide for the detailed design development.

The document is not designed as a specification or bill of materials, nor is it intended to provide detail of the equipment, fitting or services selection.

1.2 LIMITATIONS

This SSDA is preliminary in nature and represents JHA's understanding of the required systems and services needed to support this Project: the information outlined within this Report will need review and acceptance by relevant stakeholders in order to appropriately inform the next phase of this Project.

1.3 PROJECT DESCRIPTION

The proposed Mosman High School development seeks detailed built form approval of new teaching and educational facilities, as detailed below:

Development consent is sought for the following works:

- Demolition of Building B, Building C and part Building E;
- Removal of existing sports court and surrounding retaining walls and nominated trees;
- Construction of a new part 3/ part 4 storey building plus lift overrun and net enclosure to rooftop multi-court (Building G) on the corner of Military Road and Belmont Road providing:
- Administration and staff facilities;
- Multipurpose gym/hall;
- Library;
- Canteen facilities;
- General and senior learning units;
- Science learning unit;
- Health / PE and performing arts unit; and
- Learning and admin support unit.
- Associated landscaping works including new outdoor play areas, a rooftop play space and rooftop multi-purpose court; and
- Relocation of the main pedestrian entrance from Military Road to Belmont Road.

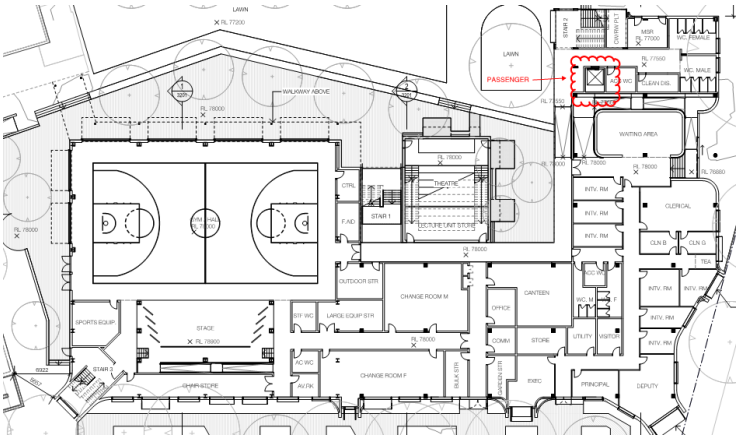


Figure 1: Location of lift in Building G

1.4 REFERENCE DOCUMENTATION

The SSDA has been developed with the project briefing document in consultation with the project team, and client stakeholder. The services design intent has been formulated based on the following project reference documents:

DOCUMENT	DESCRIPTION
Floor plans	Architectural Drawings Issued 21/02/2021 AR-02-L0-001 [1], AR-02-L1-001 [1], AR-02-L2-001[1], AR-02-L3-001[1], AR-02-L4-001[1]
Section	DA-3201 Revision -
EFSG SG 1011	NSW Department of Education EFSG Lift Design and Install, accessed 28/01/2021

Table 1: Reference documentation

2 VERTICAL TRANSPORTATION SERVICES

2.1 GENERAL

It is the intent of this document to represent a sign-off of the project's Vertical Transportation Services provided for the client by JHA.

The proposed vertical transportation scope of work will include:

- One (1) off new electric passenger lifts

2.2 STANDARDS AND REGULATIONS

Australian Standards	Lifts, Escalators and Moving Walks, General Requirements	AS 1735.1-2016
	Fire Rated Landing Doors	AS 1735.11-1986
	Facilities for persons with disabilities	AS 1735.12-1999
Authorities	National Construction Code	2019
Other relevant Codes and Standards	Electrical Installations (known as the Australian/New Zealand Wiring Rules). Wiring requirements for lift installations;	AS/NZ 3000
	Electrical Installations – Selection of Cables – Cable sizes for lift installations	AS/NZ 3008
	Quality Systems (Manufacturers shall provide evidence of accreditation)	ISO 9001
	WHS Act 2011 and WHS Regulation 2017	
Additional Requirements	NSW Department of Education, EFSG	SG1011 (28/02/21)

Table 2: Reference standards and regulations

3 TRAFFIC SIMULATIONS

3.1 GENERAL

3.1.1 TRAFFIC SIMULATION SOFTWARE

Lift traffic analysis software used is Elevate™, Version 9.0.26, Dr Richard Peters, Peters Research. For each analysis, Elevate™ runs 10 simulations with the same configuration; the results of each simulation are then averaged to produce the final results. Also, for each simulation, Elevate™ generates a random number seed to make a list of people and their arrival time based on the building and passenger data. By changing the random number seed, the simulation will have the same number of people generated but they will arrive at different times.

