CHAPTER 4

SITE PLANNING & EXTERNAL FIRE FIGHTING PROVISION

4.1 GENERAL

4.1.1 The purpose of this Chapter of the Code is to make provision for space around buildings to enable effective mounting of rescue and external fire fighting operations.

General

4.2 PROVISION FOR EXTERNAL ACCESS TO BUILDING FOR FIRE FIGHTING AND ACCESSIBILITY OF SITE TO FIRE FIGHTING APPLIANCES

4.2.1 Accessway shall be provided for accessibility of site to fire fighting appliances. To permit fire-fighting appliances to be deployed, the accessway shall have a minimum width of 6m throughout its entire length. Access openings shall be provided along the external walls of buildings fronting the accessway to provide access into the building for fire-fighting and rescue operations.

Introduction

Accessway shall be provided to within 18m of breeching inlet for buildings that exceed the habitable height of 10m.

4.2.2 ACCESSWAY FOR FIRE FIGHTING APPLIANCES

Provision of accessway

(a) (i) For buildings under Purpose Group I, accessway will not be required, irrespective of the building height. However, in cluster housing developments, (Cluster housing is landed housing with shared communal facilities), fire engine access road with a minimum 4m width shall be provided for access by pump appliance to within a travel distance of 60m from every point on the projected plan area of any building in the housing developments.

(ii) For buildings under Purpose Group II, no accessway will be required for buildings that do not exceed the habitable height of 10m. However, fire engine access road having minimum 4m width for access by pump appliance shall be provided to within a travel distance of 60m of every point on the projected plan area of the building.

This requirement for fire engine access road shall not apply to non-residential standalone building, such as clubhouse, carpark, etc. (excluding guardhouse and substation) that are located within the housing development. The non-residential standalone building shall comply with Cl.4.2.2(a)(iv) and Cl.4.2.2(b)(i).

(iii) For buildings under Purpose Group II that exceed the habitable height of 10m, fire engine access road shall be provided within a travel distance of 18m to the entrance of all exit staircases where the landing valves (dry or wet riser) are provided in accordance with Cl.6.2.2(b). The fire engine access road shall have a minimum 4m width and designed to sustain the load of stationary 30 tonnes fire engine fighting appliance, and shall be provided within 18m of dry riser breeching inlets of the building. The breeching inlets shall be located at the exterior, readily visible and accessible from the fire engine access road.

(iv) For buildings under Purpose Groups III, IV, V and VII not exceeding the habitable height of 10m, accessway will not be required. However, provision of fire engine access road having minimum 4m width for pump appliance will be required to within a travel distance of 45m of every point on the projected plan area of the building.

(v) In the case of basement, the fire engine access road shall be provided within a travel distance of 18m to the entrance of all exit staircases that are provided with landing valve (dry or wet riser) in accordance with Cl.6.2.2(b). The measurement of 18m shall be between the fire engine access road and the entrance of exit staircase.

(b) (i) For buildings under Purpose Groups III, IV, V and VII exceeding the habitable height of 10m, accessway shall be located directly below the access openings to provide direct outreach to the access openings. Accessway shall be provided based on the largest gross floor area of the following:

(1) any floor including 1st storey,

(2) if there are more than one floor interconnected, the aggregate areas of all the floor interconnected.

Minimum	1/6 perimeter (min 15m)
2000m² to 4000m²	¼ perimeter
>4000m² to 8000m²	½ perimeter
>8000m² to 16,000m²	¾ perimeter
>16000m²	island site access

For buildings protected by an automatic sprinkler system, the floor area shall be doubled as follows:

Minimum	1/6 perimeter (min 15m)
4000m² to 8000m²	¼ perimeter
>8000m² to 16,000m²	½ perimeter
>16,000m² to 32,000m²	¾ perimeter
>32,000m²	island site access.

