Keeping freight on the move

AN ON-SITE DESIGN GUIDE FOR HANDLING FREIGHT

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Foreword

Site design is a complex process. Achieving an appropriate design, that functions effectively for the delivery and handling of freight, requires the correct application of design principles and standards.

There are many intricacies to consider when developing a site. To assist developers, their advisors and planners in achieving good design, this document brings together commercial vehicle and on-site design standards, integrated with knowledge from the traffic engineering and freight transport industries. The operational needs of freight vehicles and practical design parameters are explained and guidance provided to help develop safe and efficient sites.

This document was prepared by the Canterbury Freight Working Group, with the support of Environment Canterbury. The Canterbury Freight Working Group was formed to develop actions and programmes to implement the Canterbury Regional Land Transport Freight Action Plan. The Working Group consists of a number of Canterbury organisations with a vital interest in the movement of freight. Technical engineering content was provided by MWH Ltd, along with planning input from Response Planning Consultants Ltd.

Contents

Definitions	
Light Commercial Vehicle (LCV)	A vehicle constructed primarily for the carriage of goods and which has a gross vehicle mass less than or equal to 3.5 tonnes. Included are utilities, panel vans, cab chassis and forward control load carrying vehicles.
Medium Commercial Vehicles (MCV)	A vehicle constructed primarily for the carriage of goods and which has a gross vehicle mass exceeding 3.5 tonnes but not exceeding 12 tonnes.
Heavy Commercial Vehicle (HCV)	A vehicle constructed primarily for the carriage of goods and which has a gross vehicle mass exceeding 12 tonnes. Included are truck and trailers and articulated truck prime movers, which have no significant load carry area but with a turntable device which can be linked to a trailer.
(See Tables 4, 5, 6 & 7 for further detail on commercial vehicle size and classifications)	
Strategic Freight Hub	Primeport Timaru, Port Lyttelton, Christchurch International Airport, Middleton rail yard Christchurch, Woolston freight area, Sockburn freight area.
Freight Terminal	An on-site freight terminal or freight distribution centre for loading and unloading goods.
Road Controlling Authority (RCA)	The authority, body or person having control of the road.
Central business District (CBD)	Central business district in town or city centre.
Gross Floor Area (GFA)	Gross floor area available on a developed site.
Gross Leasable Floor Area (GLFA)	Gross leasable floor area available on a developed site.
Bay	Area required to park and load / unload freight from a vehicle (see Table 6)

Introduction

Developers, local authorities, road controlling authorities, site managers, and their advisers all have a significant stake in the safe and efficient movement of freight around Canterbury.

Issues around the current design of facilities and methods for moving freight are reducing the efficiency of land transport freight delivery systems. This is critical to businesses in the Canterbury Region because over 80% of products and goods are moved by roads. Inefficiencies are impacting negatively on the businesses and organisations that rely on freight transport for their wellbeing, and also upon the overall social and economic wellbeing of the Canterbury community.

As prosperity in Canterbury increases, so will the amount of freight moved by road. To balance the demand for low cost and time efficiencies, increasingly freight will be moved 24 hours a day by larger trucks for bulk items and bulk delivery of smaller items, and by more panel vans and small trucks for small, frequent deliveries. Existing facilities and infrastructure for freight transport will be under further pressure.

This Guide aims to improve planning, design and site management practices to support the safe and efficient movement of road freight in Canterbury.

The planning and design guidelines outlined in this document are based upon these principles:

- There is limited ability to influence the economic activities and factors driving demand for freight movement.
- The current and future demand for movement of freight must be recognised and provided for.
- Future freight demand is based on analysis of current activities involving the movement of freight.

The desired key outcome is that land transport systems, facilities and sites should be designed according to current and foreseeable demand for the movement of freight.

The implementation of this Guide is expected to bring a series of benefits, namely:

1. Improve road usage and access:
   - Reduce road usage by freight vehicles caused by time-of-day and type-of-vehicle constraints; and
   - Eliminate the need to redesign roads and site accesses, and freight handling facilities to resolve issues caused by inefficient freight operations.
2. Improve safety:
   - Minimise safety issues between freight vehicles, other motor vehicles, cycles and pedestrians.
3. Improve neighbourhood and environmental values:
   - Minimise negative impacts on the community caused by freight vehicles moving through a freight handling facility or parking on surrounding roads;
   - Improve environmental conditions by reducing pollution and noise;
   - Reduce community severance caused by freight vehicles using local roads and freight activities spilling onto the road; and
   - Create happy tenants.
4. Improve efficiency and reduce costs:
   - Reduce the cost of freight delivery by maintaining operational flexibility and decreased delivery times through less on-site congestion and queuing;
   - Reduce the variability in delivery time caused by time delays; and
   - Maintain, during business hours, the availability of customer parking.

Section A: Planning for Freight

District and city plans provide local planning controls. These represent the 'minimum' provision for moving freight to manage adverse effects on the environment. Developers and managers of sites should treat district and city plan requirements as the 'minimum' criteria for effective and efficient movement of freight.

For efficient freight handling, individual sites must be designed to handle trucks likely to service the site (see Table 2). Freight vehicles must be given the freedom to move through the site, queue, load and unload, in dedicated vehicle bays, separated from other vehicle facilities on the site.

At the very least, district and city plans should:

- Provide objectives and/or policies recognising the importance of the movement of freight both on the road network and on individual sites;
- Ensure commercial activities are located where they are accessible from an appropriate part of the land transport network; and
- Ensure that sites are designed and, where required, road networks upgraded for the safe, efficient and effective movement of current and future freight demand.

Appropriate requirements should be provided for:

- Access and egress
- Manoeuvring space
- Loading space
- Queuing space
- Separation of freight transport from other types of vehicles and users
- Signage

When planning a site there are many factors influencing the systems used to handle freight. Some critical factors include:

Location and type of activity: Retail, industrial, warehousing, specific use sites (e.g., car sales yards), offices, hotels, cinemas, housing and restaurants all influence urban freight needs and the range, variety and demand for goods used and sold.

Size of premises: The size of the business influences the frequency of goods movement. Frequency of movement will also depend on factors such as the time sensitivity and turnover of goods. Often smaller businesses have more frequent deliveries by LCV than businesses that rely on bulk supplies transported by HCV including those with centralised storage systems.

Type and timing of delivery: Movement patterns may include freight deliveries from centralised distribution centres to urban premises, deliveries from decentralised suppliers or a mix of the two. The type of distribution system influences the quantity and frequency of delivery trips. Other important aspects include the time of delivery and the use of single drop or multi drop operations.

