



Resource Recovery & Waste Management Standard

The University of Sydney

Engineering & Sustainability team

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1 PURPOSE

The Resource Recovery and Waste Management Standard provides the University of Sydney's minimum requirements for recovering resources and managing waste at existing facilities and construction site in order to minimise waste generation and disposal to landfill.

Applicable requirements documented in Workplace Health and Safety legislation, Disability Discrimination legislation, State Environmental Planning legislation, Commonwealth and State legislation, National Construction Codes (NCC), the Building Code of Australia (BCA) and Australian and New Zealand Standards (AS/NZS) are the minimum and mandatory compliance requirements.

Where any ambiguity exists between this standard and the aforementioned mandatory requirements then:

- a. the highest performance requirements must apply
- b. applicable requirements must follow this order of precedence:
 - i. Workplace Health and Safety legislation
 - ii. Disability Discrimination legislation
 - iii. State Environmental Planning and Assessment legislation
 - iv. All other Commonwealth and State legislation
 - v. NCC and BCA
 - vi. AS/NZS
 - vii. This standard and other University standards

2 SCOPE

This design standard describes minimum requirements for recovering resources and managing waste for buildings owned, operated and managed by the University of Sydney and for construction and demolition projects undertaken by the University.

This design standard applies to:

- a. new building construction projects
- b. refurbishment projects for University-owned spaces
- c. facilities management services

The standard applies to planners, architects, project managers, consultants, contractors, sub-contractors, tenants, managing agents, University staff and others involved in the design, construction and maintenance of existing, new and proposed University buildings and facilities.

The standard does not cover management of liquid waste, trade waste, radioactive waste, hazardous waste or any laboratory or process waste generated at the University. Please refer to the University's [Work Health and Safety Procedures](#) and [Hazardous Waste Disposal Procedures](#).

3 GLOSSARY OF TERMS

DECC	Department of Environment and Climate Change NSW
FF&E	Furniture, Fixtures & Equipment
FMS	CIS Facilities Management Services
KPI	Key Performance Indicator
Landfill	Items disposed to landfill
MGB	Mobile Garbage Bin
MUD	Multi-Unit Dwelling
Open Space & Breakout Areas	Open spaces within a building. This includes; Lobby areas, breakout/ assembly areas, student study lounges.
OWMP	Operational Waste Management Plan
Resell	Items sold via Retail or Wholesale.
Resource Recovery	Items put through the recycling programme and not sent to landfill.
Reused	Items used back into the same project works or other University project.
Storage	Items stored to the University of Sydney inventory.
Stripout	Works that involve the decant or refurbishment of a space or building that generates waste
StOWMP	Student Accommodation Operational Waste Management Plan
SWMP	Construction Site Waste Management Plan

4 AUTHORITIES AND RESPONSIBILITIES

This standard is owned by CIS. It is approved and signed-off by the Director CIS and the CIS Engineering and Sustainability Unit is responsible for maintaining the standard and keeping it up-to-date. The Standard must be reviewed and kept up-to-date at least biennially.

5 DESIGN REQUIREMENTS

Design requirements for resource recovery and waste management are outlined for operating buildings and for construction projects.

5.1 GENERATION RATES

The following minimum waste generation rates must be used for preliminary planning and design of centralised waste recycling stations for functional spaces in buildings. The size and number of bins for internal functional spaces must consider the minimum waste generation rates in **Table 1**.

See **Attachment F** to **Attachment H** to calculate the waste generation of each functional space and the number of bins required.

Table 1 - Waste Generation Rates

Type of premises	Waste generation	Recycling generation	Source
Restaurant	10L / 1.5 m ² floor area / day	2L / 1.5 m ² floor area / day	(City of Sydney, 2005)
Takeaway	80L / 100 m ² floor area / day	25L / 100 m ² floor area / day	
Offices	10L / 100 m ² floor area / day	10L / 100 m ² floor area / day	
Retail	50L / 100 m ² floor	25L / 100 m ² floor	

(other than food)	area / day	area / day	
University (teaching spaces)	5L/100m ² floor area/day	5L/100m ² floor area/day	
Student Accommodation	40L/occupant /week	40L/occupant /week	(City Of Melbourne, 2015)
Sporting facilities (E.g. Gyms, grandstand, etc.)	10L/100m ² /day	10L/100m ² /day	

5.2 FUNCTIONAL SPACES

The University's key objective must maximise resource recovery rates at its facilities by providing source separation bins in functional spaces. These include triple-bin recycling and waste stations:

Yellow Lidded Bins – for depositing commingled (mixed) recyclables e.g. plastic bottles, drink cans, wet paper

Blue Lidded Bins – for depositing paper and cardboard recyclables e.g. clean paper and cardboard

Red lidded bins – for depositing landfill waste e.g. landfill and food waste

The number and size of these bins will depend on the occupancy of the spaces, waste collection frequency and distance to occupants. Acceptable waste and recycling station bins are shown in **Attachment A – Bin Specifications**

Individual office or desk bins are prohibited. The University will not be providing individual bins nor will cleaners service them. Centralised waste and recycling stations will be located at convenient locations in functional areas, including office areas, study spaces, teaching spaces, circulation spaces, and printer rooms, meeting rooms, kitchenettes and common areas, etc.

Specialist functional spaces such as laboratories and workshops which generate special hazardous liquid and solids wastes are not covered by this standard. Please refer to **WHS - Hazardous Waste Disposal** guidelines for management of such specialist wastes.

All new buildings must provide a dedicated waste storage area to consolidate waste and recyclables deposited in bins. This area must be equipped with an appropriate number of collection bins to store the building's waste for collection by contracted waste trucks. The number of collection bins is dependent on the occupancy of the spaces and waste collection frequency. See **Attachment F – University Collection Bin Requirements**

Staff Workspaces

Twin-bin recycling stations must to be provided in office spaces comprising:

- A yellow lidded bin for mixed recycling, waste paper and cardboard
- A red lidded bin for general (landfill) waste

The distance to a set of centralised waste and recycling station will typically be within approximately 20 metres walking from the furthest desk.

In addition, specific blue bins for office paper and cardboard will be provided in areas generating high volumes of office paper waste. All office paper waste must be placed in the blue bins.

See **Attachment G – University Internal Bin Requirements**

5.2.1 MEETING AREAS

No bins are to be provided in individual meeting rooms. Occupants must take their waste to the nearest recycling station which must typically be within 20m walking from the meeting rooms.

5.2.2 KITCHEN AREAS

Sufficient centralised waste and recycling stations must be provided in every kitchen and kitchenette areas. Where appropriate, use waste generation rates provided in **Table 1 - Waste Generation Rates** for sizing requirements. Typically, larger bins must be provided for kitchen recycling stations to accommodate higher volumes of wastes and recyclables.

5.2.3 PRINTER AREAS

A minimum of one 240L blue paper and cardboard bin must be provided in printer and photocopier locations. The occupant density of a print/photocopy area must be considered when determining the number of bins provided, e.g. a learning hub will require more bins than an office space.