(c) (i) For buildings under Purpose Groups VI and VIII, accessway shall be provided for fire fighting appliances. The provision of accessway shall be calculated based on the following gross cubical extent of the building as follows:

Minimum	1/6 perimeter (min 15m)
>28,400m³	¼ perimeter
>56,800m³	½ perimeter
>85,200m³	¾ perimeter
>113,600m³	island site access.

For buildings protected by an automatic sprinkler system, the cubical extent of the building can be doubled as follows:

Minimum	1/6 perimeter (min 15m)
>56,800m³	¼ perimeter
>113,600m³	½ perimeter
>170,400m³	¾ perimeter
>227,200m³	island site access.

(d) (i) Accessway shall be metalled or paved or laid with strengthened perforated slabs to withstand the loading capacity of stationary 30 tonnes fire-fighting appliance. Please see Appendix (G) for technical data on fire-fighting appliance.

Accessway

(ii) The accesssway shall have a minimum width of 6m throughout. Such accessway must be able to accommodate the entry and manoeuvring of fire engine, extended ladders pumping appliances, turntable and/or hydraulic platforms.

Width of accessway

(iii) Accessway shall be positioned so that the nearer edge shall be not less than 2m or more than 10m from the centre position of the access opening, measured horizontally.

Location

	(iv)	Accessway shall be laid on a level platform or if on an incline, the gradient shall not exceed 1:15. Access road shall be laid on an incline not exceeding a gradient of 1:8.3.	Gradients of accessway and access road
	(v)	Dead end accessway and fire engine access road shall not exceed 46 m in length or if exceeding 46m, be provided with turning facilities as shown in Diagram 4.2.2(d)(v).	Turning facilities
	(vi)	The outer radius for turning of accessway and fire engine access road shall comply with the requirements as shown in Diagram 4.2.2(d)(vi).	
	(vii)	Overhead clearance of accessway and fire engine access road shall be at least 4.5m for passage of fire fighting appliances.	Overhead clearance
	(viii)	Public roads can serve as accessway provided the location of such public roads is in compliance with the requirements of distance from access openings.	Public road
	(ix)	Accessway and fire engine access road shall be kept clear of obstructions and other parts of the building, plants, trees or other fixtures shall not obstruct the path between the accessway and access openings.	Obstruction
(e)	(i)	All corners of accessway shall be marked.	Marking of fire engine accessway.
	(ii)	Marking of corners shall be in contrasting colour to the ground surfaces or finishes.	
	(iii)	Accessway provided on turfed area must be marked with contrasting object (preferably reflective) that is visible at night. The markings are to be at an interval not more than 3m apart and shall be provided on both sides of the accessway.	
	(iv)	Sign post displaying the wordings 'Fire Engine Access - Keep Clear' shall be provided at the entrance of the accessway. Size of wordings shall not be less than 50mm.	

4.2.3 ACCESS OPENING TO BUILDING FOR FIRE FIGHTING

Definition

(a) Openings on the external wall for external fire fighting and rescue operation. Access openings shall include unobstructed external wall openings, windows, balcony doors, glazed wall panels or access panels. Windows, doors, wall panels or access panels must be readily openable from the inside and outside. Inside and outside of access openings shall be unobstructed at all times during the occupancy of the building.

(b) Where an external wall which faces the accessway has external openings on each storey level that meet the requirements of sub-clauses 4.2.3(a), 4.2.3(e) and 4.2.3(f), there is no need to designate any access opening.

(c) An external wall which faces the accessway and is windowless or a blank-wall shall be provided with access openings at each storey level.

(d) Panels to access openings shall be posted with either a red or orange triangle of equal sides (minimum 150mm on each side), which can be upright or inverted, on the external side of the wall and with wordings "Fire Fighting Access - Do Not Obstruct" of at least 25mm height on the internal side.

Signage

(e) Access openings shall be not less than 850mm wide by 1000mm high with sill height of not more than 1100mm and head height not less than 1800mm above the inside floor level. The access opening shall not be placed at plant/ store room, staircase, smoke-stop lobby or “dead space”. It shall be placed against an occupied space.

