University of Wollongong

Vertical Transportation Design Standards
Version 1.07 – 23 September 2009

QUALITY SYSTEM

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Director's Signature:	
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VERSION CONTROL SYSTEM

Section Modified	Description of Modification	Version	Organisation	Representative	Date
9.8	Life Cycle Costings moved to section 9.9	1.03	Asset Technologies Pacific	Tom Poyner	21/11/06
9.8	Warranty section added	1.03	Asset Technologies Pacific	Tom Poyner	21/11/06
Throughout	UOW Logo added to headers	1.03	Asset Technologies Pacific	Tom Poyner	28/11/06
9.2	Add risk assessment activity to conceptual design process.	1.03	Asset Technologies Pacific	Tom Poyner	1/12/06
9.4	Insert OH&S reference link	1.03	Asset Technologies Pacific	Tom Poyner	1/12/06
9.4	Standards (Table 1.1, Page 8)	1.04	University of Wollongong	Chris Hewitt	27/11/07
Throughout	Punctuation	1.05	University of Wollongong	Tony Johnson	7/12/07
9.3.2	Added bullet point to Passenger Transportation regarding disabled scooter.	1.05	University of Wollongong	Tony Johnson	7/12/07
9.4	Removed dates and word handicapped.	1.05	University of Wollongong	Tony Johnson	7/12/07
9.3	Deleted red & white colour buttons Altered landing indication position Altered landing doors size height	1.06	TEC Services	John Thomson	21/06/08
9.3.3	Deleted lift emergency stop button	1.06	TEC Services	John Thomson	21/06/08
9.3.5	Added hazardous goods operation Added code compliance for restricted use lifts	1.06	TEC Services	John Thomson	21/06/08
9.3.7	Added MRL ventilation requirement	1.06	TEC Services	John Thomson	21/06/08
Table 9.2	Added OH&S Contractor Safety	1.06	TEC Services	John Thomson	21/06/08
9.6.8	Run counter added	1.06	TEC Services	John Thomson	21/06/08
Throughout	Update to new version	1.07	TEC Services	John Thomson	25/09/09

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VERTICAL TRANSPORTATION

Vertical transport services shall be installed in buildings generally of two levels or greater. The primary functions are to facilitate non-emergency pedestrian flows within the building, provide disability access and provide conveyance of heavy or bulky goods.

9.1 OVERVIEW

This design standard outlines the functional, installation and technical requirements for a new vertical transport system. Prior to undertaking the design, the designer shall undertake a hazard and risk assessment in accordance with the AEA National Code of Practice.

The designer shall use these standards as the basis for the system design, however it is incumbent upon the designer to ensure that the design satisfies site specific operational, logistical and performance requirements and meets UOW's transportation objective for the facility.

Where the designer considers that an alternate equipment type is preferred to the equipment type specified in the design standard, the designer will advise the principal of the functional, performance or cost benefit that will be achieved through the use of the alternate equipment type.

In determining the most appropriate equipment types and control systems for a particular installation, the designer shall consider the long-term energy efficiency, maintenance implications, operational efficiency and life cycle costs as well as the initial capital costs.

9.2 DESIGN PROCESS

This section overviews the design process. The process shall be followed to achieve UOW's desired outcomes.