3.1.2 DEFINITIONS

Two-way traffic	is a traffic condition which exists when the dominant traffic flow is to and from the main floor
Incoming traffic	the part of the total demand that corresponds to passenger arriving at the entrance floor
Outgoing traffic	the part of the total demand that corresponds to passenger arriving the other floors, and travelling to the entrance floor—exit traffic
Handling Capacity	defined as the percentage of the building population transported by the lift system in a five-minute period
Average Waiting Time	defined as the average period of time in seconds 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
Capacity Factor	allows for passengers not loading the elevators to their rated capacity
Loading Time	The time taken, in seconds, for a single passenger to load the car
Unloading Time	The time taken, in seconds, for a single passenger to unload from the car

Table 3: Traffic simulation definitions

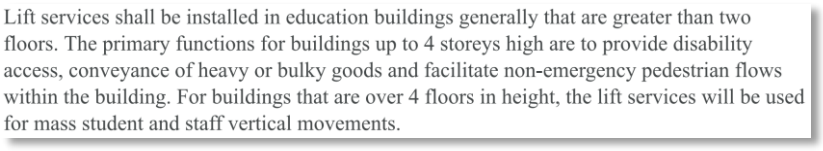
Note that during interfloor or light traffic, the car may not stop at the home floor regularly. This results in large values for the interval. Thus, at times when there is little traffic to or from the home floor, interval is not a good measure of performance.

3.1.3 NOTE

Note: Lift simulations are based on theoretical models that are used to assist with system selection for performance, differences between this report and the actual service provided by the indicated equipment may be encountered due to variations in user behaviour or building design which were not anticipated when this report was prepared. Results can also differ between suppliers.

3.2 REQUIREMENTS

The purpose of the lift is defined in EFSG SG1011: buildings with four or less floors, the purpose is for disability access and moving goods; for more than four floors, its purpose is for moving students and staff, see extract below.



Lift services shall be installed in education buildings generally that are greater than two floors. The primary functions for buildings up to 4 storeys high are to provide disability access, conveyance of heavy or bulky goods and facilitate non-emergency pedestrian flows within the building. For buildings that are over 4 floors in height, the lift services will be used for mass student and staff vertical movements.

Figure 2: Extract EFSG SG1011, Lift purpose

The school building comprises of four levels therefore the lift's purpose is for disability access and moving goods. The lift performance requirements are listed below.

1011.3.1.4.2 High School

Traffic Pattern	Interval (s)	Handling Capacity	Traffic Profile			Utilisation Factor	Stair Factor
			Traffic Profile				
			Incoming	Outgoing	Interfloor		
Morning Up Peak	50 – 60	15%	100%	0%	0%	90%	60%
Class Change	50 – 60	33%	10%	10%	80%	25%	60%
Break Down Peak	50 – 60	25%	0%	100%	0%	60%	80%
Break Up Peak	50 – 60	25%	100%	0%	0%	60%	60%
Afternoon Down Peak	50 – 60	25%	0%	100%	0%	80%	80%

Table 2 - High School Performance Targets

Figure 3: Extract EFSG SG1011, Lift performance

3.3 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

- Floors served,
- Floor marking,
- Floor type,
- Finished Floor Level (FFL) for each floor,
- Floor-to-floor heights,
- Estimated population on each level
- Estimated lift usage based on percentage of population

Estimated Population was determined from the EFSG Secondary Rooms & Spaces and the room types on the architectural drawings. As no guidance is available regarding the lift usage for disabled access, two rates will be assessed and assumed to be 5% and 10% of estimated population. Should these values change, a re-assessment will need to be done. The movement of heavy or bulky goods is assumed to be done during class times and not during student and staff movements.