See **Attachment F – University Collection Bin Requirements**

5.2.4 TEACHING & LEARNING SPACES

5.2.4.1 Teaching Spaces

Sufficient waste and recycling stations must be provided and located outside entry points to these spaces in highly visible and accessible areas. No bins are to be provided inside lecture theatres, seminar rooms, tutorial rooms or classrooms. Where appropriate, use **Attachment G – University Internal Bin Requirements** waste generation rates to determine the minimum number of required bins for the space per **Table 1 - Waste Generation Rates**.

Posters and notices promoting recycling must be placed in prominent locations in circulation spaces and close to access points for these teaching and learning spaces. Additional signage (**Attachment B – Waste Signage**) may be provided (as required) inside the lecture theatres, seminar rooms, tutorial rooms or classrooms to advise students to use bins outside the rooms and to dispose of their recycling and waste correctly.

5.2.4.2 Learning Spaces

Sufficient centralised waste and recycling stations must be provided in learning hubs, computer labs, libraries and student common spaces. Where appropriate, use the waste generation rate to determine the minimum number of required bins for the space per **Table 1 - Waste Generation Rates**.

They must be located in convenient, highly visible and accessible locations within 20 metre walking distance from the furthest desk. Blue office paper and cardboard recycling bins must be provided at printing facilities within computer labs.

5.2.5 TOILETS

Only provide a paper-recycling bin where there are paper hand towel dispensers. Toilet sanitary bins must be provided in female toilets.

5.2.6 CORRIDORS

Sufficient centralised waste and recycling stations must be provided in corridors and open space breakout areas.

The stations must not obstruct emergency pathways and ensure associated width of the corridor(s) complies with NCC safe access and egress requirements.

5.2.7 OPEN SPACE & STUDY/BREAKOUT AREAS

Sufficient centralised waste and recycling must be provided in all open space and study and/or breakout areas. This includes lobby areas, breakout/assembly areas and open student study lounges. Where appropriate, use waste generation rates to determine the minimum number of required bins for the space per **Table 1 - Waste Generation Rates**. See **Attachment G – University Internal Bin Requirements**

As these spaces can sometimes be located in open plan building corridors, the stations must not obstruct emergency pathways and ensure associated width of the corridor(s) complies with NCC safe access and egress requirements.

5.2.8 EXTERNAL SPACES

Appropriate provisions for the number and size of external waste and recycling stations must be made for all new building / precinct developments. The number of public domain waste and recycling stations must be determined by the project team based on the expected peak people traffic in the external areas and distance to existing external bins in the precinct. As a minimum, external waste and recycling station(s) must be provided in external areas adjoining retail outlets.

External waste and recycling bin enclosures must be able to house 240L mobile garbage bins. The enclosures must be lockable and two sets of keys must be provided to CIS. The stations must be made from low maintenance materials that are robust, weather and vermin-proof. Signage on these stations must be made from weather proof material.

5.3 WASTE STORAGE

5.3.1 VENTILATION

A waste and recycling storage or service room and service areas must be to prevent the entry of vermin. The main waste and recycling storage room and service area(s) must be adequately ventilated in accordance with AS 1668.1 Mechanical Ventilation and Air Conditioning code, Part 1 and AS 1668.2 Mechanical Ventilation and Air Conditioning code, Part 2 per the **CIS Mechanical Services**.

5.3.2 REFRIGERATION

Where a waste and recycling storage or service room does not have external louver vents, refrigeration by a cooling system is required to maintain a room temperature at $\pm 22^{\circ}\text{C}$, and in accordance with AS 1668 Mechanical Ventilation and Air Conditioning code.

The main waste and recycling room and service area(s) must be provided with artificial light, controlled by switches.

5.3.3 MAIN WASTE AND RECYCLING STORAGE ROOM

A dedicated and enclosed waste and recycling storage room must be provided in all new buildings. Unless a neighbouring building with safe and easy access has the capacity to store the current and new buildings' waste quantities e.g. a precinct based waste storage area. It must be sized to accommodate bins for all waste and recycling volumes generated on the premises between collections as per **Attachment F – University Collection Bin Requirements**. Refer to the **CIS Building and Architecture Standard** for further details.

5.3.3.1 Ceilings

The ceilings of the main waste and recycling storage room and service compartment(s) must be finished with a rigid smooth faced non-absorbent material capable of being easily cleaned.

5.3.3.2 Walls

The walls of the main waste and recycling room and serviced compartment(s) must be constructed of approved solid impervious material and shall be cement rendered internally to a smooth even surface coved at all intersections.

Each wall or wall section must be painted in an appropriate colour based on the waste stream of the bin(s) placed against it according to requirements in **Table 2**.

The walls should also have signage consistent with **Attachment B – Waste Signage**

Table 2 - Main Waste & Recycling Room Wall Colour

Wall Colour	Bin – Waste Stream
Yellow	Commingled (Mixed) Recycling
Blue	Paper & Cardboard
Red	Landfill (General) Waste
White	E-Waste
Green	Organic (Food Scraps)
Black	Batteries

5.3.3.3 Floors

Floors of the main waste and recycling storage room must be constructed of concrete, at least 100mm thick. The floor must be finished to a smooth surface coved at the intersection with walls and plinths and provided with a ramp to the doorway where necessary.

Sufficient floor space must be allocated for the number of waste stream bins per **Attachment A – Bin Specifications** and where possible the wall colours must be extended across the floor surfaces per **Table 2**.

5.3.3.4 Access

The main waste storage room must be located close to the waste vehicle collection point and no lower than one level below street level. Provisions must be made for collection vehicle access according to **Attachment C – Collection Vehicles** and **Attachment D – Vehicle Access**.

A close fitting and self-closing door operable from within the main waste storage room must be fitted to all waste storage and waste service area rooms. An approved roller shutter door may be permitted under special circumstances. Where permitted a sign must be erected in a visible position drawing attention to the fact the door must be kept closed at all times when not in use.

5.3.3.5 Wash Facilities

The main waste and recycling storage room must be provided with adequate supply of hot and cold water mixed through a centralised mixing valve with hose cock. Bin wash facilities must be provided and include a hose cock and floor graded to a 100 mm diameter floor drain outlet. The hose cock must be protected from the waste containers and be accessible at all times, even when the area is storing waste bins and containers.

5.3.3.6 Infrastructure

Segregated storage area(s) must be provided where applicable, at each premises:

- a. Commingled (mixed) recycling
- b. Paper & Cardboard recycling
- c. Electronic (E-waste) recycling (if applicable)
- d. Batteries (non-rechargeable batteries)
- e. Printer and toner cartridges (if applicable)
- f. Landfill (General) waste
- g. Organic Waste (if applicable)
- h. Garden Organics (if applicable)

For tenancies such as a café, the main waste storage room should include a clearly labelled designated area for the tenancy's collection bins, as a minimum the following segregated bins must be provided:

- a. Commingled (mixed) recycling
- b. Paper & Cardboard recycling
- c. Cardboard recycling
- d. Organic waste
- e. Landfill (General) waste
- f. Grease traps (where applicable per Sydney Water Requirements)

See *Waste Stream Acceptance Criteria (Section 10)* **Attachment N – Operational Waste Management Plan (OWMP)**.

