حكومة دبي
GOVERNMENT OF DUBAI

هيئة الصحة بدبي
DUBAI HEALTH AUTHORITY

DHA Health Facility Guidelines 2019

Part B – Health Facility Briefing & Design

Planning Preliminaries

800342 (DHA) | dha.gov.ae
@dha_dubai
Dubai Health Authority

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Introduction

Part B – Preliminaries of the Dubai Health Facility Guidelines covers the subject of Health Facility Briefing & Design and the various factors which look at health planning principles. All components of the Dubai Health Facility Guidelines, Part A through to Part F, endeavour to provide relevant authorities, investors and designers with the necessary information to deliver optimal, safe and efficient healthcare facilities which meet the Dubai Health Authority's requirements.

The administrative requirements for health facility applications have been covered in Part A of the Dubai Health Facility Guidelines. This Part focuses on the Architectural and Health Planning Aspects which include aspects of health service provision and facility design which are required to ensure facilities meet population and service requirement expectations. Health service provision and facility design can be further broken down and described through Role Delineation Level (RDL), Functional Planning Units (FPUs), Standard Components (SCs) and Schedules of Accommodation (SOA).

Health service requirements can be classified under broad categories such as Emergency, Inpatients, Surgery, and Intensive Care etc and define various service lines a facility may provide. Each of these may be designed for a particular level or standard of service. These are known as Role Delineation Level or RDL and numbered from 1 to 6 with level 1 representing uncomplicated health facilities such as a GP Clinics, ascending to level 6 representing complex specialist services and hospitals.

Functional Planning Units (FPUs) describe the various units which comprise a hospital including inpatient unit, emergency unit, operating unit. Within each FPU a schedule/s of accommodation (SOA) by RDL can be found and includes listings of Standard Room Types required. In order to assist designers to better understand the requirements of each room type, the Dubai Health Authority has developed a comprehensive set of Standard Components to compliment the FPUs and SOAs. These Standard Components are represented by two sets of documents; room layout sheets (RLS) and room data sheets (RDS) which can be found in these Guidelines.

Finally, this Part outlines the various requirements and considerations which are required for the development of a chosen physical site including master planning, local design requirements, floor area measurement and vehicular access. Proposed sites shall be in accordance with the requirements of the Planning and Building sections from the Dubai Municipality and UAE Green Building Guidelines. It should be noted that all parts must be taken into consideration in the design of health facilities.

Disclaimer

Although the quality of design and construction has a major impact on the quality of health care, it is not the only influence. Management practices, staff quality and regulatory framework potentially have a greater impact. Consequently, compliance with these Guidelines can influence but not guarantee good healthcare outcomes.

Compliance with these Guidelines does not imply that the facility will automatically qualify for accreditation. Accreditation is primarily concerned with hospital management and patient care practices, although the design and construction standard of the facility is certainly a consideration.

The Dubai Health Authority will endeavour to identify for elimination any design and construction non-compliances through the review of design submissions and through pre-completion building inspections, however, the responsibility for compliance with these Guidelines remains solely with the applicant.

Any design and construction non-compliances identified during or after the approval process, may need to be rectified at the sole discretion of the Dubai Health Authority at the expense of the applicant.

Therefore, the Dubai Health Authority, its officers and the authors of these Guidelines accept no responsibility for adverse outcomes in Health Facilities even if they are designed or approved under these Guidelines.

These Guidelines are not exhaustive and do not cover every eventuality that may or may not occur in the design, commissioning, operation or decommissioning of the health facility. Where there is conflict between DHA-HFG and existing laws, the latter takes precedence.

Live Documents as published on the DHA-HFG website should always be the only source of reference. Printed / downloaded version could go dated as revisions are published on the website.

Structure of the Guidelines

These Health Facility Guidelines are divided into 6 volumes in order to present information in a comprehensive and logical sequence and avoid unnecessary duplication of information between sections:

Part A	**Administrative Provisions** • Approval process for Health Facility Licensing • Prequalification of Health Facility Design Consultants • Standards and Guidelines applicable to planning and engineering
Part B	**Health Facility Briefing and Planning** (this part) • Planning guidelines • Role delineation level • Functional Planning Unit incorporating Description of each Unit • Functional Relationships with diagrams • Schedule of Accommodation for typical units • Standard Components Room Layout Sheets and Room Data Sheets
Part C	**Access, Mobility and OH&S** • Space standards • Human Engineering • Ergonomic considerations • Accessibility requirements • Signage guidance • Safety and mobility considerations for floors, grab rails, doors, windows

Part D	**Infection Prevention and Control** • General principles applicable to health facilities • Hand hygiene • Sources of Infection • Isolation Rooms • Surfaces and Finishes • Construction and Renovation
Part E	**Engineering - Building Services** • Electrical / ELV & ICT • Mechanical (HVAC) • Water Systems • Drainage Systems • Medical Gas Systems • Fuel Systems • Pneumatic Tube Systems • Fire Protection Systems (Special Areas Only) • Applicable Standards
Part F	**Feasibility Planning and Costing** A framework related to Part A licensing and methodology covering • Needs analysis • Risk Analysis • Funding strategies • Procurement strategies

All parts must be taken into consideration in the design of health facilities.

1. Terms & Abbreviations

Abbreviations used in this volume include:

Abbreviation	Meaning
CCU	Coronary Care Unit
CRT	Cathode ray tube monitors
HDU	High Dependency Unit
HVAC	Heating Ventilation and Air Conditioning
ICU	Intensive Care Unit
FPU	Functional Planning Unit
Kg	Kilogram
KPU	Key Planning Unit
M	Metres
mm	Millimetres
m^2	Square metres
MRI	Magnetic Resonance imaging
NICU	Neonatal Intensive Care Unit
RDL	Role Delineation Level
SSU	Sterile Supply Unit

The term 'End-User' in these Guidelines refers to patients, visitors, doctors, nursing staff and other support staff.

2. Planning Preliminary Information

2.1 Levels of Recommendation

2.1.1 Mandatory Requirements

Within these Guidelines, all paragraphs by default are mandatory. In situations where the text has the potential for misunderstanding, the note "mandatory" may be used to clarify any aspect which is absolutely required without re-interpretation. Even if the word "Mandatory" does not appear in the text, it does not indicate that the paragraph is optional.

This principle also applies to Schedules of Accommodation, Room Data Sheets and Room Layout Sheets. Items listed are required and only optional if indicated. Any mandatory requirement that has not been achieved has to be reflected in the non-compliance form in **Part A, Appendix 4** of these guidelines for DHA's decision.

2.1.2 Recommended Requirements

On some occasions a standard is mandatory, but a higher standard is recommended. The intention is to guide designers who wish to voluntarily upgrade the facility to a higher standard and wish to know what the higher standard is.

2.1.3 Optional Requirements

The text, Schedules of Accommodation and Room Data Sheets will indicate "Optional" for all items that that are not mandatory requirements.

2.2 Health Planning

Health Service Provision is determined by the discipline known as Health Planning.

There are two branches to this discipline; Health Service Planning and Health Facility Planning.

2.2.1 Health service planning

This discipline relates to the research, analysis and calculation of demand and supply for a given population catchment. Every competent proposal for a health service starts with a Service Plan.

Demand

A Health Service Planner uses various statistical tools as well as benchmarks and localised information to determine the raw demand. This may be represented by Occasions of Service (OOS), Average Length of Stay (ALS), Presentations Per Annum (PPA), etc. The service planner will consider inflows of patients

from other catchment areas as well as outflows to other catchment areas. The calculations will include level of self-sufficiency desired or anticipated.

The demand is typically calculated for a period of time into the future known as the Time Horizon of the Study. This may be 10 to 20 years into the future. The starting point will be known as the Base Point or Base Year. The characteristics of the population in terms of age, gender and predisposition to various diseases and socio-economic class have the greatest influence on the on the demand of each population catchment.