DWG Ref	Rev	Floor	Marking	FFL	FTF	S	F	R	Use	Est Pop	Est Lift Use Pop 5%	10%
					-							
AR-02-L4-001	1	5	4	93,860	4,250	X	F		Roof			
AR-02-L3-001	1	4	3	89,610	3,870	X	F		Library/Staff/ OLA	185	10	20
AR-02-L2-001	1	3	2	85,740	3,870	X	F		Classes	372	20	40
AR-02-L1-001	1	2	1	81,870	4,370	X	F		Theatre/GLS	386	20	40
AR-02-L0-001	1	1	G	77,500		X	F		Ground			
				Lift Travel	16,360	5	5			943	50	100

Table 4: Floor matrix

3.4 RESULTS

The simulations were run for the five traffic patterns based on the two lift usage rates ie 5% and 10%. The average waiting times for the peak 5-min period in each traffic pattern is shown below.

Traffic Pattern	Interval (s)	Average Waiting Time 5% of Est Pop	Average Waiting Time 10% of Est Pop
Morning Up Peak	50 – 60	13.2	22.4
Class Change	50 – 60	26.9	57.0
Break Down Peak	50 – 60	26.9	45.6
Break Up Peak	50 – 60	14.7	27.4
Afternoon Down Peak	50 – 60	19.7	45.6

Table 5: Traffic study results

3.5 CONCLUSION

Based on the information drawn from architectural drawings received and the floor matrix above, the one-lift design will provide an acceptable level of service for disable access during the peak times. Moving goods should be transported outside of peak times.

Note that when the lift is out-of-service for maintenance of repairs, there will not be any wheelchair access to the floors above Ground. Maintenance can be 'scheduled' for out-of-school hours but the lift many not be available for a long period of time during repairs. Also note that the upgrade to Chatswood High School has three buildings each with a single lift.

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

4 DESIGN

4.1 SUSTAINABILITY

The lift installation will be designed with minimal power consumption and impact on the environment.

Lift shall include:

- Variable Voltage Variable Frequency (VVVF) motor drives.
- High efficiency permanent magnet gearless motors.
- LED down lights, T5 fluorescent or equivalent energy efficient lighting.
- Motion sensing / timing devices to turn off car lighting and ventilation fans when not in use.

4.2 LIFT SECURITY

Lift shall be fully integrated with the building access security control system and include the following provisions where required:

- Provision for electronic data key or swipe card reader which allows for individual floors to be secured or released.
- Provision for CCTV cabling within the lift car trailing cables

4.3 MAINTENANCE REQUIREMENTS

All equipment shall be of latest technology with a proven reliability and serviceability under the anticipated traffic loads and environment.

Particular attention shall be afforded to the design and layout of equipment to make provisions for suitable maintenance access in line with safe working practices.

4.4 LIFTWELL

The liftwell shall not be used for any purpose other than the lift. Conduits, ducts, and other equipment not associated with the lift shall not be installed in the liftwell.

The liftwell shall be designed to accept the loads imposed by the lift, be square and plumb, have a waterproof pit with a dry sump (300 mm square x 300 mm deep), and will need to:

a) ensure that the dry bulb air temperature in the liftwell does not exceed 40°C; and

b) if the cooling is by a ventilation system, be provided with an air change rate determined using a temperature rise of no more than 5 K.

c) Where lift equipment such as lift control panel, landing controls and entrances are located externally, provide protection from direct / indirect weather and water ingress to the liftwell (eg air-lock), floor level to be at least 50 mm higher than surrounding area, grated drain located in front of the entrances,

d) Louver to be a two-stage with stainless steel vermin proof mesh.

Landing entrances may require floor rebates to accommodate the landing door mechanisms.

During lift installation, components will be moved with the aid of either a lifting eyes/hooks installed in the lid or beams installed at the top of the liftwell. These loads will need to be factored in the liftwell design.