Size

(f) Number and position of access openings for buildings other than residential:

(i) For buildings under Purpose Groups III, IV, V and VII exceeding the habitable height of 10m up to 60m, access opening is required at every storey level, other than 1st storey, opening directly onto accessway.

Buildings other than residential

(ii) For building under Purpose Groups VI and VIII, access openings located over accessway shall be provided and evenly distributed along the external walls up to a habitable height of 60m.

Access opening to compartment or spaces

(iii) Access openings shall be remote from each other and located along the side of the building. Such access openings shall be spaced at not more than 20m apart measured along the external wall from centre to centre of the access openings.

Position

(iv) For buildings under Purpose Groups III IV, V, VI, VII and VIII where an area or space has a ceiling height greater than 10m, additional high level access openings for smoke venting and fire-fighting purposes shall be provided and located in the external walls opening into the area or space.

Additional openings

(g) The provision of access openings shall not be applicable to buildings under Purpose Groups I and II, including buildings under Purpose Group II that have non-residential uses located in the same buildings.

4.3 ACCESS TO BUILDINGS WITH RISING MAINS

Buildings fitted with rising mains and automatic sprinkler system shall have accessways for pumping appliances within 18m of the breeching inlet. The breeching inlets shall be visible from the accessways.

Access to buildings with rising mains

4.4 PRIVATE FIRE HYDRANT

4.4.1 REQUIREMENTS

(a) (i) Every part of a fire engine access road and/or an accessway in a private lot shall be within an unobstructed distance of 50m from a hydrant. Where a public hydrant conforming to such requirement is not available, private hydrant(s) shall be provided (see diagram 4.4.1(a)).

Private fire hydrant

(ii) Existing public hydrants along one side of a public road shall not be designated to serve developments that are sited across the other side of the public road, except for a one-way or two-way lanes road.

(b) In situations where more than one private hydrants are required, the hydrants shall be located along the fire engine access road and/or an accessway such that every part of the access road and/or accessway is within an unobstructed distance of 50m from any hydrant (see diagram 4.4.1(b)).

(c) Siting and types of fire hydrants shall comply with the requirements stated in SS 575: Code of Practice for Fire Hydrant Systems and Hosereels.

(d) For a building that is required to have island site accessway under clause 4.2.2(b), the hydrant pipe shall be a ringed system. Isolation valves shall be provided on the hydrant ring such that any section of ring, with a maximum of one fire hydrant, can be isolated when required for maintenance without affecting the water supply (both designed pressure and flow) to the other fire hydrants. Locking device shall be provided to lock the valves in open position during normal operation.

4.4.2 WATER SUPPLY FOR PRIVATE HYDRANT

Water supply for private hydrant

Provision of water supply for private hydrant system where required by this Code shall comply with one of the following requirements:

(a) Private fire hydrants installed at reduced level 125m and below can receive direct supply from public water main. If the flow and pressure from the public water mains cannot meet the hydrant requirements, a storage tank of sufficient capacity with the requisite pumping facilities shall be provided. Private fire hydrants receiving direct supply from public water mains shall comply with:

(i) The nominal bore of the hydrant pipe and the bulk water meter shall not be less than 150mm in diameter; and

(ii) The running pressure/flow at the hydraulically most unfavourable hydrant of the private hydrant system shall comply with the following :

(1) Running pressure >= 0.9 x (running pressure of the nearest public hydrant – pressure drop across the bulk water metre); and

(2) Flow Rate >= 0.9 x water flow of the nearest public hydrant or >= total flow demand (as required in Table 4.4.2) of the private hydrant system, provided the running pressure at the remotest private hydrant is greater than 2 bars.

Note :

- In calculating the frictional loss for the private hydrant system, the design flow rates shown in Table 4.4.2 shall be used.

- Pressure drop across bulk water metre shall not be more than 1bar.