5.3.4 WASTE AND RECYCLING SERVICE AREAS

Centralised waste and recycling service areas must be provided where applicable in a building to hold landfill (general) waste and commingled (mixed) recyclables before transferring the waste streams to the main waste and recycling storage room. The waste and recycling service areas must have the capacity to store at least one (1) day's volume of waste and recycling likely to be generated on that floor.

5.3.5 ACCESS AND COLLECTION POINT

Rooms for storing waste and recycling must be located in a position convenient and accessible for waste collection staff. Building/space designers must plan for efficient transfer routes from waste and recycling service areas to the main waste and recycling storage room.

Where collection vehicles are required to drive into a building to collect waste or recycling, a suitable refuse collection point must be nominated where waste-loading operations can occur on a level surface away from gradients and vehicle ramps. The collection point and the main waste and recycling storage area must be in the same place, avoiding the need to move bins to the collection point.

The path for wheeling bins between a central waste and recycling storage area and the collection vehicle must be level and free of steps or kerbs. The maximum travel distance between the storage area and the collection point for bins is:

- a. 10 metres – for bins including 240 litre, 660 litre & 1000 litre Mobile Garbage Bins (MGB's)
- b. 3 metres – for both 1500 litre and 2000 litre bulk bins (also known as skips)

The clearance height must allow for the largest waste collection vehicles to access the collection point and **at least 3.8m**, see **Attachment D – Vehicle Access** for typical dimensions of collection vehicles. Collection vehicles must be able to service the development efficiently and effectively with limited need to reverse and consider vehicle access and turning circles for the largest collection vehicles. Access to an approved collection point within a building must enable all collection vehicles to both enter and exit the premises in a forward direction.

Grease waste truck accessibility and pumping requirements are to be sized appropriately as per the **CIS Hydraulic Standard** and **relevant local water and sewerage utility/council/authority** requirements. Liquid waste from grease traps must only be removed by licensed waste contractors.

5.3.6 WASTE SIGNAGE

5.3.6.1 Waste Signs

Adequate signage identifying waste and recycling areas must be prominently displayed. Clear and easy to read sign(s) designating the storage of each recycling stream must be fixed to the internal wall(s) or on any racks provided.

All waste and recycling receptacles must be clearly and correctly labelled to identify which materials are to be placed in which bin. See **Attachment B – Waste Signage**.

The design and use of safety signs for waste rooms and enclosures should comply with AS 1319 *Safety Signs* for the occupational environment. Safety signs must be used to regulate and control safety-related behaviour, warn of hazards and provide emergency information, including fire protection information. Each development will need to decide which signs are relevant for its set of circumstances and services provided. See **Attachment B – Waste Signage** for examples.

5.4 STUDENT ACCOMMODATION

Each student room must have a centralised waste and recycling station. i.e. one landfill (general) waste bin & one commingled (mixed) recycling bin.

An operational Waste Management Plan must be submitted as part of any student accommodation development application. See **Attachment M – Student Accommodation Operational Waste Management Plan (StAOWMP)**.

5.4.1 WASTE CHUTES

For student accommodation buildings more than three (3) stories, a waste chute must be considered and comply with the following requirements:

- a. the total maximum travel distance from any dwelling to a waste chute must not exceed 45 meters (City of Sydney, 2005).
- b. Chutes should be cylindrical in section with a minimum diameter of 500mm to avoid waste being caught within the chute.
- c. Chute systems require fire mitigation features to eliminate flammable items igniting and migrating fire up the chute.

Waste chutes must discharge directly into a receptacle or compactor as such to avoid spillage and overflow.

5.4.2 MAIN WASTE STORAGE ROOM

Space must be allocated for a centralised waste and recycling storage room with the capacity to store the volume of general waste and recyclables generation. The number of collection bins is dependent on the occupancy of the spaces, waste collection frequency and distance to occupants. See **Attachment H – Student Accommodation Collection Bin Requirements**.

5.4.3 ACCESS

Design must account for easy, safe and convenient:

- a. transfer of bins to the collection points
- b. access for collection service provider
- c. path for wheeling bins between the centralised waste storage room and the collection vehicle (free of steps or kerbs).
- d. Access for the building occupants i.e. residents

5.4.4 AMENITY

Each student room, communal area (front of house) and administration area (office) needs to provide centralised waste and recycling stations comprising two bins:

- a. A yellow lid bin for commingled (mixed) recycling, waste paper and cardboard
- b. A red lid bin for landfill (general) waste

Each bin must be labelled according to the correct signage, see **Attachment B – Waste Signage**.

Student residential units must be insulated from noise to comply with the residential amenity provisions of the Council's relevant development control plans, if they are adjacent or above:

- a. Chutes or waste storage facilities, or

- b. Chute discharges, or
- c. Waste compaction equipment, or
- d. Waste collection vehicle access points

Where possible, chutes must not be situated adjacent to habitable rooms due to the noise from the hopper use and the waste falling within the shaft.

DRAFT

6 CONSTRUCTION SITE WASTE MANAGEMENT REQUIREMENTS

For new transformational developments, major retrofit and or refurbishment projects the design process must look for opportunities to improve resource efficiency and minimise waste in accordance with the University's **Environmental Sustainability Policy**. Compliance to the Protection of the Environment Operations Act 1997 is required to manage the transport and disposal of strip-out, demolition and construction waste.

The process for site waste management follows the order of:

- a. Strip-out
- b. Demolition
- c. Construction

6.1 STRIP-OUT

The University of Sydney mandates a resource recovery target requirement of at least 60% with an aspirational target of 80% for all strip-out works. This is in line with the EPA's NSW target for Construction and Demolition waste by 2020. Resource recovery is defined as any material that uses the recovery hierarchy in **Figure 1** to divert from landfill.