A Service Planner finally converts raw demand into facility units known as Key Planning Units (KPUs). KPUs may vary greatly depending on the nature of the facility. They include:

- Bed numbers of a variety of types
- Operating Room Numbers
- Birthing Room Numbers
- Emergency Treatment Cubicles
- Consultation Rooms
- Diagnostic modes of a variety of types

These KPUs are later used by Health Facility Planners to prepare a full brief for the proposed facilities.

Supply

This refers to the current supply of health facilities and the service they provide to the same population catchment. This may or may not meet the needs of that population catchment now or in the future. When considering supply, it can be the current supply or set in the future.

Service Gap

The difference between the Demand and Supply is the Service Gap which needs to be met by the provision of health facilities. The process of determining this gap and proposing solutions for meeting it is described as:

- Needs Analysis
- Feasibility Study
- Business Case

A proposal for a facility, therefore, should not commence with a block of land and design. Health Facilities are too important to be treated purely as a real-estate development. A competent Service Plan resulting in a Needs Analysis, Feasibility Study or Business Case must be at the core of any proposal.

2.2.2 Health Facility Planning

This is the discipline which aims to design facilities and meet the health service gap.

The outcome of this discipline is design and specifications for the construction of facilities or refurbishment and expansion of existing ones.

Design does not start from a blank sheet of paper. Prior to design a great deal of preparation is required. These are briefly described in the following sections.

3. Role Delineation Guide

The health service requirements can be classified under broad categories such as Emergency, Inpatients, Surgery, and Intensive Care etc. Each of these may be designed for a particular level or standard of service. These are known as Role Delineation Level or RDL and numbered from 1 to 6; level 1 representing uncomplicated health facilities, ascending to level 6 representing complex specialist services and hospitals.

Description and definition of each RDL can be found in the Figure 1 below.

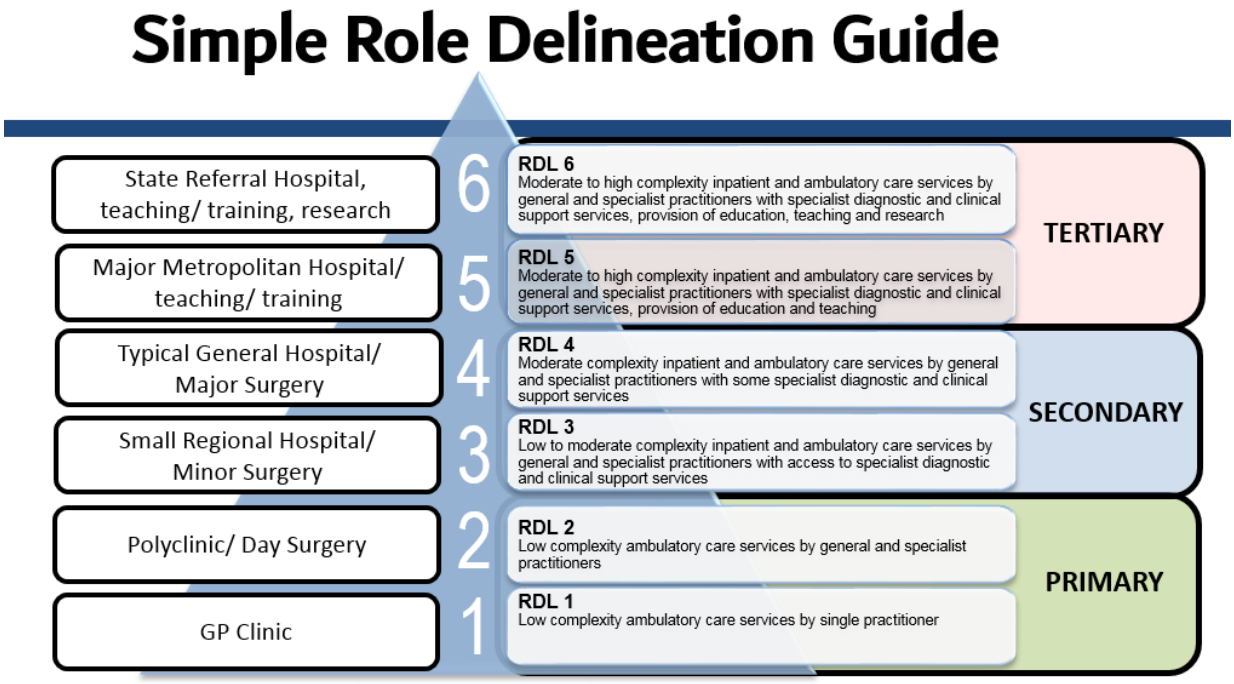

Figure 1: Simplified Role Delineation Level Guide

3.1 Role Delineation Level (RDL)

To illustrate the difference in RDL, an Intensive Care Service provided by a major Metropolitan hospital which also incorporates Teaching and Research will be at RDL 6. The same service provided at a small General hospital without Teaching and Research facilities will be at RDL 4. At higher RDLs the service provision will require access to higher levels of skill and additional, complementary services. For example, Surgery at RDL 5 will require Intensive Care services also at RDL 5 plus many more supporting services.

The relationships between all the services and the inter-dependence of the services at each RDL results in a large matrix with services one side and 6 RDLs on the other side.

The operators of health facilities and/or the designers need to decide what services they wish to provide as well as the RDL for those services. Only then, the facility requirements can be determined and verified.

For example, the number, type and size of rooms for an ICU service at RDL 6 will be different to one at RDL 4.

Any facilities which has the fundamental requirements of RDL 3 or 4 with one or more of the services and matching facilities being at RDL 5 or 6 will be regarded as a "Centre of Excellence in Oncology". By way of clarification, any service which is provided at a designated RDL may require supporting services also at certain RDL. For such requirements refer to the full Role Delineation Framework provided in Part A, Appendix

These Health Facility Guidelines provide a Role Delineation Framework which sets out the most common health services under each RDL. Under each category the requirements and dependencies are stated. The Role Delineation Framework can be found as an appendix in Part A of these Guidelines.

3.2 Role Delineation Framework

Refer to the Role Delineation Framework provided in **Part A - Appendix 6** of these Guidelines.

4. Standard Components

The FPU Schedules of Accommodation by RDL includes listings of Standard Room Types required. In order to assist designers to better understand the requirements of each room type, the International Health Facility Guidelines includes a comprehensive set of Standard Components. These Standard Components are represented by two sets of documents:

4.1 Room Data Sheets (RDS)

These are written descriptions of each room type, described under various categories:

- Room Primary Information; includes Briefed Area, Occupancy, Room Description and relationships, and special room requirements)
- Building Fabric and Finishes; identifies the fabric and finish required for the room ceiling, floor, walls, doors, and glazing requirements
- Furniture and Fittings; lists all the fittings and furniture typically located in the room
- Fixtures and Equipment; includes all the serviced equipment typically located in the room along with the services required such as power, data, hydraulics
- Building Services; indicates the requirement for communications, power, Heating, Ventilation and Air conditioning (HVAC), medical gases, nurse/ emergency call and lighting along with quantities and types as relevant

Refer to **Part B** for the full set of **Room Data Sheets**.

4.2 Room Layout Sheets (RLS)

These are individual sheets incorporating typical design of rooms at 1:50 scale with abbreviations, dimensions etc. Each Room Layout Sheet includes a Plan as well as 4 or more elevations showing the installation height of elements.

Note: These Room Layouts are indicative plan layouts and elevations illustrating an example of minimum acceptable design standard. The Room Layouts shown are deemed to satisfy these Guidelines. Alternative layouts and innovative planning shall be deemed to comply with these Guidelines provided that the following criteria are met:

- Compliance with the text of these Guidelines
- Minimum floor areas as shown in the schedule of accommodation
- Additional $2m^2$ to be added to the room area for any additional door above the minimum number required
- Heights and dimensions where shown
- Any Clean/ Dirty separations shown or implied

- Accessibility to and around various objects as shown or implied

Room Layout Sheets must indicate relative location and empirical dimensions of:

- Hand rails and Grab rails
- Call points, Power, Light Switch, Data and Medical Gas outlets
- Bed Screens
- Sanitary Fixtures

Refer to **Part B** for the full set of **Room Layout Sheets**.