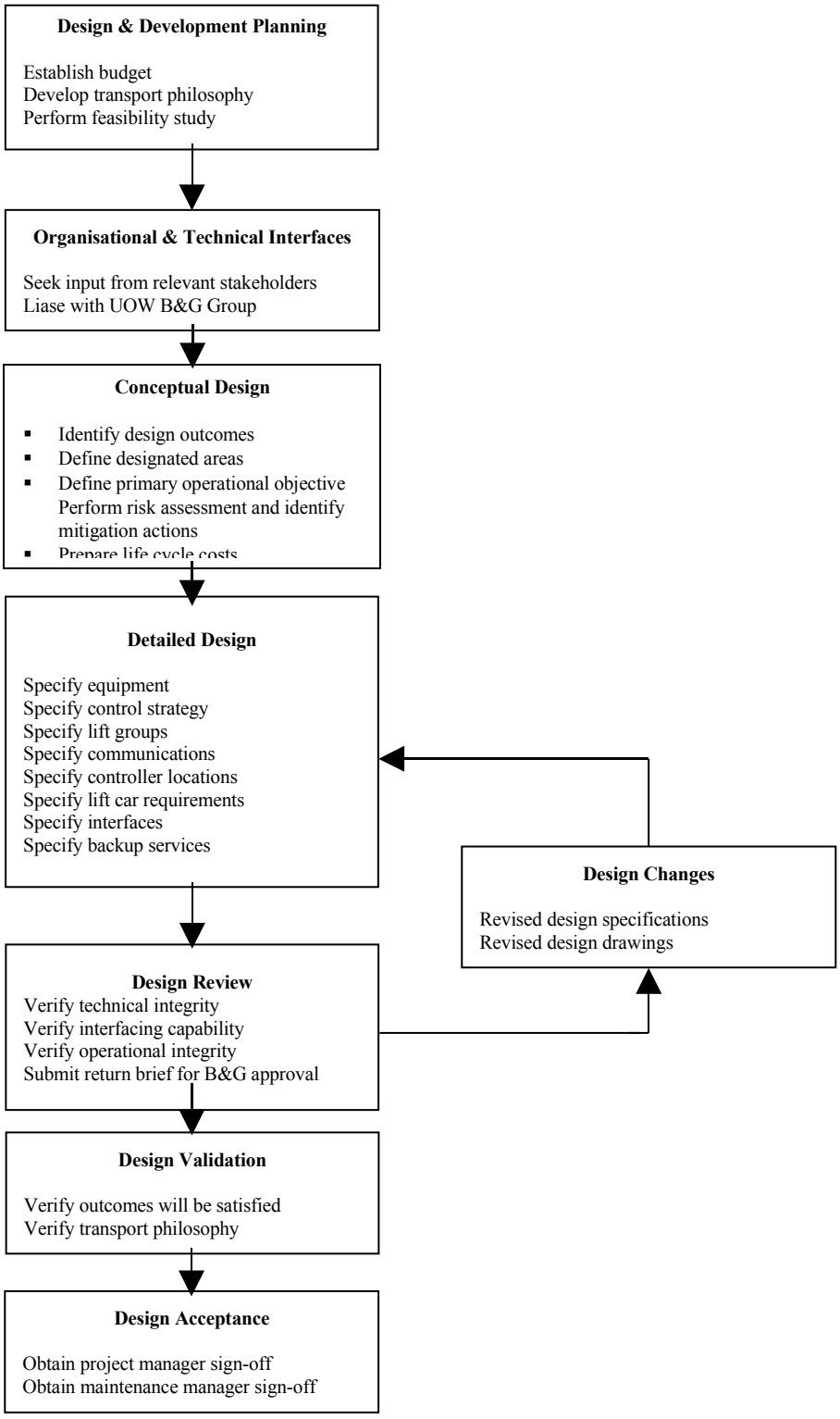


Figure 9.1 - Process Flow

9.3 RETURN BRIEF

The designers must provide a return brief to all stake holders (but to the Building and Grounds Manager in particular) that clearly shows the proposed new, refurbished or upgraded lift system complies with or exceeds the Universities requirements and expectations as well as the following requirements as a minimum:

1. The lift must be safe and comply with all relevant codes and standards.
2. The lift must be capable of being easily maintained by multiple (other than the original manufacturer) lift maintenance contractors (refer Design Guidelines Clause 9.16).
3. The lift is to be as flexible, quiet and versatile in operation as possible (refer Design Guidelines Clause 9.11).
4. The lift must be environmentally friendly as well as being both economical to operate and maintain.
5. The lift must be energy efficient with minimal electrical power consumption to meet or exceed the building's ABGR rating and design intent.
6. The lift must meet the minimum requirements for use of persons with disabilities as defined by the latest version of the lift code AS1735.12 (refer Design Guidelines Clause 9.5).
7. The lift must comply with the University's design guidelines.
8. Any non compliance or departure from these UOW's design guidelines must be clearing detailed and made known to the Building and Grounds Manager

9.4 FUNCTIONAL REQUIREMENTS

The vertical transport system shall be fully programmable to permit defined access and manage high demand periods (if applicable) to suit the UOW's requirements.