Figure 1 - Resource Recovery Hierarchy

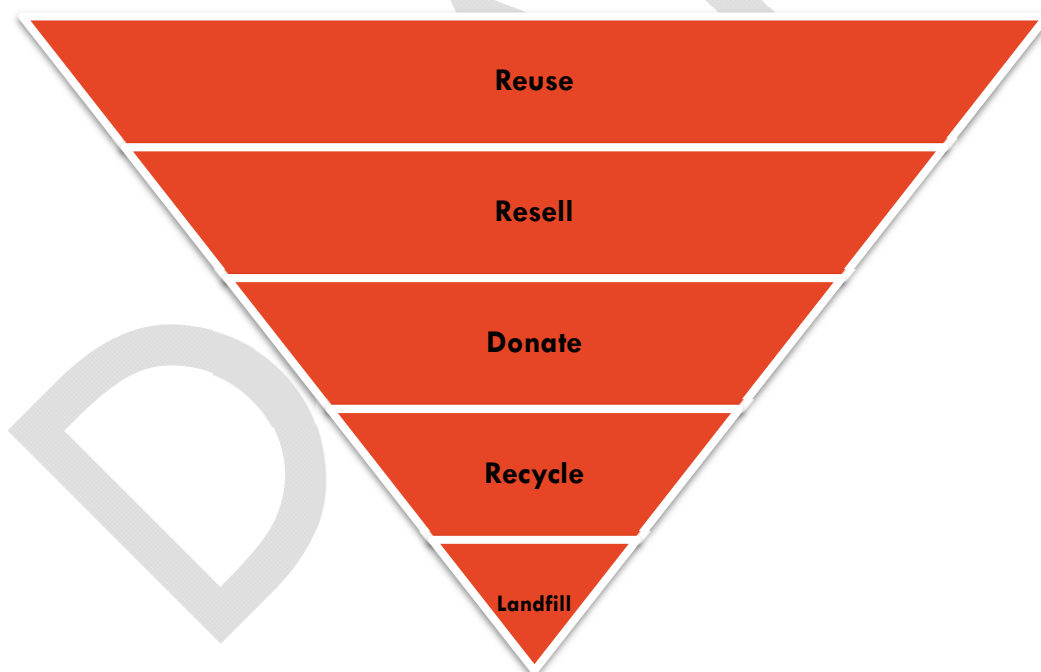
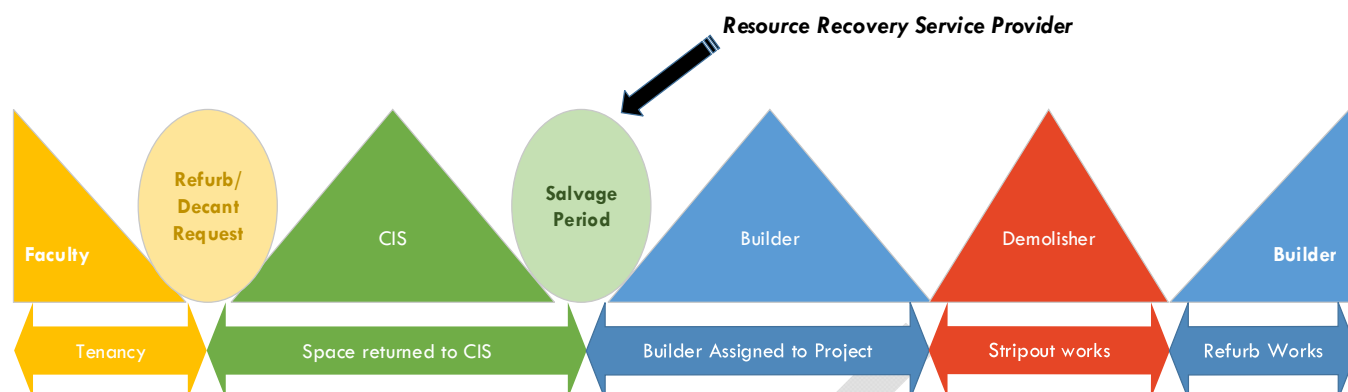


Figure 2 illustrates the opportunities to achieve maximum resource recovery, once the space is handed to Campus Infrastructure Services (CIS) and before the building contractor is engaged. At this point an inventory (**Attachment I – FF&E Inventory**) of items must be established, followed by monthly submissions of **Attachment K – Construction Site Waste Management Report (SWMR)** detailing all material recovery pathways.

Figure 2 - Site Control & Transition Process, University of Sydney



6.1.1 INVENTORY

The reuse of materials is prioritised over any end of life scenario. CIS – Planning will provide the contractor a detailed inventory of materials to be removed from the site by stream. **Attachment 1 – FF&E Inventory** will either be completed by CIS – Planning or the University’s preferred resource recovery service provider. The inventory will detail the FF&E items to be salvaged for resource recovery. Items are to be classified by their recovery pathway, **Table 3**.

Table 3 - Recovery Pathway

Recovery Pathway	Recovery Hierarchy	Destination	Description	Responsibility
1 Reuse	Reuse	By Client (Faculty or CIS)	Item has been relocated by Recovery service provider and reused by the client. Items to be stored and then returned to the client for reuse.	CIS Planning; OR Faculty
	Donated	By Charity	FF&E recovery service provider has delivered the item to a charity at the request of CIS, or has been given authority to give the item to charity.	FF&E Recovery Service Provider
	Resell	By FF&E recovery Service Provider	Item has been reused by service provider. This could be via the service provider purchasing FF&E from CIS, or CIS giving the item to the service provider at no cost	FF&E Recovery Service Provider
		Sold	Item has been sold through our resale avenues.	FF&E Recovery Service Provider, OR ICT, OR Security
2 Storage	Reuse	By FF&E Recovery Service Provider	Item has been in store by the service provider at a storage facility.	FF&E Recovery Service Provider
		By Faculty or CIS	Item has been stored in a CIS storage facility	CIS Planning OR Faculty
		By External	Item has been stored at a 3 rd party storage facility	External 3 rd Party service provider

	Recovery Pathway	Recovery Hierarchy	Destination	Description	Responsibility
3	Disposed	Recycled	Resource Recovery	Item has been dismantled to recover and recycle some of the component materials and minimise landfill disposal	FF&E Recovery Service Provider;
		Landfill	Secure Destruction	CIS has requested item to be destroyed and all sensitive information erased	FF&E resource recovery service provider; OR CIS
		Landfill	Landfill	None of the items component materials are recoverable, or CIS does not wish to pay for the resource recovery process and has requested item to be sent to landfill	Demolition contractor

Table 4 details the FF&E Inventory (**Attachment I**) submissions requirement for the project team. The inventory must be made available to the building contractor as early as possible (preferably 3-6 month) but not less than 7 days before strip-out is due to commence. The building contractor must provide reasonable access to site and/or loading dock by the appropriate inducted third parties for the purposes of resource recovery.

Table 4 : Inventory Submission Frequency

Project Stage	Before Project Start	At End Project
Strip-out	✓	✗
Demolition	✗	✗
Construction (new build or Refurb)	✗	✓

6.2 DEMOLITION AND CONSTRUCTION

Disposal of waste on the University grounds is forbidden. University waste and recycling bins must not be utilised for the disposal of stripout, demolition and construction materials and waste.

Opportunities for waste avoidance when realised can provide contractors with cost savings and project efficiencies. Contractors must identify waste avoidance opportunities at the start of each contract by:

- Working out costs and savings involved in waste avoidance
- Avoiding over-ordering of material
- Ensuring sub-contractors are aware of their responsibilities in accordance with this standard
- Identifying items for resource recovery i.e. reuse, storage, recycling or disposal
- Purchase material with minimum packaging, or ask suppliers to accept their packaging back.

6.2.1 CONSTRUCTION SITE WASTE CONTROL PLAN

Prior to commencing strip-out, demolition, construction or refurbishment projects, the project must submit a Site Environmental Management Plan (SEMP) which must include a Site Waste Control Plan (SWCP), see **Attachment J – Construction Site Waste Control Plan & Checklist**.

The plan identifies how contractors will manage their waste and intermittently removed from site in a compliant manner through occupied spaces.