(b) (i) Where there is only one private hydrant in the plot that is located above reduced level 125m; and

(ii) this hydrant is not the sole hydrant within 50m from any breeching inlet(s) feeding into fixed water based fire fighting system(s) including automatic sprinkler systems, dry riser systems, and wet riser systems for the building(s) standing on this plot of land;

this hydrant can be in the form of a "dry" hydrant. A "dry" hydrant shall be connected to a 150mm diameter dry pipe, which shall be connected at the other end to a four way breeching inlet. This breeching inlet shall be within 18m from any accessway or fire engine access road having minimum 4m width and within 50m from any wet hydrant, private or public. The private dry pillar shall be painted in "yellow" and labelled "dry" on the hydrant pillar. A signage indicating the location of breeching inlet shall be positioned next to the dry private hydrant.

(c) Where more than one private hydrants are located above reduced level 125m within the same plot, storage and pumping arrangements of water supply to these specified hydrants shall comply with those for wet rising mains stipulated in SS 575 and Table 4.4.2 – Water Supply & Storage Requirements For Private Hydrant. The water supply for hydrants serving residential and non-residential developments shall be as follows:

Table 4.4.2 – Water Supply & Storage requirements For Private Hydrant

Purpose Group/ Requirement	Purpose Group I & II	Purpose Group (*) III, IV, V, VII	Purpose Group (*) VI & VIII
Minimum running pressure	2 bars	2 bars	2 bars
Minimum flow rate	27 L/s	<1000m² - 38L/s <5000m² - 57L/s <10000m² - 76L/s (57L/s if sprinkler protected) Additional 19L/s for subsequence 5000 m²	500m² - 38L/s <5000m² - 57L/s <10000m² - 76L/s (57L/s if sprinkler protected) Additional 19L/s for subsequence 5000 m²
Minimum duration	45 mins	45 mins	90 mins

4.4.3 * Based on the floor area of the largest compartment in the building

Protection of hydrant mains in buildings

All hydrant mains which pass through a building shall have its full length within the building protected with fire resistance construction complying with Cl.3.8.7(c) of at least the same fire resistance as the element of structure, provided the following requirements are complied with:

(a) The hydrant mains shall be located in common circulation areas, such as car parking spaces and driveways; ie they shall not pass through private or confined spaces;

(b) No services (except sprinkler pipes) shall be located above or crossing over the hydrant mains;

(c) The hydrant mains shall be located away from explosion risk areas; and

(d) The protective enclosure to the hydrant mains shall be labelled with the words “HYDRANT MAIN” of minimum 50mm height at suitable intervals.

Diagram 4.2.2(d)(v)

Turning Facilities for Pumper Appliances (24 tonnes)

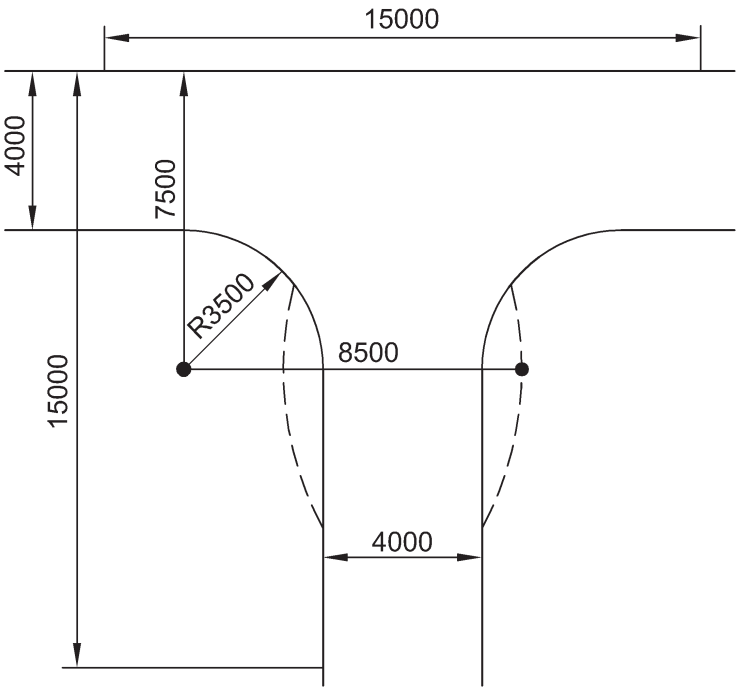


Diagram 4.2.2(d)(vi)