Following are the primary operational functions:

a. Passenger transportation;

b. Automatic and manual control;

c. Lift grouping;

d. Goods transportation;

e. Restricted use transportation;

f. Ventilation and noise control;

g. Performance monitoring;

h. System interfacing.

The lift shaft shall contain operational components critical to the safe and reliable operation of the vertical transport system and must be accessible for regular inspections and maintenance to ensure ongoing safety and reliable service.

9.5 Passenger Transportation

Passenger transportation shall be provided with the following:

- All passenger lifts are required for disabled access and must comply with AS 1428 and AS 1735.12.
- The indicator shall be located in a prominent position and as required by AS1735.12. The indicators shall provide direction arrows and floor location of the cars and operational messages such as "Out of Service".
- Braille on control buttons and voice annunciation features to announce each level shall be provided to assist the vision impaired.
- The lift cars shall be suitable for wheel chair and typical Campus scooter access and the controls shall be mounted at a height stipulated by the BCA.
- Where the lift is to be used by a person in a disabled scooter, care must be taken in the selection of a suitable car size. Car size must be agreed with UOW Project Officer. A minimum depth of 2000 mm should be considered.
- A clear inside lift car dimension (between walls) of 1600 mm wide x 2000 mm deep.
- An internal car height of 2300 mm.
- Standard door size of 1,100 mm x 2,100 mm.

9.6 Automatic and Manual Controls

Each passenger car shall contain dual control panels and graphic display, which can be remotely programmed from a lift monitoring station (if provided). Voice annunciation and a flashing sign to confirm alarm registration to assist the hearing impaired shall also be provided. Braille will be provided on the floor selection and alarm buttons to assist the vision impaired.

9.7 Lift Grouping

The lift well shall be located for easy access to and from the building entrance and should be central for general ease of passenger transit throughout the building.

Where multiple lifts are specified, they shall be grouped to maximise operational and energy efficiency. The objective is to meet peak demands and minimise waiting times.

9.8 Goods Transportation

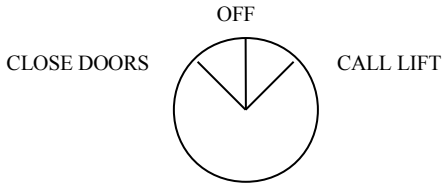
Goods transportation shall be provided as required for the particular project. As a minimum the following must be provide

- Minimum lift door size to load specified goods
- Minimum lift car size to carry specified loads
- Durable lift car finishes with no mirrors and minimal handrails
- Timber bump rails
- "Hazardous goods" or "goods" loading feature
- Extra landing indication to show lift availability and position on each landing

If hazardous goods are to be carried in the goods lift some form of restricted and controlled operation is to be used, equal to or better than the following.

Lifts required to have the Hazardous Goods feature (HGS) will operate in the following fashion although the Lift Designer/Contractor will need to confirm in each case the details with the UOW Project Officer as some features, such as the return floor for fire service, may vary from lift to lift.

All landing panels (LOP) will be provided with a three position key operated switch labelled "HAZARDOUS GOODS OPERATION" with the positions labelled as follows:



The lock will be spring return to the "OFF" position from both other positions.

In addition to normal switches, there will be a two position switch in the car operating panel (COP) labelled "HAZARDOUS GOODS OPERATION". The

two positions will be labelled “OFF” and “ON” and the key can be withdrawn in either position.

The key switches in both the COP and the LOP will be of the Bi-Lock type.