6.2.2 CONSTRUCTION SITE WASTE MANAGEMENT REPORT

The Site Waste Management Report is a tool which outlines the process by which the University and contractors can ensure all office strip-out, construction and demolition waste is transported and managed to comply with applicable environmental laws and the University's resource recovery target.

The Construction Site Waste Management Report (**Attachment K**) must be completed by the project team and returned to CIS Planning – Engineering & Sustainability for approval. The report must detail waste materials by stream, by weight, resource recovery method or landfill disposal and destination facility.

This report must be completed according to the **Table 5** by the project team. CIS reserves the right to audit the Site Waste Management Reports at their discretion.

Table 5 : Construction Site Waste Management Report Submission Frequency

Project Stage	Duration of the Project (Monthly)	At End Project (Summary Report)
Strip-out	✓	✓
Demolition	✓	✓
Construction	✓	✓

7 OPERATIONAL WASTE MANAGEMENT

The University of Sydney mandates a resource recovery target requirement of at least 80% with an aspirational target of 90% for all operational waste. CIS Facilities Management Services (FMS) will perform its services to maximise resource recovery and recycling, and to minimise waste disposal to landfill. It must implement an Operational Waste Management Plan (Attachment N).

7.1 WASTE STREAMS

The University of Sydney generates the following waste streams from operations:

SERVICE ACTIVITY	WASTE STREAM	RECYCABLE
Soft Services	Commingled (mixed) recycling	✓
Soft Services	Paper & cardboard recycling	✓
Soft Services	Electronic recycling (E-Waste)	✓
Soft Services	Batteries (non-rechargeable)	✓
Soft Services	Printer / toner cartridges	✓
Soft Services	Organic (food scraps)	✓ or ✗
Soft Services	Garden Organics (Green Waste)	✓ or ✗
Hard Services – Electrical	PCBs (Transformers & capacitors)	✓
Hard Services – Electrical	Fluros & T8 / T12 tubes	✓
Hard Services – Electrical	Ballasts	✓
Hard Services – Electrical	SF6 Gas	✓
Hard Services – Electrical	Cables	✓
Hard Services – Mechanical	Refrigerants	✗
Hard Services – Hydraulic	Trade waste	✗
Hard Services – Hydraulic	Liquid Waste (Generators)	✗
Soft Services	Landfill (General) waste	✗
Soft Services / Safety Health & Wellbeing	Hazardous Waste	✗

See *Waste Acceptance Criteria* within **Attachment N – Operational Waste Management Plan (OWMP)** for the acceptance criteria of each waste stream.

7.1.1 SOFT SERVICES

Soft services contractors must arrange the disposal of their waste streams and provide monthly and annual reporting on the weight of waste and recyclables in accordance with **Attachment N**.

7.1.2 HARD SERVICES

Hard Services contractors (electrical, mechanical and hydraulic) must arrange disposal of their waste streams and provide annual reporting on the weight of their generated waste and recyclables in accordance with the **Attachment O – Operational Waste Management - Hard Services**

7.2 CENTRALISED RECYCLING AND WASTE SYSTEM

Centralised waste and recycling stations must be placed in functional areas:

- a. offices

- b. kitchens
- c. dining areas
- d. student common areas
- e. learning hubs across all campuses

Centralised waste and recycling stations must be placed just outside functional spaces:

- a. lecture theatres
- b. tutorial rooms
- c. PC labs

Recycling Station sizes are per **Attachment A – Bin Specifications**

7.3 BIN AND WASTE HANDLING EQUIPMENT

All landfill (general) and recycling must be stored in appropriate bins or containers with permanent well-fitting lids. See **Attachment E – Waste Equipment**

Waste bins and containers should conform to AS 4123 Mobile Waste Containers if the standard is applicable for the selected bin or container type. Waste bins and containers greater than the capacity covered in the Standard (1700 L) must be designed to appropriate safety levels.

All bins must be colour coded and labelled according to University of Sydney waste signage branding, see **Attachment B – Waste Signage**.

7.3.1 WASTE SERVICES AREA

Landfill (general) waste and recyclables from the waste service area on each floor must be transferred to the main waste storage room on a daily basis or more frequently, as required.

7.3.2 SAFETY, HEALTH AND WELLBEING

Collection methods and systems used for waste management in commercial buildings must comply with the **Work Health and Safety Act 2011** and any associated regulations. See **SHW – Hazardous Waste Disposal**.

7.4 OPERATIONAL WASTE MANAGEMENT PLAN

An operational waste management plan (OWMP) must be implemented per campus which steps out the waste and recycling processes at all the sites, including noting all the waste collection points, see **Attachment N – Operational Waste Management Plan (OWMP)**

CIS Facilities Management Services (FM) will record and provide the following information per **Table 6** - OWMP Reporting Schedule Reports must be supported by Facility Receipt evidence to ensure that waste is being correctly managed and recorded. Supporting documents will be retained for a minimum of 3 years.

The OWMP must be reviewed biennially with CIS Engineering and Sustainability and other involved parties to determine enhancements, sustainability initiatives and other waste management initiatives.

Table 6 - OWMP Reporting Schedule

REPORT	OWMP SECTION	FREQUENCY
Contractor Schedule	Section 3	At inception of cleaning and/or waste contract and then as services or Contractor information is updated
Waste and Recycling Stream	Section 4	At inception of waste contractor and then annually thereafter (or as services or Facility Information is updated)
Monthly Waste Management Report	Section 5	Monthly
Annual Summary Report	Section 6	Annually
Waste Management Systems	Section 7 – Internal Bin Inventory Section 8 – Internal & Collection Schedule Section 9 – External Bin Inventory Section 10 – External Collection Schedules	At inception of waste and/or cleaning contract and then annually thereafter (or as management protocols are updated)
Facility Waste Stream Acceptance Criteria	Section 11	At inception and then annually thereafter (or as services or Facility Information is updated)
Contamination Report	Section 12	Monthly from identified facility / site (but Cleaners report within 24 hours of occurrence)
Incident Management Procedure	Section 13	Within 24 hours of incident occurrence
Education and Training	Section 14	At inception and then biennially thereafter
Compliance Review	Section 15	To be commissioned by The University as required
Evidence Documentation	Section 16	Monthly
Annual Review and Commitment	Section 17	Biennially

7.4.1 DATA INTEGRITY

Data quality and integrity is vital and The University will only accept actual weights.

Actual weights may be gained from:

- a. Contractor's on-vehicle scales per collection point;
- b. use of weighbridge – acceptable for compactors/skips only;
- c. On-site scales used to weigh bins prior to collection. All weighing devices used must be supported by evidence of 6 monthly calibration tests.

Data sources must be independent of each other. Sources may include:

- a. Waste Contractor invoice;
- b. Cleaner bin tally (bins weighed on-site by waste contractor at time of collection; to support this a cleaner tally of bin numbers would also be required);
- c. Automated bin readers;
- d. Weighbridge docket

7.4.2 GENERAL AUDITS

An audit schedule of all the streams will be produced as part of the WMP; the frequency of the audits must be agreed with CIS Engineering and Sustainability annually. The waste audit process must follow the NABERS protocol or similar. Audit reports must be saved in the [Sharepoint](#). All non-compliance must be recorded on a register detailing the description of the non-conformance, location, corrective actions, parties responsible, date correction to be implemented by and follow up audit date.