To plan the site according to the activity (land use) levels, the following three tables present the minimum requirement in terms of infrastructure, facilities and access features:

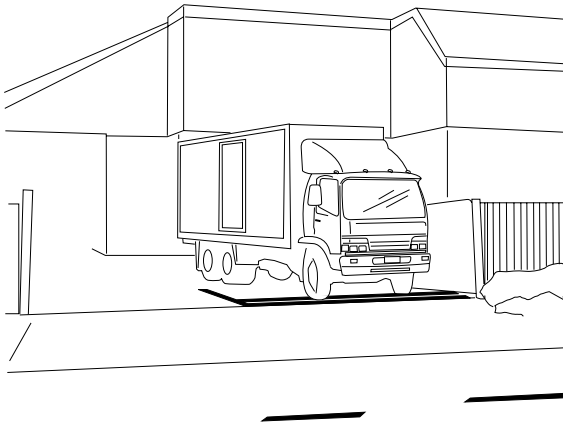


Figure 1.

Site loading facility for a supermarket. Note truck being unloaded in entranceway to freight yard. There is insufficient space within the yard to manoeuvre MCV and HCV.

Table 1 – Freight trip generation

Freight trip generation (UK Freight Transport Association)	
Type of activity	**Average number of visits per day**
CBD (100m2)	1.5 - 4
Bulk Retail Areas (100m2)	1- 2
Processing Plants / Factories (100m2)	1.5 - 4
Shopping malls (100m2)	1 - 4
Distribution Centres (Hectare)	30 - 60
Freight Hubs (Hectare)	100 - 160

Table 2 – Types of freight vehicles expected to service businesses

	LCV	MCV	HCV Full Trailers	HCV Semi-trailers	HCV towing two trailers	Tour coaches & buses
CBD	Yes Frequently each day	Yes Daily	Yes Occasionally	Yes Occasionally	Yes Occasionally	Yes Daily
Bulk Retail	Yes Daily	Yes Frequently each day	Yes Daily	Yes Occasionally	Yes Daily	No
Processing Plants / Factories	Yes Frequently each day	Yes Daily	Yes Daily	Yes Occasionally	Yes Daily	No
Shopping Malls	Yes Frequently each day	Yes Daily	Yes Daily	Yes Occasionally	Yes Daily	No
Distribution Centres	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	No
Freight Hubs	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	No

Note: See Table 7 - Vehicle Type for a description of the freight vehicles referenced above

Table 3 – Physical features of the site

Parking, manoeuvring and queuing space for sites			
Type of activity	**Typical minimum district / city plan requirement (Loading and unloading bays)**	**Recommended manoeuvre area and bays required**	**Queuing space**
CBD (100m2)	1 bay/1000m 2 GFA	For LCV and all MCV	Not required
Bulk Retail Areas (100m2)	1 bay/1600m 2 GLFA for the first 6400m 2 GLFA 1 bay/5000m 2 GLFA thereafter	For LCV and all MCV	Not required
Processing Plants / Factories (100m2)	1 bay/1600m 2 GLFA for the first 6400m 2 GLFA 1 bay/5000m 2 GLFA thereafter	For LCV and all HCV	For two HCV
Shopping Malls (100m2)	1 bay/1000 m 2 GFA (1 space minimum)	For all HCV	For one HCV
Distribution Centres (Hectare)	1 bay/1000 m 2 GFA (1 space minimum)	For LCV and all HCV	For two HCV
Freight Hubs (Hectare)	1 bay/1000 m 2 GFA (1 space minimum)	For all HCV	For two HCV

Note: See Table 4 and Table 6 for vehicle dimensions. For over dimension vehicles refer to Table 5.

The parking, manoeuvring and queuing spaces need to be designed and located to provide for effective freight handling. In particular, bays must be of a sufficient size to provide for unloading and loading (e.g. by fork lift) and located in close proximity to the source or destination of the freight.

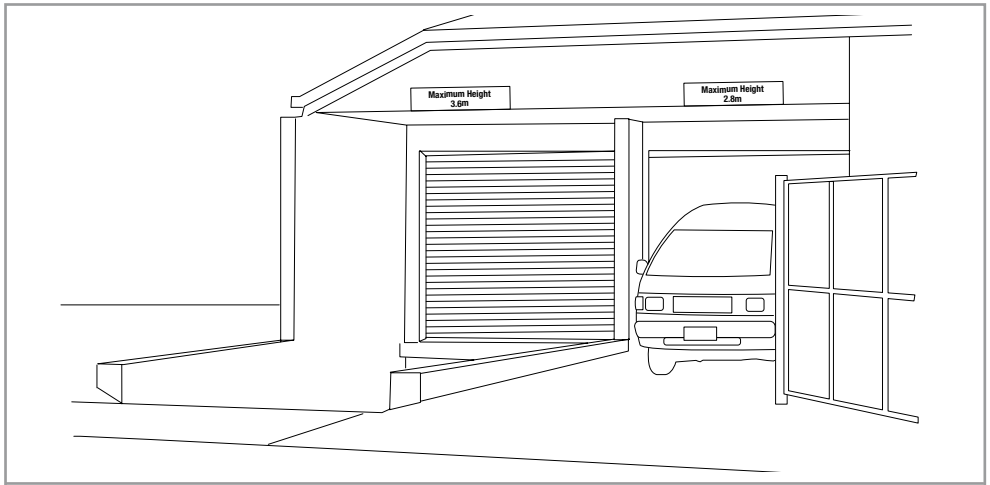


Figure 2.

Separate loading docks for access to rear loading LCV and MCV off a local road. Note no provision for side loading freight vehicles.

Summary

- Land use decisions regarding transport generating or attracting development are central to the urban freight planning process.
  - These decisions will influence the choice of site for which freight transport is a critical factor.
  - They will influence the effectiveness of different supply chain models, using a distribution centre or operating a decentralised supply system to service the site;
- Provide on-site loading facilities for bulk freight and kerbside loading zones for smaller deliveries for developments in existing malls and town centres that include shops that front onto the road. Providing freight servicing for a business from the frontage road is unlikely to be accepted by the Road Controlling Authority, particularly for businesses fronting an arterial road where freight handling activity includes encroachment onto the roadway; and
- Locate loading facilities, including HCV bays, close to their end destinations, individual shops and bulk stores.

Key outcomes:

1. Appropriate location for the business that suits transport patterns and proximity to freight hubs.
2. Freight terminals for the internal distribution of goods for malls and developments with a retail / bulk supply mix.

Guidelines:

[1] Local Authority District or City Plans;
[2] Road Controlling Authority standards for access to network roads;
[3] Austroads: Planning for Freight in Urban Areas Guidelines.