U-Turn Radii of Pumper Appliances (24 tonnes)

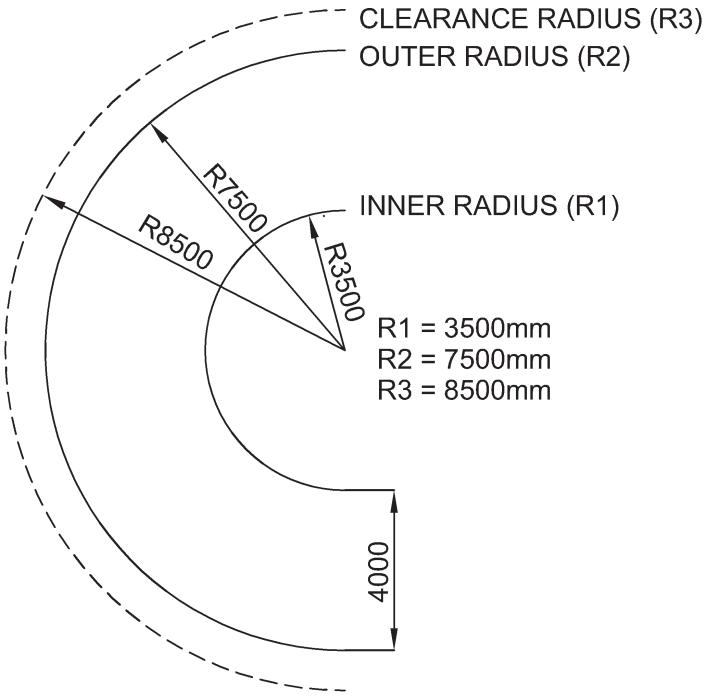


Diagram 4.2.2(d)(v)

Turning Facilities for Aerial Appliances (30 tonnes)

Applicable to buildings exceeding the habitable height of 10m

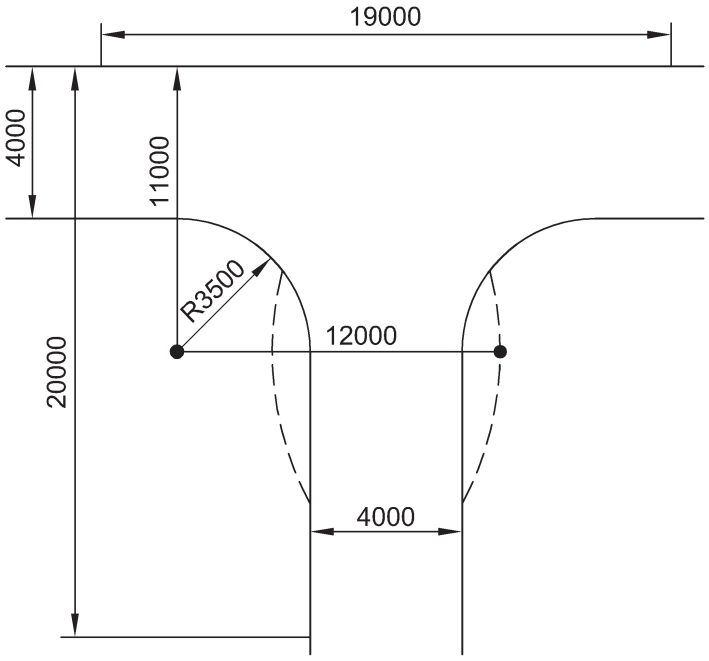


Diagram 4.2.2(d)(vi)

U-Turn Radii of Aerial Appliances (30 tonnes)