5. Planning

5.1 Site Development

The location and development of the site shall be in accordance with the requirements of the Planning and Building sections from the Dubai Municipality and UAE Green Building Guidelines. Below we have summarised the main criteria to be considered when developing a site, accommodating a health facility.

5.1.1 Environmental Impact

The aesthetics and form of a health facility shall be sympathetic with its immediate environment, either built or natural; for example, domestic scale and treatments where built in a residential area. The building should enhance the streetscape.

Consideration should also be given to the siting of a health facility to ensure that it is accepted as an asset by the community, and not thought of as an imposition and inconvenience on the neighbourhood.

5.1.2 Landscaping

A suitable landscaping scheme shall be provided to ensure that the outdoor spaces are pleasant areas in which patients, visitors and staff may relax. The scheme should also ensure that the buildings blend into the surrounding environment, built or natural.

Water conservation should be a consideration when designing layouts and selecting plants. The use of mains water for reticulation is restricted. The local authority on water supply should be consulted for current regulations.

5.1.3 Site Grading

The balance of a health facility site not covered by buildings should be graded to facilitate safe movement of the public and staff. Where this is not possible, access should be restricted.

5.1.4 Public Utilities

Impact on existing local service networks may be substantial. In establishing a health facility on any site, the requirements and regulations of authorities regulating water, electricity, gas, telephones, sewerage and any other responsible statutory or local authority must be complied with.

5.1.5 Structural requirements

If the site is low lying, on the side of a hill, or partly consists of rock then structural engineering advice should be sought at an early stage to minimise future drainage or settlement problems.

5.2 Masterplan Development

5.2.1 Planning relationships and the use of planning models

The planning of health facilities requires general knowledge of the appropriate relationships between the various components. Certain components (also referred to as Functional Planning Units or FPUs) need to be adjacent or close to other components. Most components must be accessible independently without having to go through other components. In short, the planning of a health facility requires a certain logic which is derived from the way the facility functions.

Good Planning Relationships:

- Increase the efficiency of operation
- Promote good practice and safe health care delivery
- Minimise recurrent costs
- Improve privacy, dignity and comfort
- Minimise travel distances
- Support a variety of good operational policy models
- Allow for growth and change over time

Inappropriate Planning Relationships:

- Result in duplication and inefficiency
- May result in unsafe practices
- Increase running costs
- May result in reduced privacy, dignity and comfort
- Increases travel distance or force un-necessary travel
- Result in lack of flexibility to respond to future growth and change
- May limit the range of operational possibilities

5.2.2 Planning Models

The planning of a complex health facility is based on applying commonly recognised "good relationships" as well as taking into consideration site constraints and conformity with various codes and guidelines. Just as in other buildings types e.g. hotels and shopping centres, health facilities have over time evolved around a number of workable Planning Models. These can be seen as templates for new facilities.

These Guidelines include a number of flow diagrams, also referred to as Functional Relationship Diagrams which represent Planning Models for various Functional Planning Units (FPUs). The flow diagrams are referred to in the appropriate sections of these Guidelines. They cover not only internal

planning and relationships within the FPUs, but also relationships between FPUs. Designers may use these diagrams to set out the various design components.

Designers are encouraged to see the overall design as a model. A good health facility plan usually can be reduced to a basic flow diagram. If the diagram has clarity, is simple and logical, as demonstrated in the FPUs in these Guidelines, it probably has good potential for development. A skilled designer will use these planning models to assemble the requirements of a health facility on the site without compromising functionality.

If on the other hand the model is too hard to reduce to a simple, clear and logical flow diagram, it should be critically examined. It is not sufficient to satisfy immediate or one-to-one relationships. Similarly, it may not be sufficient to satisfy only a limited, unusual or temporary operational policy. It is more important to incorporate planning relationships that can satisfy multiple operational policies due to their inherent simplicity and logic.

5.2.3 Master planning

In the health care industry, the term “Masterplan” has different meanings in different contexts. The most common use of the term “Masterplan” refers to words, diagrams and drawings describing the "global arrangement of activities" in a health facility with particular emphasis on land use, indicating growth and change over time.

Under the above definition, a Masterplan is a fundamental planning tool to identify options for the current needs as well as projected future needs. Its purpose is to guide decision making for clients and designers.

Health facility owners and designers are encouraged to prepare a Masterplan before any detailed design is undertaken. A Masterplan can be prepared in parallel with detailed briefing, so that valuable feedback can be obtained regarding real world opportunities and constraints. Ideally, a successful Masterplan will avoid wrong long term strategic decisions, minimise abortive work, prevent future bottlenecks and minimise expectations that cannot be met in the given circumstances.

A Masterplan diagram is typically a simplified plan showing the following:

- The overall site or section of the site relating to the development
- Departmental boundaries for each level related to the development
- Major entry and exit points to the site and the relevant departments
- Vertical transportation including stairs and lifts
- Main inter-departmental corridors (arterial corridors)
- Location of critical activity zones within departments but without full detail
- Likely future site development

- Areas (if any) set aside for future growth and change
- Arrows and notes indicating major paths of travel for vehicles, pedestrians, goods and beds
- Services masterplan showing the engineering impact, plant locations, availability of services and future demand

Masterplan diagrams and drawings should be prepared for several options (typically 3) to an equal level of resolution and presentation so that each option reaches its maximum potential. Only then a decision maker is in a position to compare options on equal terms. The above diagrams and drawings are typically accompanied by a report covering the following headings as a minimum:

- Project description
- Outline brief
- Opportunities and constraints
- Options considered
- Evaluation criteria
- Evaluation of the options including cost impact (if any)
- Recommended option
- Executive summary and recommendation

The exact deliverables for a Masterplan can adapted to the nature of the project. The most typical additional deliverables are listed below, allowing clients to refer to them by name and by reference to these Guidelines:

- Stacking Plans- This is typically used for locating departments in major multistorey developments where the shell is already well defined.
- Master Concept plan - This is typically used as a further development of the preferred Masterplan option so that the design implications can be further tested and priced.
- Staging Plan - A staging plan shows a complete Masterplan defined for each stage of the development rather than simply a zone allocation for future works.
- Strategic Plan - A Strategic Plan refers to higher level "what if" studies, providing a range of development scenarios. These may include the use of alternate sites, private-public collocation, purchase versus lease, alternative operational policies etc.

5.2.4 Planning Policies

Planning policies refer to a collection of non-mandatory guidelines that may be voluntarily adopted by health facility designers or owners. These policies generally promote good planning, efficiency and flexibility.

The planning policies below are included in these Guidelines so that in the process of briefing, designers or clients can simply refer to them by name or require compliance from others within the design team

In any reports or project summaries provided by the designers, these policies may be referred to by name as a shortcut.

Loose Fit

Loose Fit is the opposite of Tight Fit. This policy refers to a type of plan which is not so tightly configured around only one operational policy that it is incapable of adapting to another.

In Health Care, operational policies change frequently. The average cycle seems to be around 5 years. It may be a result of management change, government policy change, turn-over of key staff or change in the market place. On the other hand, major health facilities are typically designed for 30 years but tend to last more than 50 years.

This immediately presents a conflict. If, for example, a major hospital is designed very tightly around the operational policies of the day or the opinion of a few individuals that may leave at any time, then a significant investment may be at risk of early obsolescence.

The Loose Fit Planning Policy refers to planning models which can not only adequately respond to today's operational policy but have the inherent flexibility to adapt to a range of alternative, proven and forward looking policies.

At macro Level, many of the commonly adopted health facility planning models, including those in the enclosures to these Guidelines, have proven flexible in dealing with multiple operational policies.

At micro level, designers should consider simple, well proportioned, regular shaped rooms with good access to simple circulation networks that are uncomplicated by a desire to create interest. Interior features should not be achieved by creating unnecessary complexity.