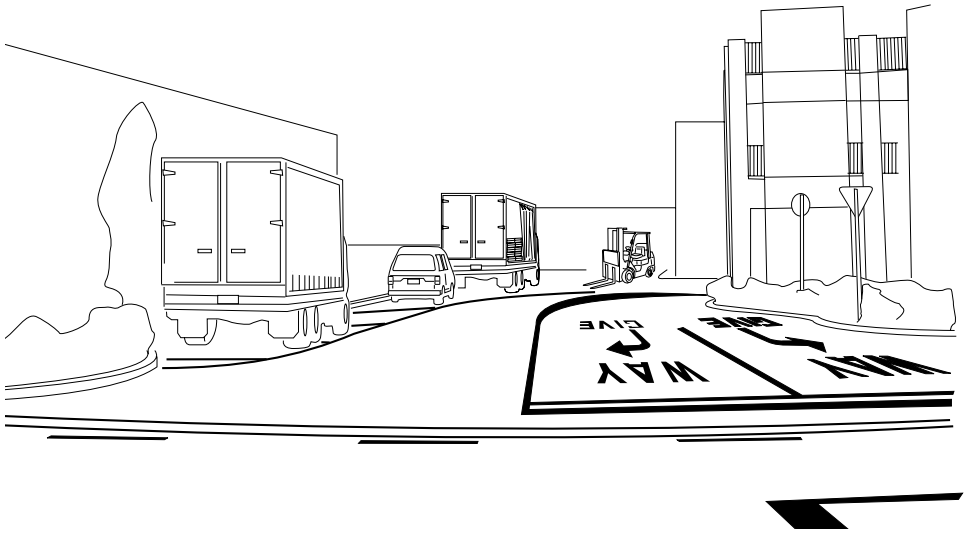


Figure 3.

Site loading facility for a supermarket. Note curtain sided trucks being loaded. The truck in the left foreground is waiting to enter the freight yard where forklifts operate to unload pallets from freight vehicles. Loading space is insufficient for the current activity generated by freight. HCV have difficulty manoeuvring within the space provided.

Section B: Vehicle Size and Characteristics

Vehicle dimensions are critical for the design of on-site freight facilities. This section considers the size and characteristics of vehicles used to service commercial sites in the Canterbury Region.

Truck turning circles and tracking curves are used to design hard standing areas for freight operations to ensure that adequate space is allowed for vehicles to manoeuvre around structures and into loading bays.

Matters to be considered when designing layouts for buildings used for deliveries to loading areas or freight terminals include:

- Striking a balance between site coverage and the need to service business(es) operating from the site and from frontage roads;
- Providing sheltered / covered freight handling facilities;
- Providing direct and convenient access to loading docks and service entrances; and
- Setting aside adequate areas for freight handling which must, unless contained within a central freight terminal, be located near entrances into buildings.

Vehicle size - standard dimensions applied in New Zealand

Listed in Table 4, maximum height and width limits are consistent for all standard vehicles used on New Zealand roads.

Table 4 – Maximum dimension limits

Vehicle	Height	Width	Length
All vehicles	4.25m (4.275m including ropes, chains & straps)	2.5m (excluding mirrors etc) 2.98m (including side mirrors and other allowable projecting devices)	Motor vehicle only 12.6m Motor vehicle towing one or two trailers 20m Articulated buses and motor vehicles towing only one semi-trailer 18m

Listed in Table 5 are maximum limits for over dimension vehicles used on roads in New Zealand. Warning signage is recommended when the clearance height for vehicles manoeuvring under bridges, through tunnels and below other rigid structures is less than 4.4m between the underside of the structure and the pavement surface.

Table 5 - Maximum limits for over dimension vehicles

Vehicle	Height	Width	Length
All vehicles provided that they comply with some travel time and piloting requirements	Up to 5m	Up to 4.5m	Up to 25m
All vehicles carrying a permit issued by the Road Controlling Authority*	Up to 6.5m	Up to 11m	Up to 35m

*Very large loads which exceed these limits need special approval from Land Transport New Zealand.

Note: To provide for over-dimension vehicle loads, it is recommended that the minimum clearance height be increased to 5m.

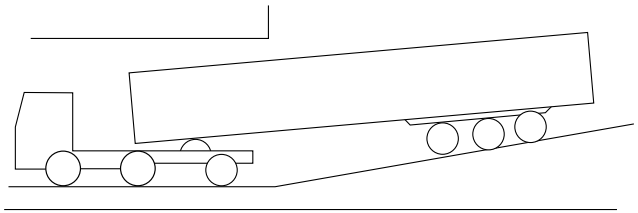


Diagram 1.
Note headroom on ramps

Listed in Table 6 are critical dimensions for manoeuvring LCV, MCV and HCV used on roads in New Zealand. On-site freight handling facilities need to cater for a range of vehicles making deliveries to and from the site. Adequate clearance around structures is essential for safe and convenient handling of freight.

Table 6 – LCV, MCV and HCV (refer to Definitions) clear dimensions to fixed obstructions

Vehicle	Typical industries	Height	Width	Length	Side clearance	Parking area required	Turning circle
LCV	Refer to table 2	4.5m	3.5m	13m	0.5m	45.5 sq m	20m diameter
MCV	Refer to table 2	4.5m	4.1m	15m	0.8m	61.5 sq m	25m diameter
HCV Full trailers	Refer to table 2	4.5m	4.1m	21m	0.8m	86.1 sq m	25m diameter
HCV Semi-trailers	Refer to table 2	4.5m	4.1m	21m	0.8m	86.1 sq m	25m diameter
HCV towing two trailers	Refer to table 2	4.8m	4.1m	21m	0.8m	86.1 sq m	25m diameter
Tour coaches and buses	Hotels / motels	4.5m	4.1m	15m	0.8m	61.5 sq m	25m diameter

Note: The height quoted in Table 6 includes the minimum clearance required for the particular vehicle. The critical dimensions listed are for manoeuvring LCV, MCV and HCV and do not include space for loading or unloading freight. Adequate on-site space must be provided for loading including room to operate forklifts.

Forklifts used to lift pallets generally have lifting capabilities that provide for maximum lifts of between 2.5m and 3m. Doorway heights and manoeuvring space must be provided to accommodate these vehicles. Loading platforms should be provided whenever possible. Platform height is normally a compromise; even the same vehicle will have varying spring and tyre depression depending on its load. One metre from the ground is about right for MCV, 1.2m for HCV. For LCV a platform height of 0.4m should suffice.

Vehicle characteristics

On roads, geometric design for HCV involves knowledge of various vehicle characteristics relating to the driving task such as safe stopping sight distances when approaching crest vertical curves and horizontal curves. Other factors considered are acceleration, roll stability and grade.

For freight handling facilities on commercial sites, designing for HCV involves knowledge of vehicle characteristics such as truck turning circles, tracking curves and pavement design.