4.5 LIFT EMERGENCY COMMUNICATION

Provision for a 4G fixed wireless module. It must have:

- Dual network/sim, to provide primary and secondary communication pathways,
- Backup battery capable of standby operation in the event of a power outage for a minimum of four (4) hours, including one (1) hour of talk-time, and
- Constant self-monitoring ability.

4.6 CAR OPERATING PANEL (COP)

Two Car Operating Panels to be provided, one on each side wall and have the following features

COP Features	Main COP	Aux COP
Car Indication	✓	✓
Floor destination buttons	✓	✓
Alarm / Communication button	✓	✓
Emergency Communication	✓	✓
Door Open button	✓	✓
Door Close button	✓	✓
Fire Service keyswitch	✓	-
Exclusive / Priority Service keyswitch	✓	-
Fan keyswitch	✓	-
Light keyswitch	✓	-
Access card reader	✓	✓

Table 6: COP features.

Access card reader to be mounted behind flush tinted lenses.

Buttons to be Dewhurst US95-AB white antibacterial.

4.7 LANDING CALL STATION (LCS)

One riser of Landing Call Stations located adjacent to the lift entrance on the lobby wall.

All LCS

- have a faceplate and buttons to call the lift,
- are surface/flush mounted and fixed in position with concealed fixings.

Surface mounted labels are placed above the LCS and are engraved with the words:

"DO NOT USE LIFT IF THERE IS A FIRE"

The LCS on terminal floors have a single button whilst the intermediate floors have two buttons. Buttons to be Dewhurst US95-AB white antibacterial.

The main floor will also include fire service keyswitch.

Access card readers can be mounted on the LCS if there is available space, alternatively they can be located beside the LCS.

Isolating keyswitch to be located on the main floor / all LCS.

4.8 LANDING INDICATION (LI)

One riser of Landing Indication located adjacent/above the lift entrance on the lobby wall.

All LI

- have a faceplate,
- are surface/flush mounted and fixed in position with concealed fixings,
- LCD/LED screen displaying lift car position and direction of travel,
- adjustable audible arrival tone

4.9 CAR FINISHES

Car finishes will be a bespoke design in accordance with EFSG SG 1011 and as tabled below.

Passenger Lift Car Fiinishes	
Car ceiling	Fixed white coloured or stainless steel
Car lighting	LED low voltage down lights to operate on initiation of landing call button
Front returns & header	Linished stainless steel
Side walls	Vandal-resistant and patterned stainless steel
Rear wall—upper half	Aluminium-framed silver tinted
Rear wall—lower half	Vandal-resistant and patterned stainless steel
Handrail	Linished stainless steel, compliance with AS 1735.12
Skirting	Linished stainless steel AISI 304
Flooring	Black vinyl
Car door	Linished stainless steel AISI 304
Landing door	Linished stainless steel AISI 316
Landing door frames	Linished stainless steel AISI 316
Car and landing sills	Aluminium
Car Operating Panels	Steel, satin finish, compliance with AS 1735.12, vertical orientation
Car and landing buttons	Commercially available third-party supplier, compliance with AS 1735.12; buttons to have white/blue illumination
Car and landing indication	Commercially available third-party supplier, compliance with AS 1735.12
Protective blankets	Allow hooks for hanging blankets

Table 7: Car finishes

Handrails to be mounted through the car walls with bolt and lock nut,

Car ventilation shall include a fan, be automatically controlled, and have keyswitch on the COP, be connected to the 2-hour backup power supply/emergency power supply in case of power failure. The fan shall be designed for low noise, with long life, maintenance free bearings in the motor.

4.10 RIDE COMFORT AND NOISE

Noise and vibration levels in the car under acceleration, deceleration, and at maximum lift car speed in the cycle shall not exceed the values indicated in Table 8 below.

Lift Speed, in m/s	*Maximum Acceleration, in m/s^2*	*Maximum Jerk, in m/s^3*	*Maximum Lateral Vibration, in mg*	*Maximum Vertical Vibration, in mg*	*Maximum Noise in Car, in dB(A)*
0.10 – 1.60	0.80	0.80	6	15	50

Table 8: Maximum noise and vibration level in lift car

The maximum vibration levels specified are the maximum peak-to-peak values using the ISO 18738-1:2012 ride quality filter during measurements, measured within the lift car during acceleration, deceleration, full speed sequences and stopping.