Change by Management

This concept refers to plans which allow for changes in operating mode as a function of management rather than physical building change. For example, two Inpatient Units can be designed back to back so that a range of rooms can be shared. The shared section may be capable of isolation from one or the other Inpatient Unit by a set of doors. This type of sharing is commonly referred to as Swing Beds. It represents a change to the size of one Inpatient Unit without any need to expand the unit or make any physical changes.

The same concept can be applied to a range of planning models to achieve greater flexibility for the management. Also see other planning policies in this section.

Overflow Design

Some functions can be designed to serve as overflow for other areas that are subject to fluctuating demand. For example, a waiting area for an Emergency Unit may be designed so that it can overflow into the hospital's main entrance waiting area.

An Emergency Unit Procedure Room or a Birthing Room may be designed specifically to provide an emergency operating room for caesarean sections in case the standard allocated operating room is not available.

Any area that includes bed bays such as an Emergency Unit may be designed to absorb the available open space and provide room for additional beds in case of natural disasters.

Progressive Shutdown

Even large facilities may be subject to fluctuating demand. It is desirable to implement a Progressive Shutdown policy to close off certain sections when they are not in use. In addition, these policies should include notification to the Dubai Ministry of Health with regard to the progressive shutdown. This allows for savings in energy, maintenance and staff costs. It should be noted that any major shutdown due to fluctuating demand needs to be notified to the DHA.

It also concentrates the staff around patients and improves communication and security. In designing for progressive shutdown, designers must ensure:

- None of the requirements of these Guidelines are compromised in the remaining open sections
- The open sections comply with other statutory requirements such as fire egress
- The open patient care sections maintain the level of observation required by these guidelines
- In the closed sections, lights and air-conditioning can be shut off independently of other areas
- The closed sections are not required as a thoroughfare for access to other functions
- Nurse Call and other communication systems can adapt to the shut-down mode appropriately
- The shut-down strategy allows access to items requiring routine maintenance

Open Ended Planning

A health facility designed within a 'finite' shape, where various departments and functions are located with correct internal relationships may look and function very well at first; however, any expansion will be difficult. Some expansion requirements can be accommodated in new external buildings with covered links; but over time the site will become complicated with random buildings and long walkways.

The opposite of this scenario is to use "Open Ended Planning": planning models and architectural shapes that have the capability to grow, change and develop additional wings (horizontally or vertically) in a controlled way. As an example, a typical health facility flow diagram which promotes open ended planning is represented below.

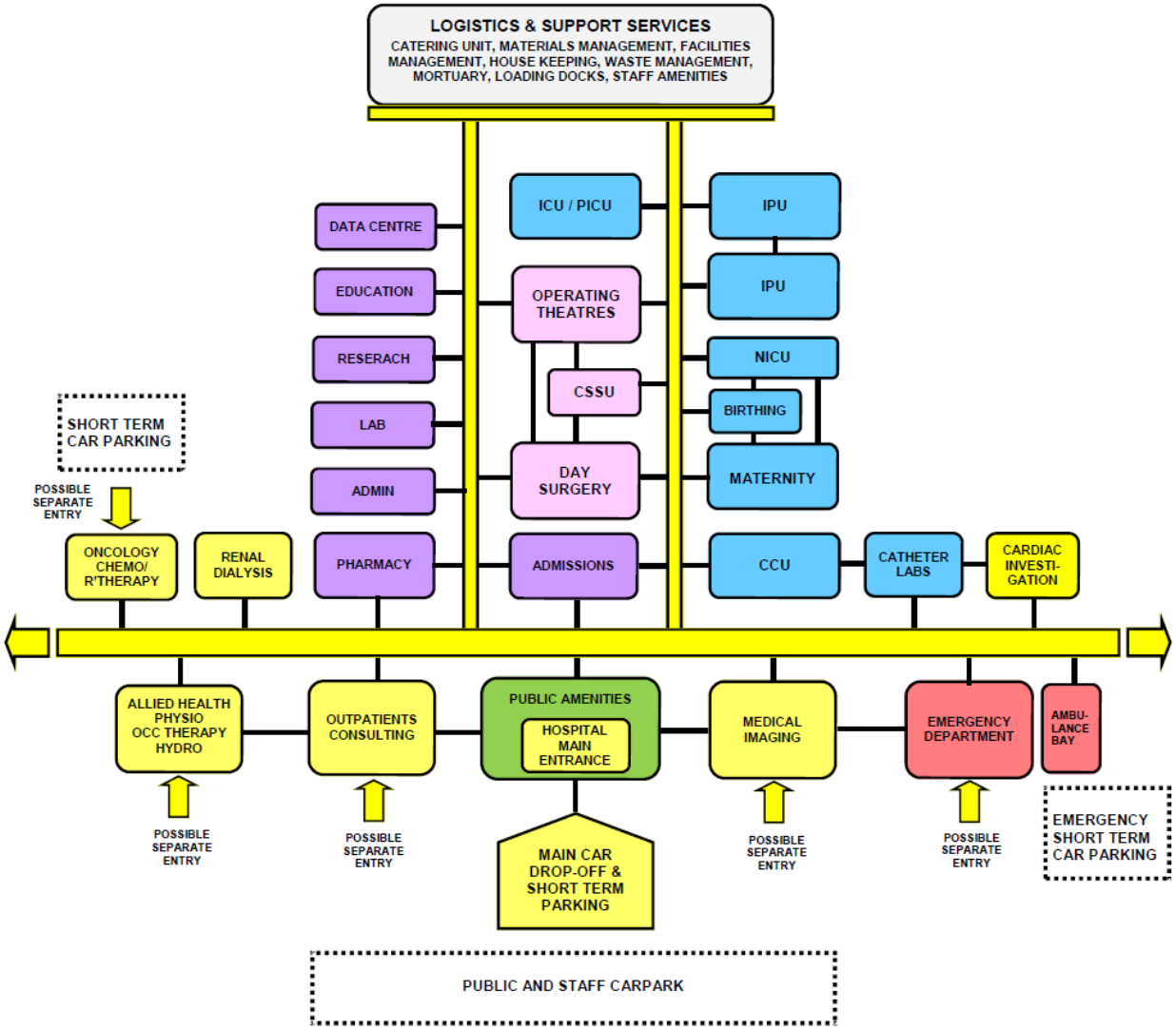

Figure 2: Overall Hospital Planning - Open Ended Planning Model

Note: Not all facilities may be present in every hospital

Below are some of the concepts involved in Open Ended Planning Policies:

- Major corridors should be located so that they can be extended outside the building
- As far as possible, FPUs should have one side exposed to the outside to permit possible expansion
- If a critical FPU must be internal, it should be adjacent to other areas that can be relocated, such as large stores or administration areas
- External shapes should not be finite
- External shapes should be capable of expansion
- Finite shapes may be reserved for one-off feature elements such as a Main Entrance Foyer
- Roof design should consider expansion in a variety of directions
- Avoid FPUs that are totally land-locked between major corridors

- Stairs should not be designed to block the end of major corridors
- The overall facility flow diagram should be capable of linear or radial expansion whilst keeping all the desirable relationships intact
- Fixed internal services such as plant rooms, risers, service cupboards should be placed along major corridors rather than in the centre of FPUs

Open Ended Planning Policies can be applied to entire facilities as well as individual FPUs

Modular Design

This is the concept of designing a facility by combining perfectly designed standard components. For example a designer may create a range of Patient Bedrooms, a range of utility rooms and other common rooms that are based on a regular grid such as 600 mm. These rooms can then be combined to create larger planning units such as an Inpatient Unit.

The Inpatient Unit can then be used as a module and repeated a number of times as required.

This approach, in the hands of a skilled designer has many benefits. Modules can be designed only once to perfection and repeated throughout the facility. No redesign is necessary to adjust to different planning configurations. Instead the plan is assembled to adapt to the modules. Errors in both design and construction can therefore be minimised.