7.4.3 CONTAMINATION MANAGEMENT

7.4.3.1 On-site

Further to scheduled waste audits. On-site contamination of the waste and recycling streams will be addressed as part of the cleaner's daily waste removal process through visual inspections. Recycling streams must be inspected for contamination or leakage before disposing in the external waste collection points. A 5% contamination tolerance is acceptable in the recycling streams. If contamination exceeds 5% the contaminated stream must be disposed of in the landfill waste and the contamination is reported to the cleaning supervisor and CIS Facilities Management Services and the Engineering & sustainability Team, providing details of the contamination, location and evidence (photo).

7.4.3.2 Recycling Facility

If the waste contractor and/or recycling facility rejects the recycling due to unacceptable levels of contamination, this must be reported immediately to CIS Facilities Management and CIS Engineering and Sustainability.

7.5 HARD SERVICES MAINTENANCE ACTIVITIES

Maintenance activities related to FMS hard services that generate waste must annually report their waste / recycling weights, e.g. replacement of light globes etc. See **Attachment O – Operational Waste Management - Hard Services**

7.6 WASTE SIGNAGE

Coloured and labelled bin lids are a crucial means of correctly identifying bins. All new internal office and public areas and external waste collection bins (MGBs and bulk bins) must adhere to the following colour coding convention and signage per waste stream across the University, see **Attachment B – Waste Signage**

7.6.1 INTERNAL AREAS

The table identifies the colours of the bin lids at the university. Colours are according to Australian Standard AS4123.7-2006 Mobile Waste Containers - Part 7: Colours, markings and designation requirement.

For bin signage not covered under the University standard, bins and bin stations must be colour coded according to this standard.

Table 7 - Bin Colours

Waste Stream	Lid Colour
E-waste	White
Cardboard / Paper	Blue
Commingled recyclables bottles, cans, cartons, paper	Yellow
Confidential paper	Blue
Rubbish/landfill waste	Red
Batteries	Black
Toner/printer cartridges	N/A

(Source; AS 4123.7-2006)

Each of the above waste stream bins must clearly display the associated colour, e.g. the lid / aperture / body of the bin unit, see **Attachment A – Bin Specifications** for examples of typical internal and external waste bin infrastructure at the University.

7.6.2 EXTERNAL AREAS

Signage must be appropriately sized to the enclosure façade panel and made from suitable outdoor material, e.g. PVC vinyl, including:

- matte lamination
- weather proof material (UV resistant & waterproof) & solvent ink

Signage required on both front and side panels of the enclosures.

8 DOCUMENTATION AND RECORDS

8.1.1 DESIGN STAGE

Prior to commencing construction of new or refurbishment projects, the project manager/consultant/contractor must conduct and provide the University a:

- a. Site waste management plan.
- b. Building waste management design (large projects) – short report outlining design concept for waste management strategy for the building, including:
 - i. Waste removal strategy
 - ii. Waste and recycling generation rates
 - iii. Location of centralised waste stations, size and design
 - iv. Waste room design

8.1.2 COMPLETION DOCUMENTATION

At the completion of all projects, the following documentation must be provided:

- a. As-built drawings (including schematics) of the locations of the centralised waste stations and waste rooms
- b. Asset schedules for centralised waste and recycling bins, external waste bin infrastructure and waste handling equipment, e.g. compactors, balers, bin lifts etc. (as per the CIS [Asset Identification and Labelling](#) Standard)
- c. Site waste management plan with supporting waste reports and waste / recycling dockets.
- d. Warranty schedules for all major items of equipment
- e. Project handover plan must be developed by the consultant/designer to allow systems to be handed over to the University.

Documentation must be provided by the contractor, in both electronic and hard copy formats and approved by the University prior to Practical Completion being granted.

8.1.3 SAFETY, HEALTH AND WELLBEING

The designer must consider how building design will impact on the ability of contractors to collect waste and provide services in a safe manner. Collection methods and systems used for waste management in commercial buildings must comply with the *Work Health and Safety Act 2011* and any associated regulations.

Waste management systems must be designed and operated in a manner that prevents the potential risk of injury or illness associated with the collection, disposal or recycling of material. This includes risk to:

- a. building occupants and visitors using the bins and equipment
- b. building management and cleaning staff that collect and maintain the service
- c. waste collection contractors

9 AUTHORISATION OF VARIATIONS

Project managers, consultants, contractors, commissioning agents and facilities maintenance personnel must ensure compliance with these requirements is achieved.

Variations to this standard must only be considered where:

- a. the University Standard's requirement cannot physically or technically be achieved.
- b. the alternative solution delivers demonstrated and proven superior performance for the same capital and life cycle cost or better.

Consultants and contractors must identify and justify requirements of the standard that do not apply to the project or which need to be varied and these which must be approved by the issuer of this standard. Formal requests for all variations to this Standard must be submitted using the CIS Request Dispensation from Standard Form (**CIS-ENG-F001**). The issuer of this standard or their delegated authority must review and consider requirements of stakeholders from clients, projects and facilities management before deciding whether to approve variations. Their formal sign-off is required for acceptance of any non-compliances and departures from this standard's requirements.

10 QUALITY CONTROL

Project managers, consultants and commissioning agents must ensure compliance with the requirements of this standard. Formal sign-off from the standard's author or delegated authority from the business unit / division is required for acceptance of any non-compliances and departures from the standard's requirements.

11 DOCUMENT AMENDMENT HISTORY

Revision	Amendment	Commencing
001	First Issue	
002	Second Issue Construction/Demo Waste – SWMP template Strip-out Waste	

12 BIBLIOGRAPHY

City of Sydney. (2005). *Policy for Waste Minimisation in New Developments*. Sydney: The City of Sydney.

Council of the City of Sydney, *Policy for Waste Minimisation in New Developments*, October 2005

NSW EPA, *Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities*, December 2012

Sustainability Victoria, *Waste Minimisation Plans for Construction and Demolition*

AS4123.7-2006 *Mobile Waste Containers - Part 7: Colours, markings and designation requirement*.

AS 4123 *Mobile Waste Containers*

DETR Partners in Innovation Project – Construction – *The Price of Waste Report* (September 2000)

City of Melbourne – *Waste Generation Rates - 2015 January Report*

Waste Technical Working Group – *Better Buildings Partnership* 2015

13 ATTACHMENTS

ATTACHMENT A BIN SPECIFICATIONS

Table 8 - Bin Dimensions

FUNCTIONAL SPACE	PREFERRED SUPPLIERS	BIN	SIZE (Liters)	DIMENSIONS (mm)		
				H	W	L
Internal e.g. Office	<u>Rud</u>		60	677	527	343
	<u>Sulo</u>		72	762	279	508
	<u>Source Separation</u>		90	755	280	505
Internal			120	485	485	560
Internal e.g. Office, Printing Areas			240	1080	580	735
External (Public Domain)	<u>Town & Park</u>		240	1080	580	735

FUNCTIONAL SPACE	PREFFERED SUPPLIERS	BIN	SIZE (Liters)	DIMENSIONS (mm)		
				H	W	L
Waste Storage/Collection			660	1215	1340	490
Waste Storage/Collection			1000	1350	1360	1160
Waste Storage/Collection			1100	1300	1340	755

Table 9 - Bin Types

WASTE STREAM	LID COLOUR	BIN
General (Landfill)	Red	
Recycling (Commingled)	Yellow	
Paper & Cardboard	Blue	
E-Waste	White	<picture>
Batteries	black	<picture>
Toner Cartridges	?	