Applicable to buildings exceeding the habitable height of 10m

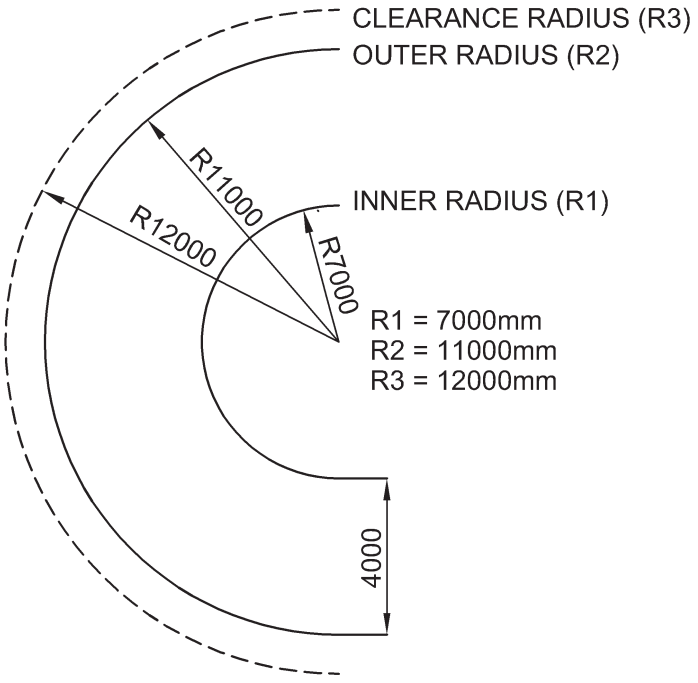
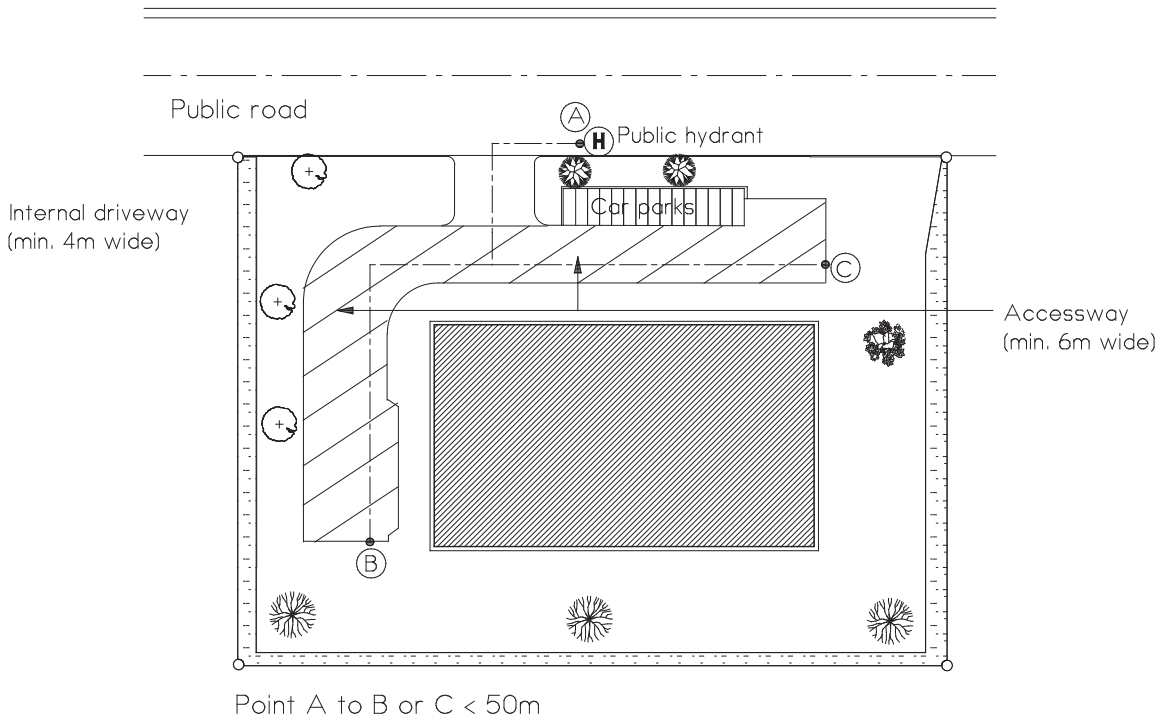