The opposite to this approach is to start from a different architectural shape for each FPU, divide it into various shapes for the rooms, then design the interior of each room independently. This approach, in the hands of a skilled designer can also result in satisfactory solutions, but at a higher risk of errors and at a greater cost. For example, in a typical health facility, one might find 10 Dirty Utility Rooms which are entirely different.

Modular Design should not necessarily be seen as a limitation to the designer's creativity, but a tool to achieve better results. Designers are encouraged to consult with clients and user groups to agree on perfect modules, and then adopt them across all FPUs.

Universal Design

This concept is similar to Modular Design. Universal Design refers to Modules (or standard components) designed to perform multiple functions by management choice.

For example, a typical patient single bedroom can be designed to suit a variety of disciplines including Medical/ Surgical/ Maternity and Orthopaedics. Such a room can be standardised across all compatible Inpatient Units. This will permit a change of use between departments if the need arises. Such Universal Design must take into account the requirements of all compatible uses and allow for all of them. The opposite of this policy is to "specialise" the design of each component to the point of inflexibility.

Other examples of Universal Design are as follows:

- Universal Operating Rooms which suit a range of operations
- Bed cubicles in Day Surgery which suit both Pre-op and Post-op
- Offices which are standardised into only a limited number of types for example $9m^2$ and $12m^2$
- Toilets may all be designed for disabled access or as unisex

The main point of Universal Design is to resist unnecessary variation in similar components, where the change in functionality can be accommodated in one standard design.

Single Handing

It is common design practice to design identical and adjoining planning modules in mirror image. This is most common in the assembly of Patient Bedrooms with Ensuites. It is commonly believed that this is also more economical.

The concept of Single Handing is the exact opposite. Single Handing refers to situations where mirror image (Handing) may not be necessary.

In areas requiring a high level of staff training, such as in operating suites, it may be more appropriate to "hand" all key rooms in identical manner. This makes the task of staff training easier and may also reduce the possibility of mistakes.

In a hypothetical example, a staff member entering any operating room, regardless of its location and approach from corridor will find the service panel on the left, electronic screen on the right and the door to the Sterile Stock Room in the front.

In another example, at micro level, medical gases may always be located to the left side of patient's bedhead regardless of the direction of approach.

Note: Single Handing is a matter of individual choice and may not suit all conditions.

Natural Disaster

All health facilities should be capable of continued operation during and after a natural disaster, except in instances where a facility sustains primary impact. This means that special design consideration is needed to protect essential services such as emergency power generation, heating and/or cooling systems, water supply (if applicable), etc. Typical problems such as disruption to public utilities such as water or sewer mains and energy supplies, may affect the operation of onsite services.

Appropriate construction detailing and structural provision shall be made to protect occupants and to ensure continuity of essential services in areas where there is a history of earthquakes, cyclones, flooding, bushfires or other natural disasters.

Consideration shall be given to possible flood effects when selecting and developing a site. Where possible, facilities shall NOT be located on designated flood plains. Where this is unavoidable, take extra

care when selecting structural and construction methodology, and incorporate protective measures against flooding into the design.

Facilities shall be designed and constructed to withstand the minimum earthquake design loads on structures.

In all cases, effective long range communications systems, which do not rely on ground lines to function, are essential.

Consultation with Emergency Services is recommended to ensure arrangements are in place for emergency long range communications assistance in the event of emergency situations or a major disaster.

Refer to DHA for further information.

5.3 Local Design Regulations

Typical Design factors for Health facilities depending on local customs and traditions may include but not limited to the following:

- Access to Recovery areas for relatives
- Separation of male and female recovery areas
- Separation of male and female waiting areas
- Larger family waiting areas
- Prayer room on each floor
- Independent male and female Inpatient Unit accommodation
- Independent male and female toilets
- Access for disabled people

Prayer Rooms

The typical hospital facility should respect the local customs of the population. Prayer rooms on each floor may be required. Separate prayer rooms for male and female may be required. The following consideration should be given to prayer rooms.

- Location of the prayer room should be in an accessible area but away from noise, distraction and heavy clinical traffic
- Orientation of the prayer room is important; appropriate location of entry into the prayer room is essential
- Airlock to the prayer room is desirable; this may accommodate ablution stations, shoe racks, bag lockers and coat hooks as deemed necessary
- Appropriate finish on the floor and walls is desirable

- External windows are desirable

Building Information Modelling (BIM)

Under these Guidelines, Building Information Modelling is not mandatory but the utilisation of BIM is highly encouraged for larger facilities and hospitals in general. Dubai Municipality also has similar requirement of BIM for hospital buildings over certain height and total built-up area.

5.4 Floor Area Measurement Methodology, Definitions and Diagrams

Within these Guidelines, Room areas, Departmental boundaries, Travel and Engineering are defined and calculated according to the following standards. The methodology required is referred to as the "No Gap" method.

5.4.1 How to measure floor areas

To measure drawings, the following measurement technique will apply.

All area measurements will be in square meters rounded up or down to the nearest 0.5m2. Distances, where relevant are in millimetres for relatively short distances and meters for longer distances.

Rooms

Room areas are measured as follows:

- To the inside face of outside walls
- To centre of walls to adjoining rooms
- To the full thickness of corridor walls facing rooms
- To the centre of departmental boundary walls (except where boundary wall adjoins a corridor)

Areas not included are:

- Circulation % (represented by Departmental corridors)
- Service risers, Service cupboards and Plant Rooms
- Fire Hose Reels, Fire Stairs, Lift Shafts

Departments

The gross FPU (Departmental) area is the sum of the room areas within the FPU plus circulation – internal corridors, measured as follows:

- FPU areas are measured to the face of corridor walls
- To the inside face of outside walls

Areas not included are:

- Service Risers, Service Cupboards and Plant Rooms
- Fire Hose Reels, Fire Stairs

- Lift Shafts

Travel

Travel includes:

- Corridors between Departments (FPUs), measured as follows:
- To the face of corridor walls
- To the inside face of outside walls
- Stairs including Fire Stairs
- Internal Fire Stairs and ramps

Areas not included are:

- Service risers and cupboards
- Fire Hose Reels, Lift Shafts
- Plant Rooms

Engineering

Engineering includes:

- Plant Rooms, Fire Hose Reels and Service Cupboards measured as follows:
- To the centre of adjoining walls
- To the inside face of outside walls
- To the full thickness of riser walls

Areas not included are Lift Shafts (the void area).

5.4.2 Impact of wall thickness

The minimum room sizes in these Guidelines assume wall thicknesses of 100mm. For wall thicknesses of more than 120mm, the minimum area of the room (as measured in accordance with these Guidelines) shall be increased to compensate for the greater wall thickness. Refer to Area Measurement Diagrams attached below for a visual representation of these area measurements.

5.4.3 Gross Floor Area

Gross Floor Area (GFA) represents the sum of the Departmental areas on the floor, measured as described in Departments above plus Travel (measured as described in Travel above) plus Engineering areas (measured as described in Engineering above).

5.4.4 Area Measurement Diagrams

The above measurement descriptions are represented below diagrammatically.

Measurement of Departments - Travel

Below diagram explains the definition of Department Area measurement.