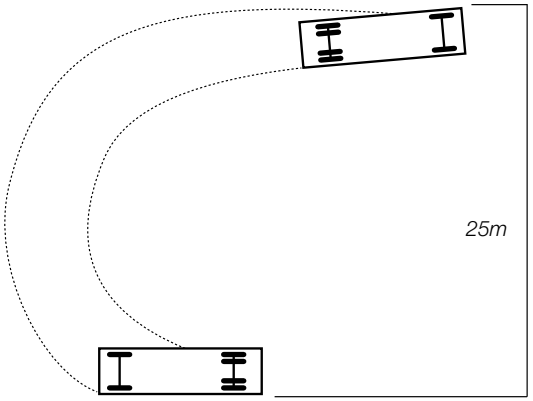


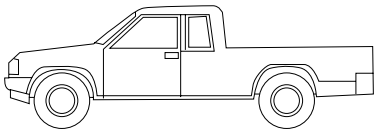
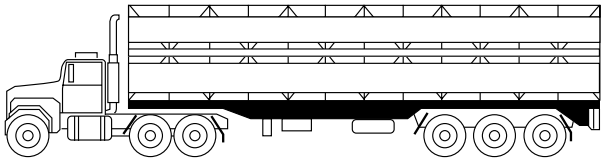
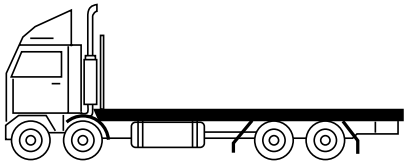
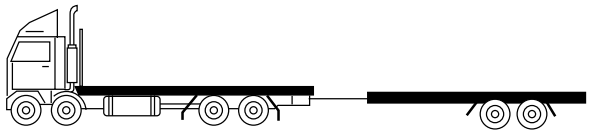
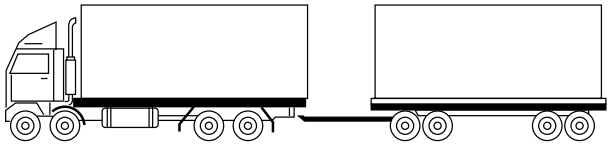
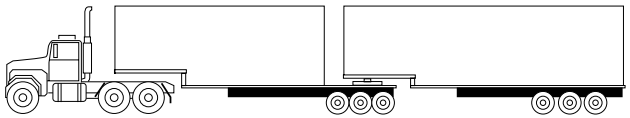
Diagram 2.

Note full lock U-turn for MCV and HCV

The following facility features must be taken into account:

- Accessway and driveway widths[5,6,8] (see Section G. Design Standards and Guidelines for these references);
- Overhanging obstructions[5,6,8;]
- Speed humps[5,6,8;]
- Horizontal and vertical clearances[5,6,8] (Diagram 1);
- Driver visibility[5,6,8;]
- Ramps and gradients[5,6,8]

Table 7 – Vehicle type

Vehicle type		**Vehicle type**	
Light Commercial Vehicles (Maximum length 12.6m)		Heavy Commercial Vehicle - Semi-trailers (Maximum length 18m)	
Medium Commercial Vehicles (Maximum length 12.6m)		Heavy Commercial Vehicle - Simple trailers (Maximum length 20m)	
Heavy Commercial Vehicle - Full trailers (Maximum length 20m)		Heavy Commercial Vehicle – Towing two trailers (Maximum length 20m)	

Summary

- Consideration must be given to the dimensional limits and characteristics of vehicles that, in the foreseeable future, will be driven onto the site as part of freight handling operations. This ensures the safe and convenient handling of all types of vehicles and their loads.
- To transport bulk goods in an economic and efficient manner, freight forwarding companies prefer to use large, articulated truck and trailer combination HCV, so these vehicles should be provided for in any design.
- The safe and convenient on-site handling of freight is essential to the efficient running of a business. Inadequate provision for freight handling can be addressed by:
  - Employing sound site design practices;
  - Planning for the future expansion of a business; and
  - Ensuring that excellent freight handling management practices are used to advantage.

Key outcomes:

1. Appropriately designed on-site accesses, driveways, manoeuvring and loading areas for large articulated truck and trailer combination HCV.
2. 'Drive-through' access for on-site freight handling facilities for large HCV.
3. Separate, dedicated loading facilities for LCV, MCV and HCV commonly used to service businesses.

Guidelines:

[4] Land Transport New Zealand: RTS 16 – Guide to heavy vehicle management.
[5] Transit New Zealand: Road Research Report No. 32 – Site Design for Heavy Vehicle Facilities.
[6] Transit New Zealand: Road Research Report No. 32A – Annex: Site Design for Heavy Vehicle Facilities.
[7] Land Transport Rule: Vehicle Dimensions and Mass 2002.

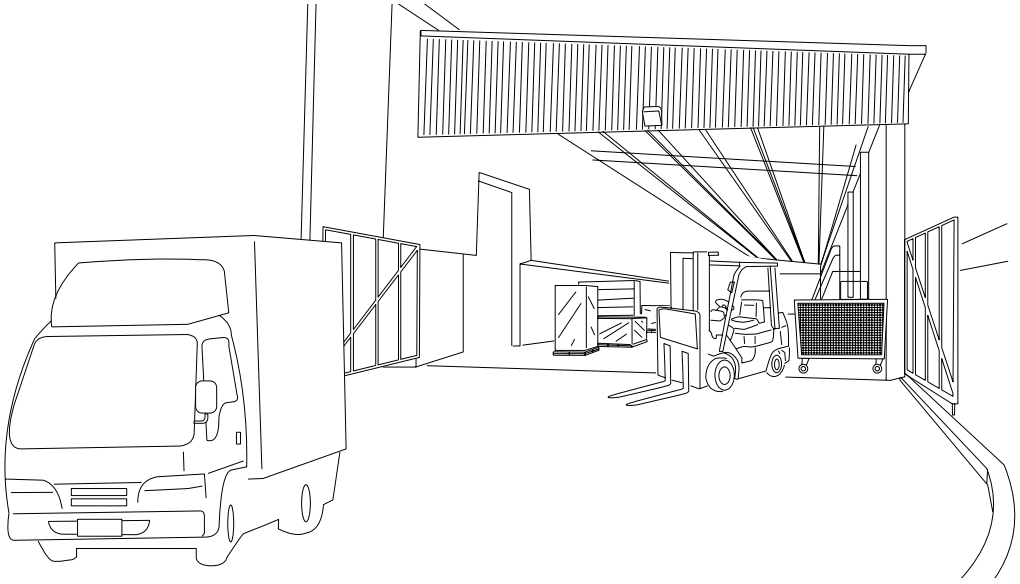


Figure 4.

Drive-through covered on-site freight terminal. Note excellent access for all classes of freight vehicles. Temporary storage of pallets comprises efficiency of facility, as there is insufficient space for trucks to overtake stationary vehicles within the loading area.

Section C: Location and Design of Site Access

This section considers accessibility to commercial premises and mobility of freight vehicles on road networks essential to the conduct of business throughout the Canterbury Region. The on-site provision of queuing space, through-routing ability and turning facilities for freight vehicles can affect turnaround efficiency and are major factors in controlling site safety.