Diagram 4.4.1(a)

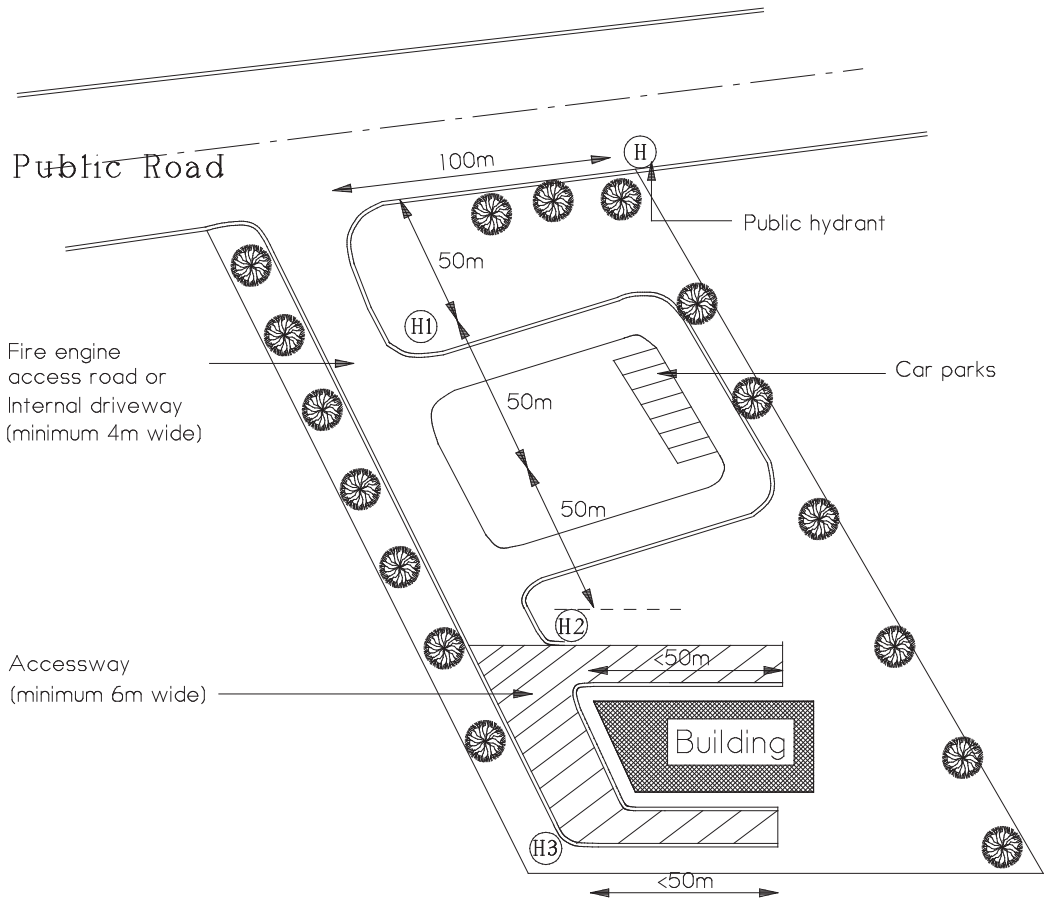
Provision Of Private Hydrant



Every part of a fire engine access road and/or an accessway in a private lot shall be within an unobstructed distance of 50m from a hydrant. Where a public hydrant conforming to such requirement is not available, private hydrant(s) shall be provided.

Diagram 4.4.1(b)

Provision Of Private Hydrant



(H1) Provision of this hydrant can be wavied if the adjoining land is used as landscape or open space only

In situation where more than one private hydrants are required, the hydrants shall be located along the fire engine access road and/or an accessway such that every part of the access road and/or accessway is within an unobstructed distance of 50m from any hydrant.