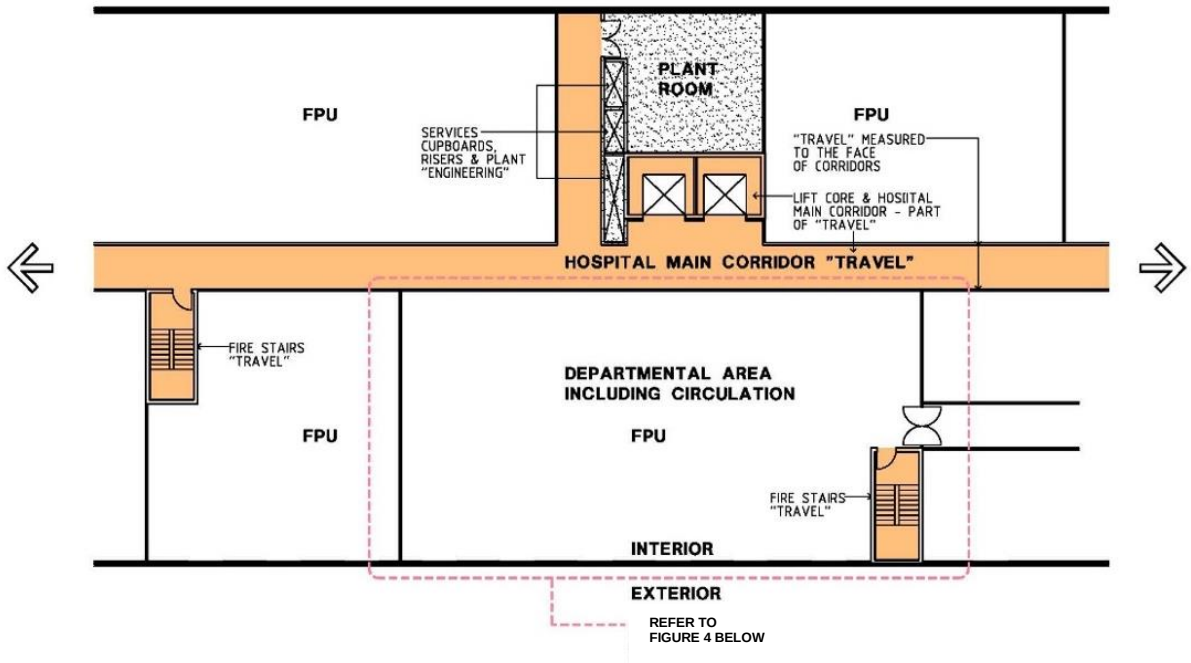

Figure 3: Plan of Departmental Area

Below diagram explains the details within a Department.