Excellent site access and interface with frontage road(s) is the goal. Factors that influence the design of freight / road / business interfaces are:

- **Road classification** and whether the frontage road is, or functions as, a local, collector or arterial road will dictate the level of access control required;
- **Controls** on site access must be compatible with traffic controls on the adjacent road network;
- On-site freight handling activity must be tailored to comply with **local restrictions** on the adjacent road network; for example prohibitions on the movement of HCV and residential street bans on the through-routing of trucks; and

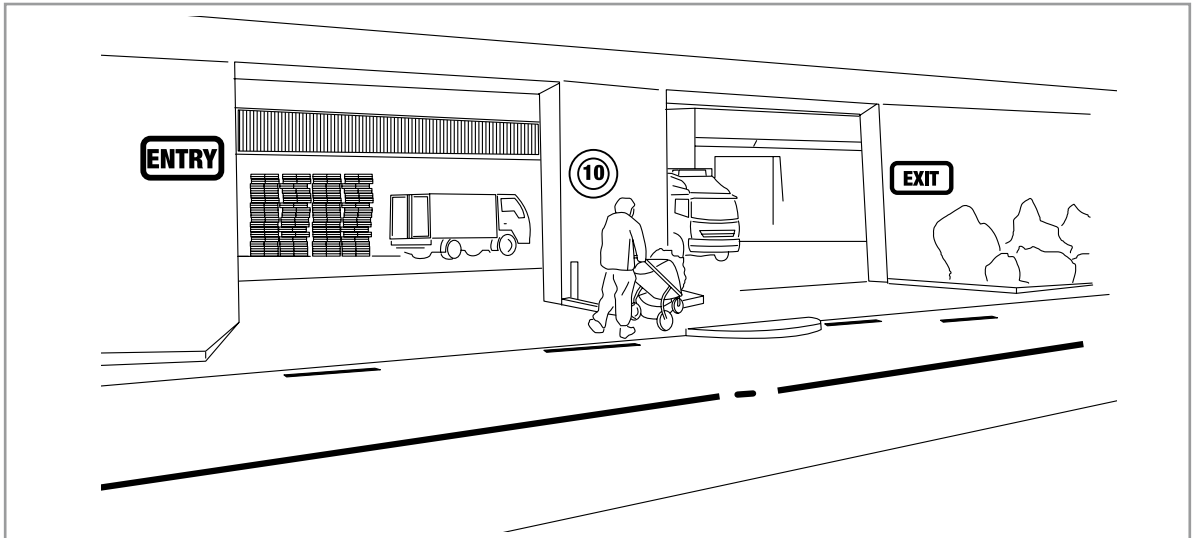


Figure 5.

Separate entrance / exit to freight facility off an urban collector road. Note secure site without sufficient separation between the entrance and exit gateways compromising pedestrian safety and encouraging drivers of freight vehicles to ignore the 'Entry' / 'Exit' signs.

- **Traffic congestion** on the adjacent local and arterial network may impose restraints on operating hours;
  - **Network improvements** including road reconstruction and existing / proposed traffic management may impose restraints on the future movement of freight;
  - **Crash records**, including any information on truck involvement in crashes occurring on the adjacent road network can be used to determine safe routes to the site; and
  - **Vehicle entrances**, including the number and form of entrances (kerb cut-downs or drive-in), width and the need for separate freight entrances / exits, must be determined.

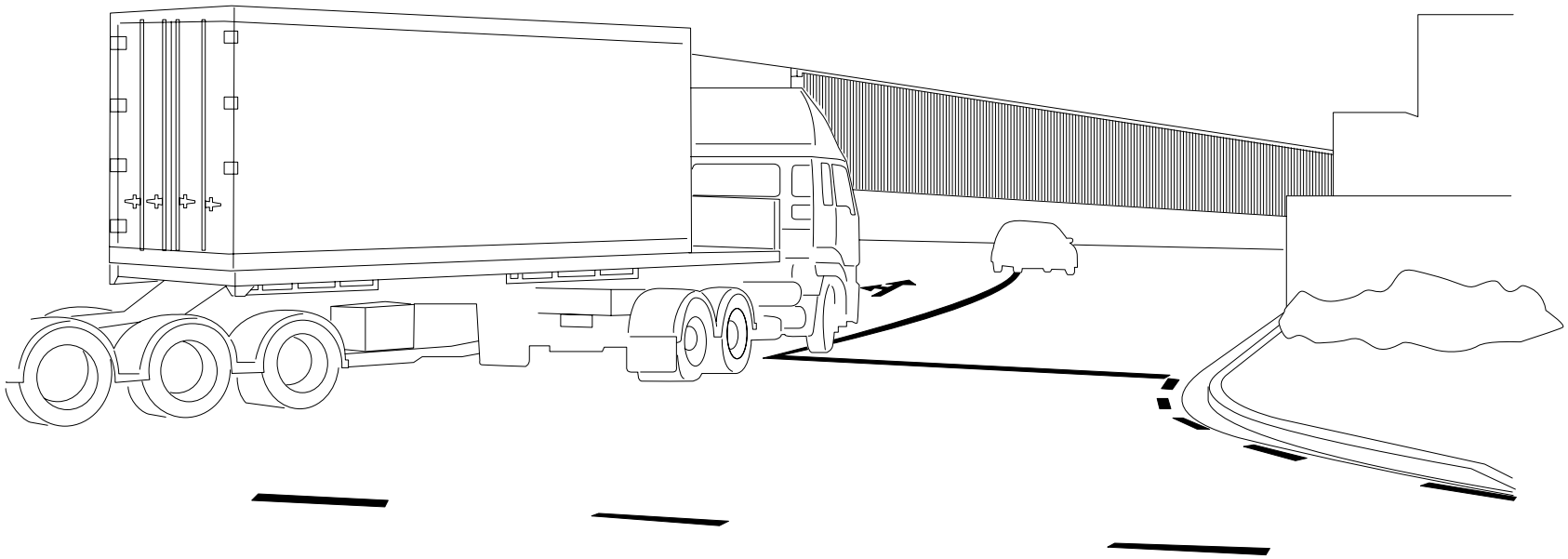


Figure 6.

A strategic freight hub entrance fronting a collector road. Cars and LCV share a common entrance with MCV and HCV. HCV entering the hub at the same time as a car exits the facility. Note generous width of entrance into the hub and yard space.

Summary

- The patterns of development in the Region, both in urban and rural situations, influence transport choices and have consequences on the profitability of businesses and quality of life.

Key outcomes:

1. The preferred route for freight transport provides space for turns both onto and from the site.
2. Separate access from the frontage road to on-site freight handling facilities.
3. One-way flow through the freight handling facility.

Guidelines:

[4] Land Transport New Zealand: RTS 16 – Guide to heavy vehicle management.
[5] Transit New Zealand: Road Research Report No. 32 – Site Design for Heavy Vehicle Facilities.
[6] Transit New Zealand: Road Research Report No. 32A – Annex: Site Design for Heavy Vehicle Facilities.