9.8.1 Hazardous Goods, Method of Operation

1. When the **HGS** key switch is in the “**OFF”** position the designated lift will operate normally and where applicable as part of a lift group.
2. The attendant turns the key switch in the LOP clockwise from the **“OFF”** to the **“CALL LIFT”** position.
3. An in car announcement is made.
   “Please exit at the next stop, this lift is required for special service”. Note, this audio announcement will repeat approximately every 10 seconds
   An illuminated flashing sign in the lift COP will light **“Special service operation”**
4. Hall call response is inhibited
5. The lift will travel to answer the next registered lift car call in its direction of travel, the doors will open, all other lift car calls will be cancelled and new lift car calls will not be accepted. All passengers are expected to leave the lift car. The doors will close and the lift travel directly to answer the **HSG** key switch. If the lift is idle it will immediately travel directly in answer to the **HSG** key switch.
6. The lift will travel (non Stop) to the ***“calling”*** floor (at which the **HGS** switch is selected.)
7. Open its doors.
8. The lift will remain at that floor with the doors open.
9. The attendant will remove the key switch from the landing fixture in the **“OFF”** position.
10. The lift will remain “captive” in the **HGS** mode of operation for **60 seconds.**
    (If the process does not proceed to the next stage, the lift will return to normal service.)
11. The **HGS COP** Key switch is turned to the **“ON”** position.
12. The key is removed in the “**ON”** position.
13. The goods are loaded.
14. The key is inserted into the hall switch and turned counter clockwise to the “CLOSE DOORS” POSITION. The doors close and the key returns to the central “OFF” position and withdrawn.
15. The attendant travels via other lift or stairs, to the “***destination”*** floor.
16. The attendant then turns the **HGS** key switch in the LOP to the **“CALL LIFT”** position at the “***destination” floor***.
17. The lift travels to the “***destination”*** floor.
18. The doors open.
19. The goods are removed.
20. The key is removed from the “***destination”*** landing **HGS** key switch.

21. The **COP HGS** key switch is returned to the **"OFF"** position.
22. The key is removed.
23. The lift returns to normal service.

The **HGS** mode of operation will not **initiate** if

- The Hall or Car Fire Service is operated**. (HFS & CFS)**
- The lift is in Inspection mode**. (INS)**
- The lift is on Independent Service**. (INDS)**

Selection of the **Hall Fire Service** mode while the lift is on **HGS** will return the lift to a designated floor for unloading.

If the **HFS** mode is selected while the lift is on **HGS**, there will be an announcement in the lift car, advising the attendant (passenger) to abandon the use of the lift and exit the lift before the doors close and the lift returns to the designated floor.

9.9 System Interfacing

Where the vertical transport system interconnects to other building services such as fire services and security services, an interface shall be provided that achieves optimum functionality, performance and reliability.

Low-level interfaces shall comprise of a set of electrical contacts controlled via a signal from the lift control system.

System to be Interfaced	Interface Type	Interface Responsibility
Fire	Low level	Fire
Electronic Monitoring and Access Control	Low level	Security
BMCS To show the following features 1. Lift not in service 2. Lift fault/out of service	Low level	HVAC

Table 9.1 - System Interfaces

9.10 STANDARDS

The lift must be "design" registered with WorkCover NSW prior to installation. The lifts registration number (obtained after Practical Completion) must be provided to the University Building and Grounds Division for their records.

The completed lift installation must comply with the latest edition of all relevant codes and standards as required by the OH&S Regulations of NSW 2001.

Table 1.1 below contains a list of additional compliance requirements.

UOW	OHS064	OH&S Consideration for Design (http://staff.uow.edu.au/workingsafely/design/OHS064-OHS_Design_Guidelines.pdf)
UOW		OH&S Contractor Safety (http://staff.uow.edu.au/ohs/safepurchasing/contractor/index.html)

Table 9.2 - Codes and Standards

9.11 MINIMUM PERFORMANCE STANDARDS

The following minimum performance standards shall be achieved to ensure efficient operation of the vertical transportation services:

Functions	Acceptable Limit
Maximum vertical acceleration	<1.0 m/s^2
Maximum jerk rate	<1.5 m/s^3
Horizontal quaking	<15 milli-g
Vertical quaking	<15 milli-g
Average Noise	<52 dBA
Maximum Noise	<58 dBA
Door opening speed	<2.5 sec
Door closing speed	>2.5 sec
Capacity to handle up-peak capacity (preferred but not compulsory)	15% (min)
Average waiting interval (preferred but not compulsory)	<30.0 seconds
Maximum waiting interval (preferred but not compulsory)	<65 seconds

Table 9.3 - Minimum Performance Standards

9.12 INSTALLATION GUIDELINES

9.12.1 Labelling

Equipment labels shall identify the equipment in accordance with UOW's asset register convention.