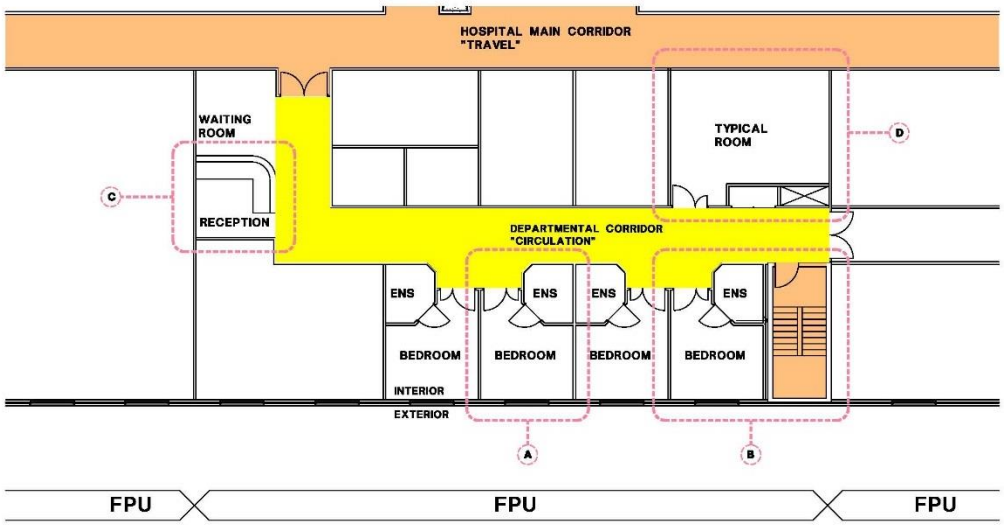

Figure 4: Typical Department (FPU) Plan

Measurement of Rooms, Corridors & Travel

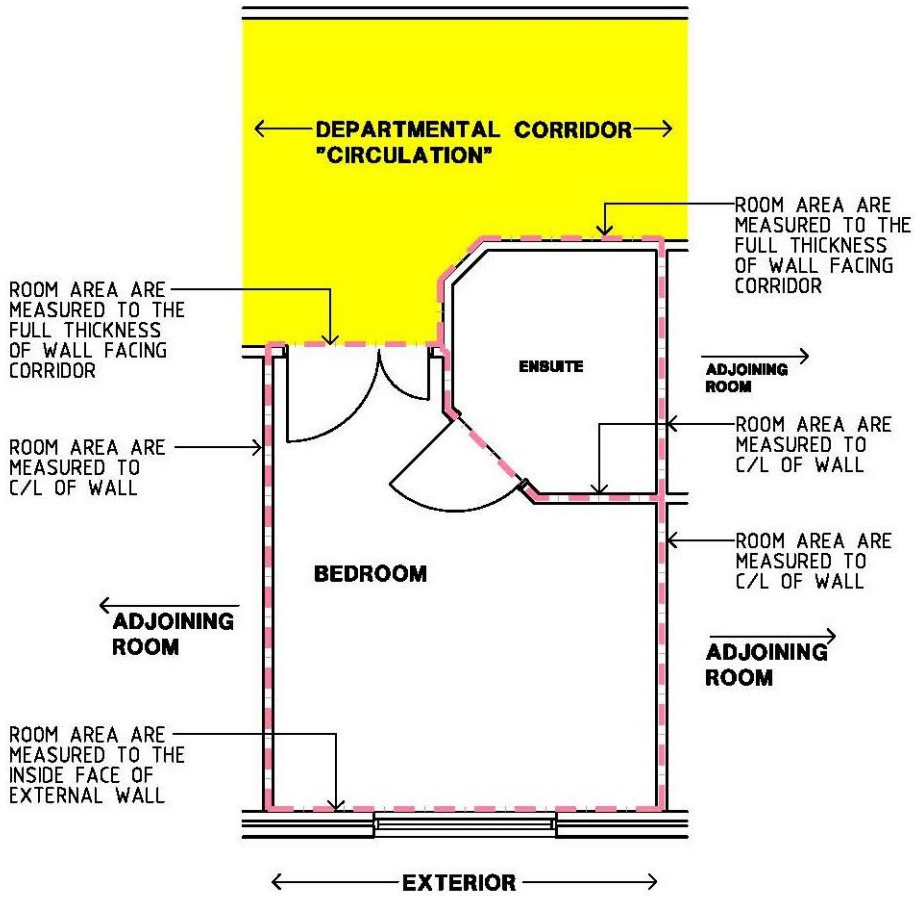

Figure 5: Typical Room adjoining Departmental Corridor

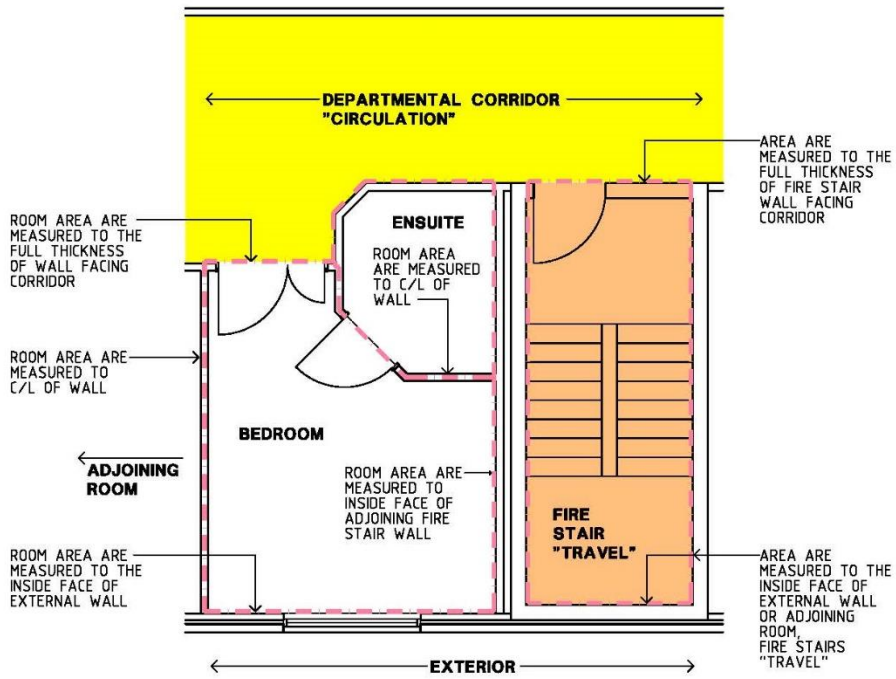

Figure 6: Typical Room adjoining Departmental Corridor with adjacent Travel Area

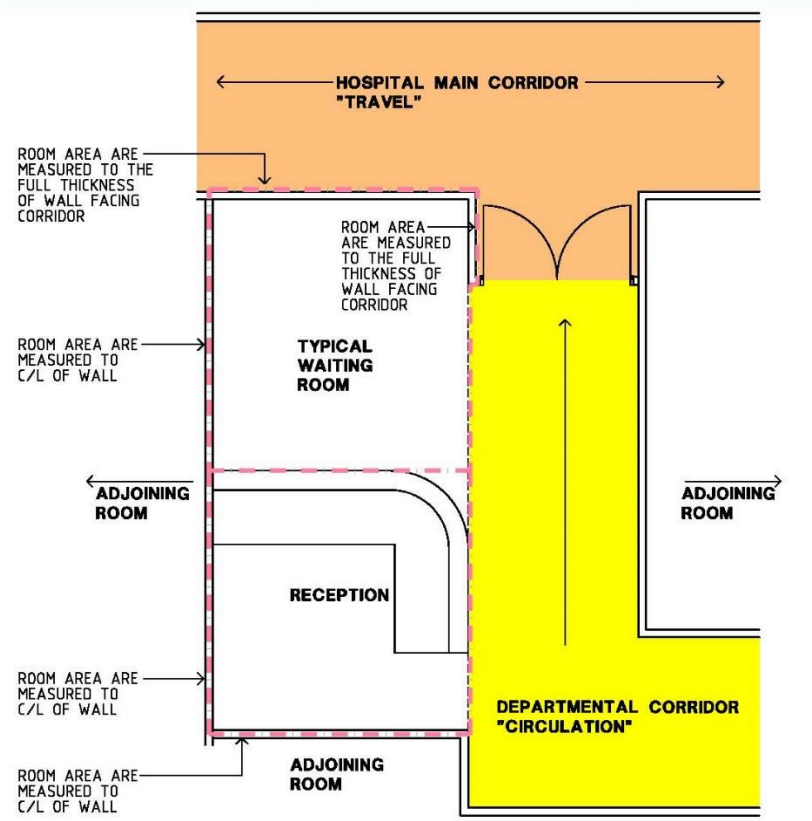

Figure 7: Typical Room adjoining Circulation and Travel Corridors

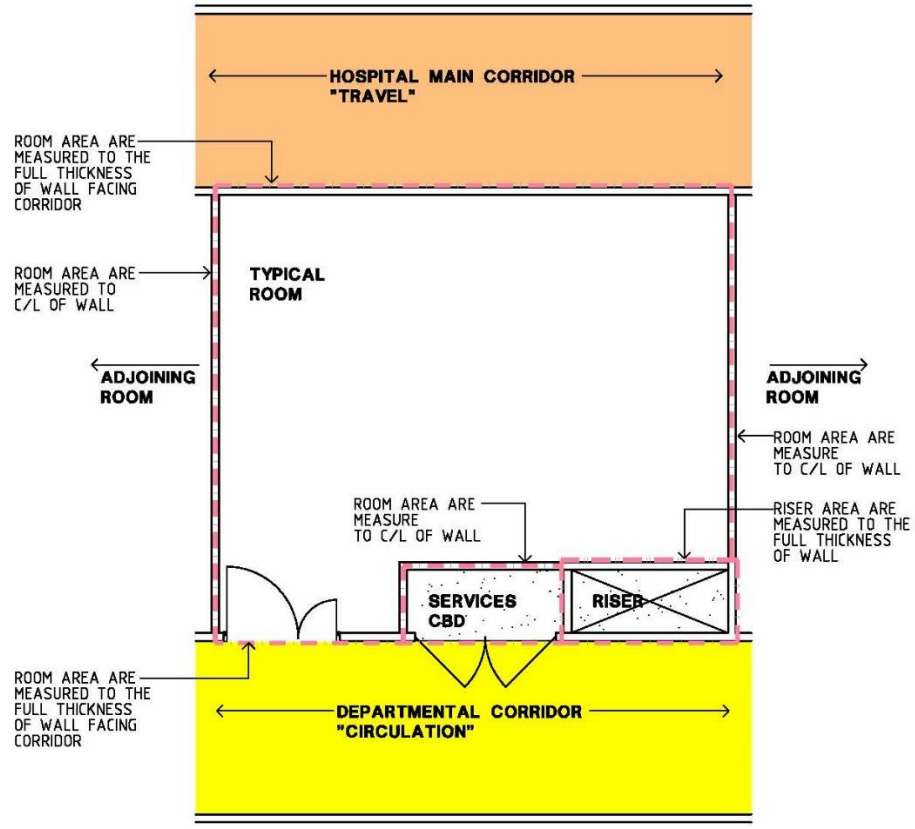

Figure 8: Typical Room between Circulation and Travel Corridors

Conversion to Net (clear) Area

For certain purposes, it may be useful to convert areas measured on site to the above No-Gap measurement method to ensure compliance. For example, during a site inspection, there may be a suspicion that a room is smaller than the required area.

There are two methods to arrive at the area measurement equal to the No-Gap method used in these Guidelines and shown in the SOA's for each FPU. They are explained below.

Method 1

- Measure the dimensions of each room from wall to wall (dimensions A and B)
- Add 100mm to each dimension A and B
- Multiply the dimensions (A+100mm) x (B+100mm) = No-Gap area
- Round up or down to the nearest half square meter

Note: The additional 100mm dimension is approximately equal to the No-Gap centreline measurement method.

Method 2

- Measure the dimensions of each room from wall to wall (dimensions A and B)
- Calculate the net room area (A x B)
- Look up the table below and add the grossing %

Net Measured Area	Grossing %
1 to 2 m^2	25%
2.5-4.5 m^2	20%
5 -14.5 m^2	15%
15-29.5 m^2	10%
30-100 m^2	5%

- Round up or down to the nearest half square meter

For example, for a room which is measured at 15m^2 net, add 10% of 15m^2 = 16.5m^2 in the No-Gap Method.

For a bedroom which measures 16.5m^2 net, add 10% to arrive at 16.5 +1.6= 18.1m^2, rounded down to 18m2 in the No-Gap Method.

Note: The DHA inspectors have the discretion to permit deviations of up to 10% from the approved area where the functionality of the room is clearly not compromised.

5.5 Parking and Vehicular Access

5.5.1 Introduction

In a new health facility development, planned parking and vehicular access is essential and should be provided based on health facility functions, available staff, community needs and space available.

The parking should provide an adequate number of spaces for vehicles including cars, commercial vehicles, emergency vehicles and 2-wheelers such as motorcycles, scooters and bicycles. Access to and from parking areas should meet applicable disability standards and other relevant local and safety standards.

5.5.2 General Design Guidelines

Physical Location

Various circumstances may dictate the location of the parking such as

- Location of the Emergency department
- Location of the Main Waiting area
- Proximity to Staff, patients and other users
- Practicality of consolidated parking versus spread out parking
- Transport policy objectives determined by the local Road Transportation Authority
- Any other specific services offered at the health facility

Physical Characteristics

The physical characteristics of a car park must meet the needs of the different types of vehicles in use or expected to be in use.

For private and emergency vehicles, the car park or drop off areas should adhere to Municipality and RTA guidelines. For emergency areas, designated ambulance drop-off and parking is essential for the safety and well-being of patients and staff. Clear access ways and designated parking spots shall be demarcated to avoid misuse.