ATTACHMENT B WASTE SIGNAGE

INTERNAL SPACE SIGNAGE

The University of Sydney has a custom made signage for the following waste and recycling streams. All associated internal and external bins must use this standard, contact CIS Engineering and Sustainability for templates.



Paper and cardboard recycling



Commingled (mixed) recycling



Landfill (General) waste



Better Recycling, Less Waste

Figure 3 - Internal Spaces: Waste Signage

Alternative signage for GTS spaces and multi-language are available by contacting CIS Sustainable Campus; cis.sustainablecampus@sydney.edu.au

For recycling streams not covered by the above, designers may use The NSW EPA standard signs and labels, which can be downloaded at <http://www.epa.nsw.gov.au/warr/RecyclingSigns.htm>

EXTERNAL SPACE SIGNAGE

Signage for waste storage rooms and/or areas are to be placed along the walls of the storage rooms/areas above their corresponding waste stream bin.

Signage is available by contacting CIS Sustainable Campus; cis.sustainablecampus@sydney.edu.au

Figure 4 - External Spaces: Waste Signage

SAFETY SIGNAGE

The design and use of safety signs for waste rooms and enclosures should comply with **AS 1319 Safety Signs** for the occupational environment. Safety signs must be used to regulate and control safety-related behaviour, warn of hazards and provide emergency information, including fire protection information. Each development will need to decide which signs are relevant for its set of circumstances and services provided.



Figure 5 - AS Signs



ATTACHMENT C COLLECTION VEHICLES

The waste collection vehicles may be side-loading, rear-end loading or front-end loading. The size of the vehicle varies according to the type and frequency of the collection service. Thus, it is impossible to specify what constitutes the definitive waste collection vehicle, but the characteristics outlined below provide a guide.

REAR LOADING COLLECTION VEHICLE

Rear loading collection vehicles are commonly used for garbage and recyclables collection. They can also be used to collect waste stored in mobile bins or bulk bins. Dimensions and specifications vary according to the manufacturer, but typical dimensions are shown below.

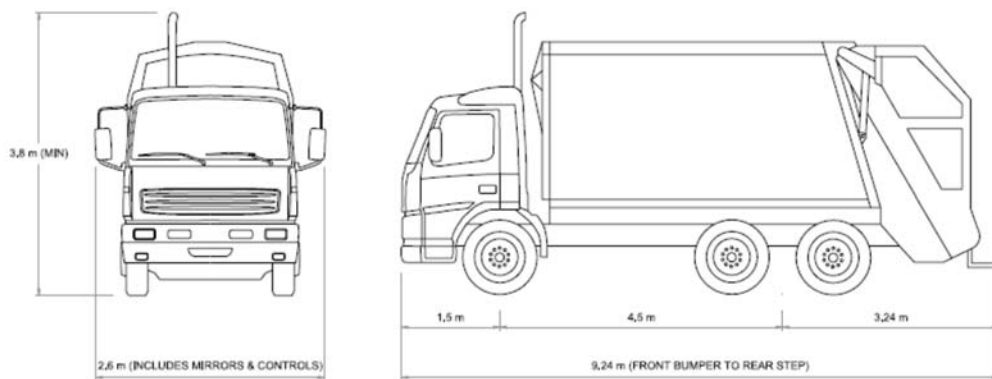


Table 10 - Typical dimensions of rear-lift collection vehicles

Dimension	Measure
Length overall	Up to 10.24m
Width overall	2.5 m
Operational height	Up to 3.5 m
Travel height	Up to 3.5 m
Weight (vehicle only)	12.4 tonnes
Weight (payload)	9.5 tonnes
Turning circle	18.0 m

SIDE LOADING COLLECTION VEHICLES

Side loading collection vehicles are suitable for collecting mobile bins up to 360 litres in size.

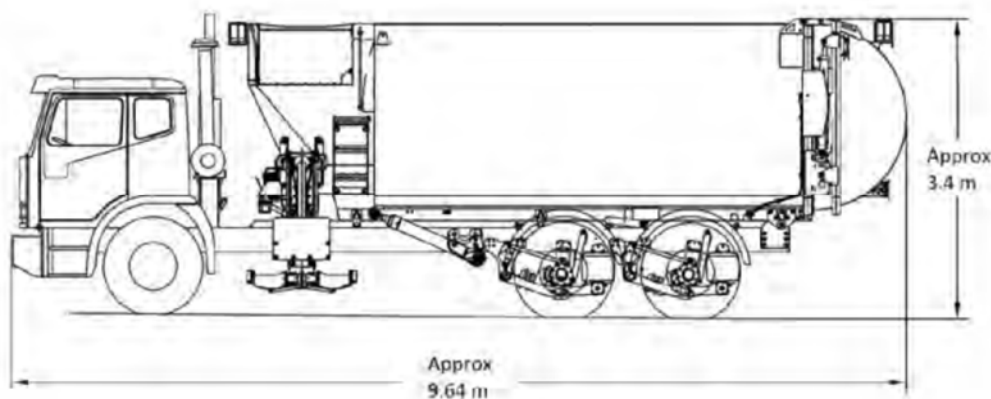


Table 11 - Typical side-lift vehicle dimensions

Dimension	Measure
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Length overall	Up to 9.64m
Front overhang	1.51m
Wheelbase	5.20m
Rear overhang	2.93m
Turning circle kerb to kerb	17.86m
Turning circle wall to wall	20.56m
Front of vehicle to collection arm	3.8m
Maximum reach of side arm	3.0m
Travel height	Up to 3.63m
Clearance height for loading	Up to 3.9m

FRONT-LIFT LOADING COLLECTION VEHICLE

Front-lift loading vehicles are commonly used for collecting commercial waste, and are only suitable for bulk bins with front-lift pockets and not mobile bins.