9.12.2 Run Counter

The controller of every lift is to have a 6 digit trip meter to register the number of motor starts of the lift. The trip meter will not be of the resetting type.

9.12.3 Key

All fire service keys are to be TOK 3. All other lift control keys are to be TOK 6.

The lift machine room door, or the MRL lift controller door, lock must be keyed the same as the U of W lift machine rooms.

9.13 EQUIPMENT

Any new lift installation shall only be installed by a competent, well-established, lift contractor with at least 10 years local lift installation experience and the ability to maintain the entire campus in compliance with the University of Wollongong Comprehensive Maintenance Agreement.

All lifts shall be, as a minimum, user friendly to people with disabilities and in compliance with the Building Code of Australia. Full compliance to the lift code AS 1735.12 is required for all passenger lifts.

Consideration shall be given to lift power systems that are energy efficient and environmental friendly. Any lift power system that can be proven to be more efficient or less power consuming and/or environmental friendly shall have preference over a less efficient system.

Preference will be given to non proprietary equipment and hardware/software that has a minimum unconditional service life and full support for 20 years from time of installation.

The following lift companies are considered as "preferred" to install and maintain new lifts at the UOW due to their size, experience on site and number of existing installation in the area.

- Otis Elevator Company
- Kone Elevators
- Schindler Lifts Australia
- ThyssenKrupp Elevator
- Liftronic

9.14 LIFE CYCLE COSTING

The designer shall prepare life cycle costing as part of the conceptual system design. A twenty-year period of financial interest shall be used as the basis of the life cycle analysis. In the case of the vertical transportation system, these costs will include:

- Initial cost of system equipment
- Installation costs
- Maintenance costs
- Software support and regular upgrades
- Cost of third party support for interfaces

Where the upgrade of lift services can be cost justified through operational, maintenance or energy savings, the designer shall prepare a cost feasibility report containing the capital costs, life cycle costs, cost benefits, payback period and internal rate of return. The cost benefit will be supported by engineering calculations that are based on the specific equipment ratings and the predicted operational profile.

9.15 AS-INSTALLED DOCUMENTATION AND SERVICE MANUALS

On completion of the lift installation a complete set of as-installed documentation is to be provided which shall comply fully with the UOW Documentation Design Standard, plus:

A training session or sessions to be provided for the lift users and the University maintenance personnel. This training session/s is to be at no additional cost to the University. The training sessions is to include the operation of the lift and its controls, keys and locks, cleaning of all finishes, operation in an emergency (such as fire or power failure), hanging/cleaning/storage of protective curtains, etc. The Lift contractor is to allow for at least 2 sessions of 2 hours each. Written documentation of the training details is to be provided.

9.16 INTEGRATION WITH EXISTING LIFT MAINTENANCE PROCEDURES

The following procedures shall be included in any new lift construction specification to assist the integration of any new lifts into the existing lift maintenance program.

The Building and Grounds Manager is to be involved in all lift tender assessments. All documentation must be made available to the Building and Grounds Manager with at least one week's prior notice of the assessment date.

The Building and Grounds Manager is to be involved in the commissioning of all lift installations. At least 2 weeks prior notice is to be given to the Building and Grounds Manager of any commissioning of lifts.

Prior to commissioning of any lift (at least 1 week) the Building and Grounds Manager is to be provided with at least one copy of the Operational and Maintenance Manuals for that particular lift.

Any lift in Defects Liability Period must comply with the procedures for recording and reporting of the existing lifts that are in place for the University at the time of tender. It is the contractor's responsibility to ensure that the procedures being applied are current and the latest available.