Section D: Site Layout

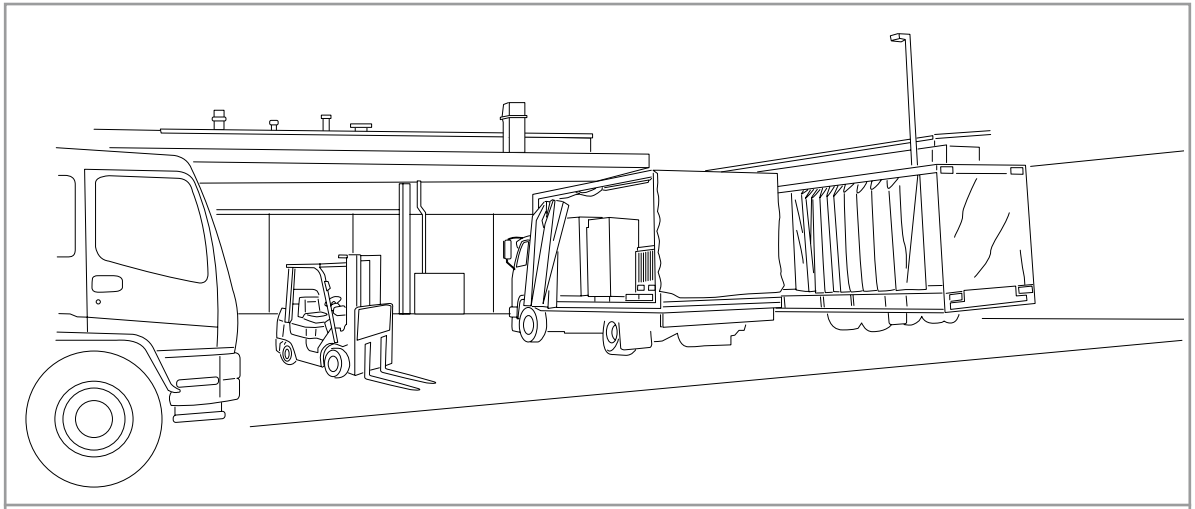


Figure 7.

Site loading facility for a supermarket. Note curtain sided trucks being unloaded. The truck in the left foreground is waiting to enter the freight yard where forklifts operate to unload pallets from freight vehicles. Loading space is sufficient for the current activity generated by freight. HCV have difficulty manoeuvring within the space provided.

This section considers principles to be taken into account when designing a site serviced by freight vehicles. Its focus is on designing driveway, manoeuvring and handling areas for all freight vehicles expected to visit the site. To provide for freight vehicle movements on-site the following factors influence the appropriate design:

- The dimensions of LCV, MCV and HCV servicing the site. Allowing for a range of differing sizes of trucks servicing the site is most important. If insufficient space is provided for HCV then this could result in the need to double handle merchandise delivered to the site;
- The width of the entranceway and clearance to buildings and other fixed structures;
- Adequate queuing and passing facilities for HCV on driveways servicing the site;
- Adequate on-site facilities for manoeuvring these vehicles and clear access to parking and loading facilities; and
- The existence of a freight management plan that provides for security and logistics.

Effective freight handling is at the 'core' of the successfully functioning of a site. When considering requirements for managing freight, other site development constraints (e.g. configuration of buildings, car-parking, access locations) will need to be recognised. The importance of freight must be reflected in the balance struck between the different activities occurring on the site.

Car parking must also be provided in areas separated from freight handling facilities. Access to these car parks must be available during business hours and if not designed with business hours access in mind can constrain the on-site movement of freight.

Other site constraints include:

- Natural and existing built environments, waterways, plantings and neighbouring businesses;
- Vertical separation of business activities, basement car parking / goods handling, first floor retail operations and offices;
- The grouping of proposed buildings on a site and how businesses relate to one another; and
- The need to service businesses separately or from a dedicated freight terminal.

Unimpeded access to sites for delivering bulk freight must be provided for 24 hours a day, 7 days a week.

In New Zealand, most bulk deliveries are made using curtain sided trucks and trailer units with 800kg pallets loaded by forklifts. Rear loading trucks are not so common.

Although some trailers have both side and rear loading flexibility, allowance must be made on site to handle both types of vehicle.

Truck washing facilities must be available at demolition and other sites where hazardous materials are being handled. The transport of stock and raw materials, steel and timber will require specialist handling facilities. These vehicles often have flat decks and trailers loaded from the rear.

Summary

- Sufficient space for the movement of LCV, MCV and HCV to and from the site is essential for the safe and efficient management of freight. This may involve considering these amenities:
  - A separate on-site freight terminal where freight is unloaded at a central location and distributed internally (malls and bulk storage depots);
  - Dedicated loading zones for LCV within public car parking areas for servicing shops (malls) and on-street in town centre CDB and strip shopping areas;
  - Overnight parking / storage facility for HCV; and
  - Space to accept over dimension vehicles to load / unload on-site.

Key outcomes:

1. Freight handling facilities separate from parking areas and other visitor orientated activities on the site.
2. Sufficient space for HCV entering the site to pass exiting HCV on driveways, queue and manoeuvre within the site.
3. On-site 'Driver Safe' practices encouraged by the management of HCV movements. Fewer freight delivery movements using large HCV have positive outcomes, as does time-of-day service delivery to avoid on-site conflict.

Guidelines:

[4] Land Transport New Zealand: RTS 16 – Guide to heavy vehicle management.
[5] Transit New Zealand: Road Research Report No. 32 – Site Design for Heavy Vehicle Facilities.
[6] Transit New Zealand: Road Research Report No. 32A – Annex: Site Design for Heavy Vehicle Facilities.