4.11 CONTROLLER CABINET LOCATED AT THE TOP FLOOR

The lift's controller cabinet will be located at the top floor served and will require a clear working space of 500mm wide x 700mm deep x 2100mm high. Note that the shape, size, and location vary between suppliers, the four common types are shown below. Also note that technicians will require access for maintenance and emergency purposes so, there must be a clear access at all times. A false wall can be built in front of the wall with a joinery door to improve aesthetics provided it does not impede the controller door from opening more than 90° and technicians working.

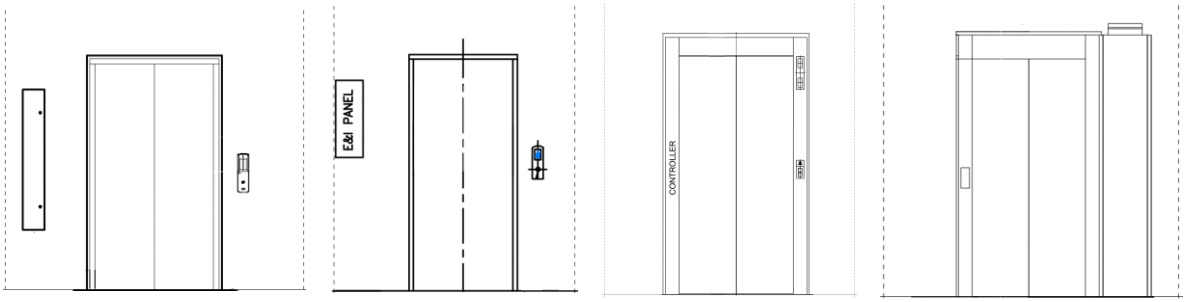


Figure 4: View of various types of lift controller cabinets at top floor

4.12 ATMOSPHERIC CORROSIVITY ZONE

The proximity of this project to the sea—less than 1 km—places it in the high corrosive marine environment C5-M (AS 4312). Consequently, the lift and its components are required to be suitably protected for installation in a marine environment. Manufacturer's standard finishes may not be suitable and may require modification or additional protection. Where stainless steel is used, it shall be grade AISI 316.