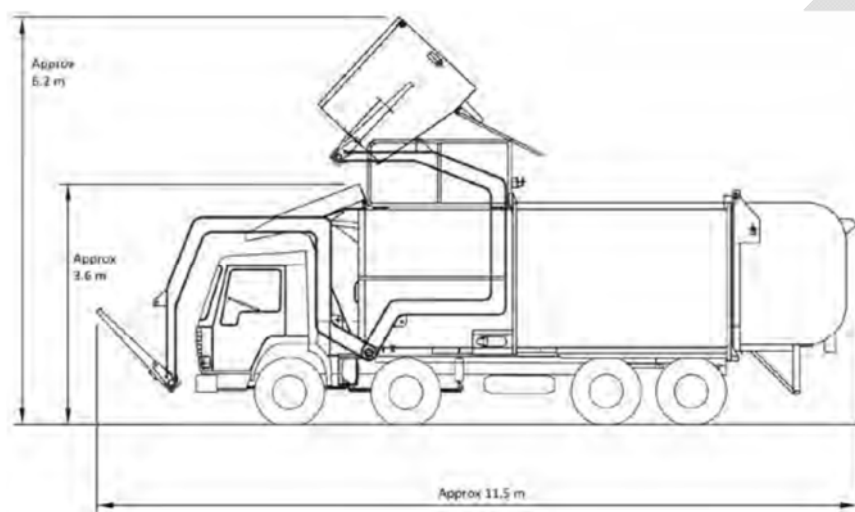


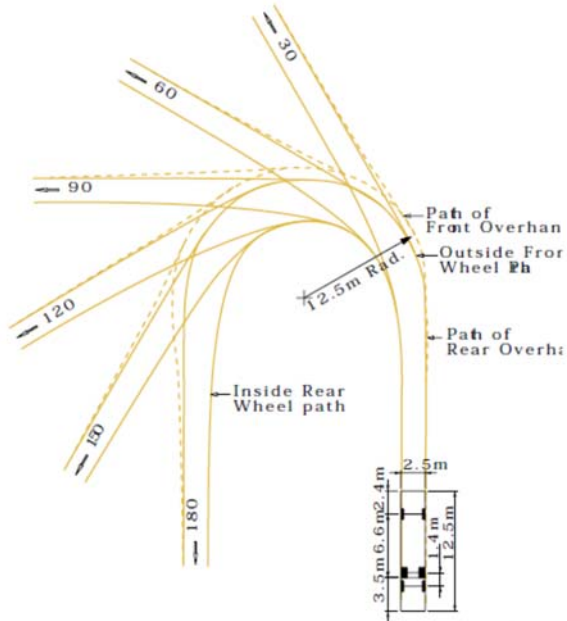
Table 12 - Front-lift vehicle dimensions

Dimension	Measure
Length overall	Up to 11.5m
Front overhang	1.51m
Wheelbase	Up to 5.84m
Rear overhang	3.17m
Turning circle kerb to kerb	22.10m
Turning circle wall to wall	23.66m
Travel height	3.82m
Clearance height for loading	Up to 6.2m

ATTACHMENT D VEHICLE ACCESS

Best design practice for access and egress from a development calls for a separate entrance and exit to allow the collection vehicle to travel in a forward direction at all times. Where there is a requirement for collection vehicles to turn within a development, the design must incorporate either a bowl, 'T' or 'Y' shaped arrangement.

Sample turning circle (source: AUSTRROADS design single unit truck / BUS (12.5m) Absolute Minimum Radius)



COLLECTION FROM ENCLOSURES

Collection vehicles may enter building basements for the collection of waste and/or recyclables provided the following requirements are met:

The gradient of the ramp access to basement must not exceed 1:8

The height to the structural members and upper floor ceiling must allow for a typical collection vehicle travel height / operational height consistent with type of vehicle employed

The provision of space clear of structural members or vehicle parking spaces adequate to allow typical three-point turn of collection vehicles, and

The basement floor must be of industrial-type strength pavement and designed for a maximum wheel loading of 7 tonnes per axle in order to accommodate waste and recycling collection trucks. (The standard road pavement design specifications for an industrial driveway entry on public land is 150mm thick concrete, 20MPa concrete with F82 mesh).

ATTACHMENT E WASTE EQUIPMENT

MOBILE BINS

Mobile bins can be any one of a variety of different-sized moulded plastic containers that incorporate two or four wheels, a close-fitting lid and handles for individual transport by hand. They are designed for lifting and emptying by purpose-built equipment.

Mobile bins with two wheels are commonly referred to as 'wheelie bins', and range in sizes from 80 litres up to 360 litre capacity. Wheelie bins in the University are generally 240 litres in capacity. Larger mobile bins in the University are commonly 660 litres and 1100 litre.

Table 13 - Typical mobile bin dimensions

Bin capacity	Typical mobile bins				Larger mobile bins		
	120L	140L	240L	360L	660L	770L	1300L
Height (mm)	940	1065	1080	1100	1250	1425	1408
Depth (mm)	560	540	735	885	850	1100	1250
Width (mm)	485	500	580	600	1370	1370	1770
Approx. footprint (m ²)	0.27	0.27	0.43	0.53	1.16	1.5	1.21

Note: exact bin measurements differ between manufacturers.

COMPACTORS

A compactor is a device for compacting material and holding compacted material. There are two types of compactors; fixed and integrated. Fixed (or stationary) compactors have two parts, the compactor itself – a hydraulic ram that compresses waste material and is often fixed to the ground – and a bin, where waste is forced into. Integrated (or transportable) compactors have both the compactor mechanism and the bin in one unit. Bins can be 5–30 m³ in size.

BALERS

Balers compress materials such as cardboard and plastic film and tie them into bales so that they remain compacted. The advantages of balers are that bulky materials can be compressed and not occupy valuable bin capacity. Balers come in a wide variety of sizes and capacities and have a small footprint.

BIN LIFTERS

These are lightweight bin lifting devices that attach to larger bins, such as front-lift bins or open bins, and use hydraulic or air strut supports to assist users to empty wheelie bins into the larger bins. They help make emptying smaller bins into larger bins easier and safer for operators. Bin lifters may be powered (hydraulic) or unpowered. There are a variety of different types, sizes and lifting capacities.

WASTE HANDLING SYSTEMS

Chutes

Chutes are commonly located in utility / waste storage areas where waste is placed and then falls into a bin or compactor on a lower level. Where compactors are used, they compress waste and discharge it into bins which are removed for collection. Chutes should terminate in a garbage and recycling room and discharge directly into a receptacle or waste compactor in a manner that avoids spillage and overflow. Consideration must be given to installing two chutes in any application, one for garbage and one for recycling. This avoids the need for cleaners to transport recyclables by hand from upper levels.

ATTACHMENT F	UNIVERSITY COLLECTION BIN REQUIREMENTS
ATTACHMENT G	UNIVERSITY INTERNAL BIN REQUIREMENTS
ATTACHMENT H REQUIREMENTS	STUDENT ACCOMMODATION COLLECTION BIN
ATTACHMENT I	FF&E INVENTORY AUDIT
ATTACHMENT J CHECKLIST	CONSTRUCTION SITE WASTE CONTROL PLAN &
ATTACHMENT K REPORT (SWMR)	CONSTRUCTION SITE WASTE MANAGEMENT
ATTACHMENT L	WASTE VOLUME ESTIMATION METHODS
ATTACHMENT M	STUDENT ACCOMMODATION OPERATIONAL WASTE MANAGEMENT PLAN (STAOWMP)
ATTACHMENT N (OWMP)	OPERATIONAL WASTE MANAGEMENT PLAN
ATTACHMENT O SERVICES	OPERATIONAL WASTE MANAGEMENT - HARD
ATTACHMENT P	RESOURCE RECOVERY FACILITY DIRECTORY