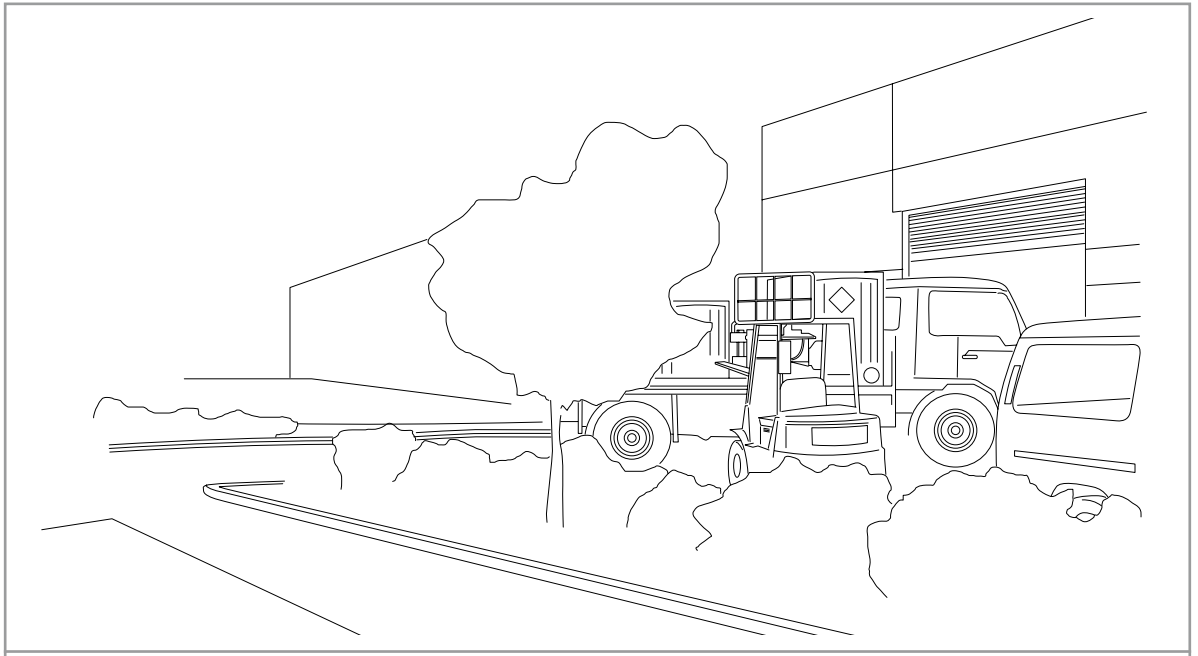


Figure 8.

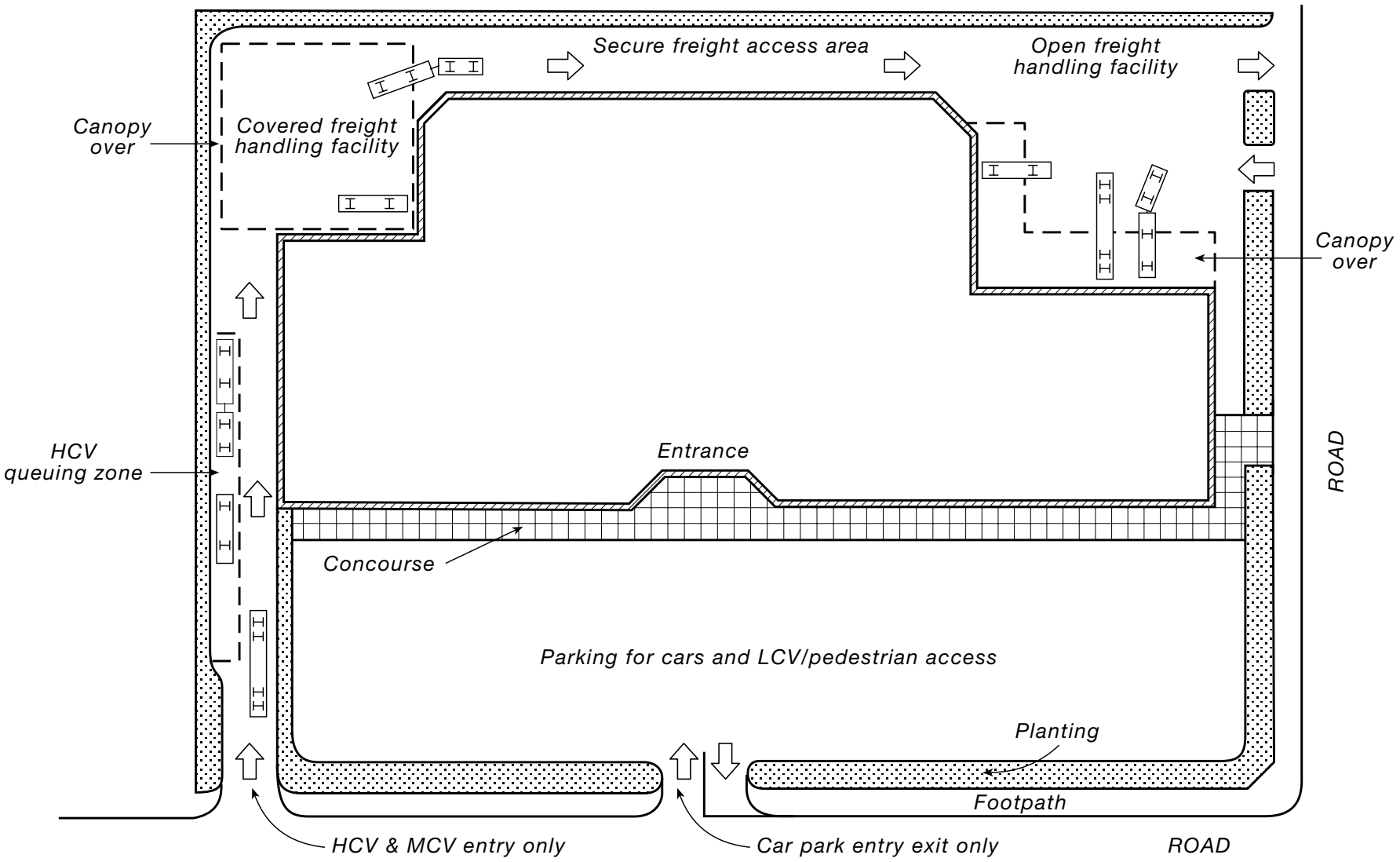
A site loading area fronting a local road. Note the open sided truck blocking the off-street parking facility and a forklift operating in a confined space between the truck and a parked panel van.

Section E: Example Site Layout

This example site layout applies the guidance and key outcomes recommended throughout the Guide. The site layout is based on a large retail building. For most sites, the design consideration required for vehicle movements, freight delivery and handling facilities set out in this example will apply.

The following criteria were used to develop the example site layout;

- The site layout is based on a building complex of approximately 10,000 sqm (the size of the building and car park is similar in size to the original retail complex on the Madras St / Moorhouse Ave corner in Christchurch).
- A corner site allows more flexibility with designers being able to choose access points from two roads. However, the territorial authority will have planning requirements that will restrict the number and position of access points;
- Dedicated entry / exit facilities have been provided for freight deliveries involving MCV and HCV. LCV will also use these entrances;
- The public entrance / exit on the frontage road is two way and would also be used by some LCV. MCV and HCV freight vehicles would not normally enter this area;
- Parking facilities for cars, cycles, motorcycles, and loading facilities for LCV, can be provided in the area shown to satisfy the requirements of a city or district plan;
- A site of this size may not require two freight handling facilities of the scale shown on the plan. The 'covered' and 'open' freight handling facilities shown illustrate two scenarios:
  1. A single lane entry for freight vehicles from the frontage road to a covered loading facility with an exit onto another road;
  2. A 'drive-in / drive-out' facility for freight vehicles from a roadway to an 'open' loading facility;
- A HCV 'queuing zone' is provided for entry into the covered freight handling facility;
- A central freight terminal can be operated in a development of this size. Management of freight can be managed safely and efficiently from either of the freight handling facilities shown; and
- The key outcomes from the 'Site Layout' section of the guide were central to the development of this example.