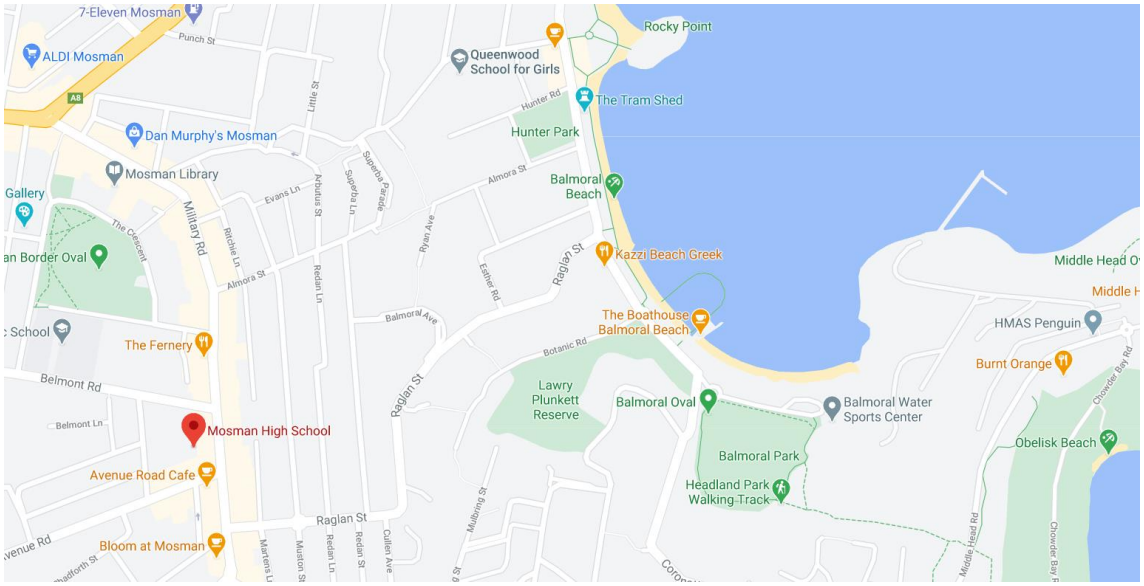


Figure 5: Map showing location of Mosman HS and the sea

Where lift equipment such as lift control panel, landing controls and entrances are located externally, provide protection from direct / indirect weather and water ingress to the liftwell (eg air-lock), floor level to be at least 50 mm higher than surrounding area, grated drain located in front of the entrances.

4.13 BMS SYSTEM INTERFACE

Lift system to provide interface with BMS for the following lift alarms:

- Lift failed to start
- Lift on fire service
- Lift car alarm button
- Lift on independent operation
- Lift on normal operation
- Lift on maintenance
- Lift on hazardous goods operation
- Lift position

5 NEW LIFT DESIGN

5.1 PASSENGER LIFT

A total of one (1) new machine room less *(MRL)* electric passenger lifts will be specified. The table below details the passenger lift design also refer to the architectural drawings for location of lifts, openings, and further details.

Passenger Lift			
Description			
Number of lifts	One (1)		Building 1 Lift No. 1
Capacity	1,200 kg *nom.*		
Passenger rating	16 *nom.*		
Service classification	Passenger		
Control System	Microprocessor Full Collective		
Machine type	Gearless Overhead Traction		
Power / drive system	Variable Voltage, Variable Frequency (VVVF)		
Group Operation	Simplex		
Speed	1.00 m/s		
Travel	16,360 mm TBC		
Motor starts / hour	180 *min.*		
Levels served	Five (5)		Floors: G, 1, 2, 3, 4
Total number of entrances	Front	Five (6)	Floors: G, 1, 2, 3, 4
	Rear	Nil	Floors: –
Car Details:			
Clear internal car width	1,400 mm		Measured to wall finishes
Clear internal car depth	2,000 mm		Measured to wall finishes
Clear internal car height	2,300 mm		Clear to underside of suspended ceiling
Entrance Details:			
Number of car entrances	One (1)		
Clear door opening width	1,100 mm		
Clear door opening height	2,100 mm		
Door protection	Infrared Light Beam, 3D		
Door type / configuration	Two Panel Centre Opening		2PC
Door frames	Box Frame		Option for full depth jambs
Certified landing door FRL	-/ 60 / -		AS 1735.11

Fixture Details:	
Car Operating Panels (COP)	Two (2) per lift—Main and Aux, refer to Section 4.6 for details
Car Indication (CI)	LED or TFT LCD screen, located in the main COP displaying lift car position and direction of travel
Oral announcements	Yes, English, female voice
Landing Call Station (LCS)	Recessed mounted on adjacent wall, mounted with concealed fixings
Car & landing button type	Dual illuminating with audible feedback, AS 1735.12 Compliant, refer to Section 4.9 for details
Landing Indication (LI)	LED or TFT LCD screen, each entrance displaying car position and direction of travel with adjustable audible arrival tone recess mounted with concealed fixings, refer to Section 4.9 for details
Liftwell Details:	
Well construction	Fully enclosed, concrete structure
Well width	2,400 mm *nom.*
Well depth	2,400 mm *nom.*
Headroom height	3,700 mm *nom.*
Pit depth	1,400 mm *nom.*
Machinery space location	Overhead in well
Levelling accuracy	±5 mm
Electrical Details:	
Mains supply voltage	3Ø, 415 Volts AC, 50 Hz
Nominal line current	24 A
Start/Acceleration current	29 A
Cable size	16 mm²
Motor output power	7.5 kW
Fault level	6 KA
Thermal losses	1.0 kW
Lift Car Finish Details:	Refer to Section 4.9 for details
Special Requirements	• Compliance with AS1735.12 Facilities for Persons with Disabilities • Emergency battery drive for automatic evacuation to nearest floor in the event of main power failure • Provision for installation of CCTV • Provision for installation of 3rd-party swipe card reader • Compliance with EFSG SG 1011