FREIGHT HANDLING FACILITIES

Section F: The Six Step Design Process

1

Determine the demand for freight (refer to 'Planning for Freight' Section A)

Table 1 – Freight trip generation

Freight trip generation (UK Freight Transport Association)	
Type of activity	**Average number of visits per day**
CBD (100m2)	1.5 - 4
Bulk Retail Areas (100m2)	1- 2
Processing Plants / Factories (100m2)	1.5 - 4
Shopping malls (100m2)	1 - 4
Distribution Centres (Hectare)	30 - 60
Freight Hubs (Hectare)	100 - 160

2

Determine the type of freight vehicles using the site (refer to 'Planning for Freight' Section A)

Table 2 – Types of freight vehicles expected to service businesses

	LCV	MCV	HCV Full Trailers	HCV Semi-trailers	HCV towing two trailers	Tour coaches & buses
CBD	Yes Frequently each day	Yes Daily	Yes Occasionally	Yes Occasionally	Yes Occasionally	Yes Daily
Bulk Retail	Yes Daily	Yes Frequently each day	Yes Daily	Yes Occasionally	Yes Daily	No
Processing Plants / Factories	Yes Frequently each day	Yes Daily	Yes Daily	Yes Occasionally	Yes Daily	No
Shopping Malls	Yes Frequently each day	Yes Daily	Yes Daily	Yes Occasionally	Yes Daily	No
Distribution Centres	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	No
Freight Hubs	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	Yes Frequently each day	No

3

Determine the physical freight facilities required on the site (refer to 'Planning for Freight' Section A)

Table 3 – Physical features of the site

Parking, manoeuvring and queuing space for sites			
Type of activity	**Typical minimum district / city plan requirement (Loading and unloading bays)**	**Recommended manoeuvre area and bays required**	**Queuing space**
CBD (100m2)	1 bay/1000m 2 GFA	For LCV and all MCV	Not required
Bulk Retail Areas (100m2)	1 bay/1600m 2 GLFA for the first 6400m 2 GLFA 1 bay/5000m 2 GLFA thereafter	For LCV and all MCV	Not required
Processing Plants / Factories (100m2)	1 bay/1600m 2 GLFA for the first 6400m 2 GLFA 1 bay/5000m 2 GLFA thereafter	For LCV and all HCV	For two HCV
Shopping Malls (100m2)	1 bay/1000 m 2 GFA (1 space minimum)	For all HCV	For one HCV
Distribution Centres (Hectare)	1 bay/1000 m 2 GFA (1 space minimum)	For LCV and all HCV	For two HCV
Freight Hubs (Hectare)	1 bay/1000 m 2 GFA (1 space minimum)	For all HCV	For two HCV

6

Determine the location and design of the access to the site (refer to 'Location and Design of Site Access' Section C)

1. The access to the site is located in a manner that recognises the road environment.
2. Sufficient space is provided for freight transport to turn both onto and from the site without delay.
3. Sufficient space for HCV entering the site to pass exiting HCV on driveways, queue and manoeuvre within the site.
4. On-site freight handling facilities are provided with a dedicated separate access from the frontage road.
5. One-way traffic flow through the freight handling facility.

5

Determine the overall site layout (refer to 'Site Layout' Section D)

1. Separate freight handling facilities from parking areas and other visitor-oriented activities on the site are provided.
2. A separate on-site freight terminal is provided where freight is unloaded at a central location and distributed internally (malls and bulk storage depots).
3. Dedicated loading zones for LCV within public car parking areas for servicing shops (malls) and on-street in town centre CDB and strip shopping areas are provided.
4. Overnight parking / storage facility for HCV are provided if there is demand.
5. Space to accept over dimension vehicles to load / unload on-site are provided if there is demand for these delivers.

4

Determine the size of the freight facilities (refer to 'Vehicle Size and Characteristics' Section B)

Table 6 – LCV, MCV and HCV (refer to Definitions) clear dimensions to fixed obstructions

Vehicle	Typical industries	Height	Width	Length	Side clearance	Parking area required	Turning circle
LCV	Refer to table 2	4.5m	3.5m	13m	0.5m	45.5 sq m	20m dia
MCV	Refer to table 2	4.5m	4.1m	15m	0.8m	61.5 sq m	25m dia
HCV Full trailers	Refer to table 2	4.5m	4.1m	21m	0.8m	86.1 sq m	25m dia
HCV Semi-trailers	Refer to table 2	4.5m	4.1m	21m	0.8m	86.1 sq m	25m dia
HCV towing two trailers	Refer to table 2	4.8m	4.1m	21m	0.8m	86.1 sq m	25m dia
Tour coaches and buses	Hotels / motels	4.5m	4.1m	15m	0.8m	61.5 sq m	25m dia

Section G: Design Standards and Guidelines

1 - Local Authority District or City Plans
All District and City Councils' have District and City Plans, prepared under the Resource Management Act 1991. Each District or City Plan will be different, reflecting the different resource management issues and objectives for that territorial authority area.

2 - Road Controlling Authority standards for access to network roads
District and City plans, policies and standards.

3 - Austroads: Planning for Freight in Urban Areas Guidelines
This document, compiled to assist people working in transport planning and engineering was published in 2003. It is also used as a reference for planners, economists and other specialists involved in urban freight planning.

4 - Land Transport New Zealand: RTS 16
This 'Guide to heavy vehicle management' provides information on dimensional limits, size and weight currently operating on roads in New Zealand, with a section on over dimension vehicles. These two sections in particular are important for planning the safe on-site management of LCV and HCV.

5 - Transit New Zealand: Road Research Report No. 32 – Site Design for Heavy Vehicle Facilities
This research report 'Site Design for Heavy Vehicle Facilities' updated to 1993, was compiled to assist architects and site planners designing on-site facilities for trucks and buses. It focuses on overall design and spatial arrangements for manoeuvring and parking vehicles.

6 - Transit New Zealand: Road Research Report No. 32A – Annex: Site Design for Heavy Vehicle Facilities.
This Annex: 'Site Design for Heavy Vehicle Facilities' summarises seven unpublished, research studies undertaken between 1985 and 1990 from which the 'Transit New Zealand Research Report No. 32' was prepared. The Annex was published in 1994.

7 - Land Transport Rule: Vehicle Dimensions and Mass 2002 (VDM Rule).
This is the Land Transport Rule governing the dimension limits and mass for vehicles used on roads in New Zealand.

8 - FTA-Freight Transport Association - Designing for deliveries, 1983.
This Guide, published by the UK Freight Transport Association, includes advice on vehicle characteristics, truck turning and manoeuvring. It is a valuable resource for planners and is illustrated with diagrams of site designs for manoeuvring trucks.

Acknowledgements

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Want to know more?

Copies of Keeping freight on the move and the Canterbury Regional Land Transport Freight Action Plan can be obtained by:

- Visiting the website: **www.ecan.govt.nz**
- Phoning ECan Customer Services:
  353-9007 in Christchurch of toll free on
  0800 EC INFO **(0800 324 636)**
- Emailing the Land Transport Section:
  ecinfo@ecan.govt.nz

Environment Canterbury
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