For commercial and service vehicles such as delivery and waste management trucks, loading docks should be designed compatible with the type of vehicles to be used or expected to be used in the future. Traffic controls may need to be provided to segregate vehicles according to their use. For example, loading/ unloading areas for a ‘Clean’ delivery truck and a ‘Dirty’ waste management truck. Similarly access points and access ways through the site need to be designed such that patient access does not interfere with emergency and service vehicle access.

Disabled Access Parking

All access to and from the car park will need to adhere to the Dubai Universal Design Code and applicable disability guidelines. Parking spaces for use by people with determination should be in accordance with such Code and guidelines. A parking space for people with determination should consist of an unobstructed area having a firm and level surface with a fall not exceeding minimum requirements of the applicable code. Space width and overlap allowances also need to be in accordance with such codes.

A continuous, accessible path of travel should be provided between each parking space to an accessible entrance/lift. Parking spaces should be identified by a sign incorporating the international symbol of access for people with determination.

Community Safety

Car parking and vehicular access ways should provide a safe environment for its users. Clear sightlines should be provided throughout the car parking areas to enhance safety and avoid confusion. Car parks should be directly linked to accessible pedestrian pathways linking directly to the main building or reception areas. Adequate lighting is essential after hours for patients and staff to access their vehicles. Communication and security systems may be installed in large car parks depending on the location, function and layout. Adequate traffic controls may be required to safely navigate pedestrian and vehicular traffic through the parking area. This could be achieved through signage or other electronic controls.

Access ways and parking spots for emergency vehicles should kept clear of any public interference for the well-being of both patients and the general public. Loading and unloading areas should follow minimum applicable standards for Occupation and Health Safety. This shall include adequate lighting, clear access ways and designated parking spots. Communications and security systems may be installed to monitor such areas that have low frequency of visitors or vehicular access.

Landscaping and Signage

Car parks should generally be attractive and pleasant spaces that are aesthetically designed for public and private use. To avoid unattractive expanses of paving, vegetation may be used to soften the visual impact. The landscaping should generally respect the terrain of the land.

Trees may be utilised to provide greenery as well as shade during summer months. Plants should be selected that have vigorous growth, longevity, minimal maintenance and ample shade. Care should be taken that sub-soil drainage is provided for all trees and adequate drainage is provided for surface water run-off from paved areas.

Wayfinding and signage are important elements that safely guide patients and staff to and from the health facility. Signage should prominently highlight pedestrian/disabled access ways. Clear directions to the nearest stairwell or lift well should be posted at prominent locations or at proper intervals.

Proper signage also helps visitors to identify a particular location so that they are able to access their vehicles in an easy and timely manner. Care should be taken that exit and direction signs are clearly visible to avoid incidents. Security systems may be installed to discourage miscreants.

Maintenance

The design of car parks and vehicular access ways should aim to achieve minimum maintenance. Elements such as signs, landscape, barriers, etc. should be designed to ensure minimal maintenance and discourage vandalism. For example, sealed pavement may be used instead of gravel that requires constant maintenance.

5.5.3 Car Parking Calculations

Car Parking provisions for health facilities are unlike other types of buildings. It is advised parking allowance to be calculated based on number of beds/ treatment spaces where applicable and a fixed ratio to the total area in other clinical or non-clinical areas in a healthcare facility.

Table below indicated the minimum parking provision. For facilities which are RDL 3 and above, all categories below should be considered. For RDL 1 and 2 facilities,

Category	Recommended Parking Provision (minimum)
Inpatient Beds (in IPU, ICU, PICU, CCU and NICU)	1 parking per bed
Emergency	1.5 parking per Treatment/ Observation Bay
Outpatients (including all dedicated support areas) - eg. GP clinics, Dental clinics, Polyclinics, School/ Hotel clinics, TCAM centres	1 parking per $25m^2$
Ambulatory (including all dedicated support areas) - eg. Day Surgery Centres, Renal Dialysis Centres, Chemotherapy centres, IVF Clinics, Radiotherapy Facilities, Rehabilitation Centres	1 parking per $25m^2$
Clinical Support - Admin, Laboratory, Medical Imaging, Nuclear Medicine, Pharmacy, SSU, Kitchen, Supply Store, Laundry, Public Area etc.	1 parking per $50m^2$
Education	1 parking per $50m^2$
Retail	1 parking per $75m^2$ with at least 1 parking per each retail unit
Accessible Parking	2% of total aggregated parking provided with a minimum of 2 per facility

Figure 9: Recommended Minimum Car Parking Provision for Healthcare Facility

Alternatively, a specific traffic study prepared by a qualified consultant taking into account the use of the facility, patient and staff numbers as well as shift work and overlaps can be considered. Note that Carparking demand is typically calculated for the peak demand, which in most cases may be between 10AM and 2PM.

In either method, the minimum provision must be no less than the Dubai Municipality requirements.

5.5.4 Carparking Design

Parking bays may be organised in a variety of arrangements including 30^0, 45^0, $60^0$and 90^0 with single or two-way aisles. The preferred parking angle is 900 which allows for the flexibility of two-way aisles.

Allow an area of 35 m^2 for a typical carparking space; this allowance includes the aisle space required.

Carpark Bay Dimensions

Provide the following minimum car parking bay dimensions:

Bays at 30º

Classification	Dimension A mm Bay Width	Dimension B mm Bay Width	Dimension C mm Bay Length to wall or high kerb with no overhang	Dimension C mm Bay Length to low kerb which allows 600 mm overhang	Dimension C mm Bay Length with wheelstops*	Aisle Width mm
Employee & Commuter parking; staff only(all day)	2100	4200	4400	4100	4500	3100
Hospital and Medical Centres (mix of patient and staff parking)	2500	5000	4400	4100	4900	2900

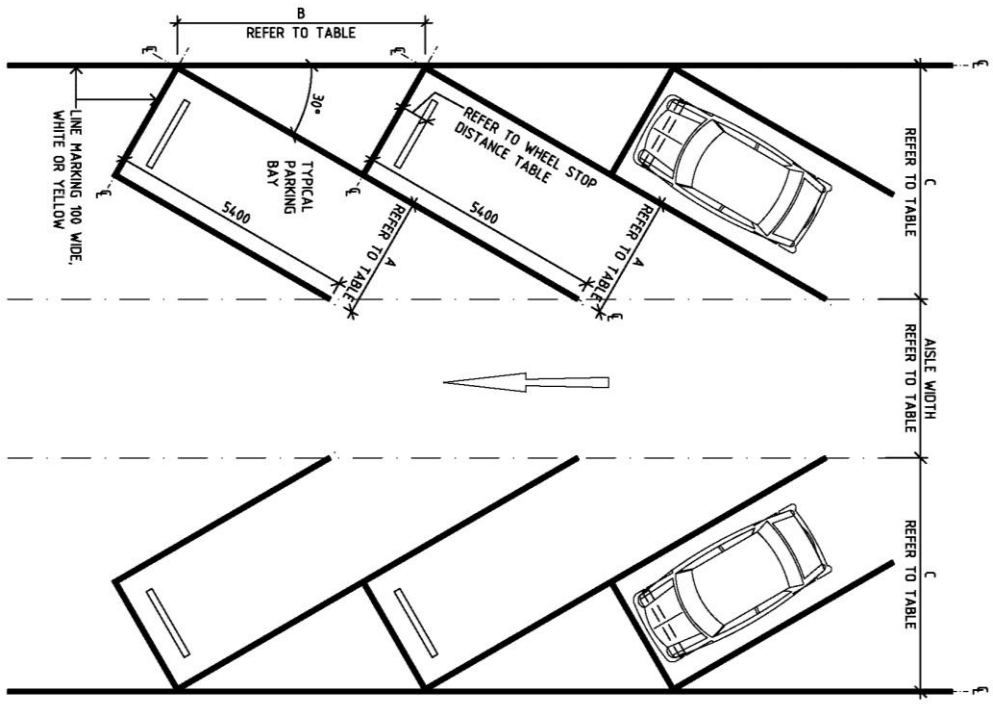

Figure 10: Typical Carparking Bays at 30º

Bays at 45°

Classification	Dimension A Mm Bay Width	Dimension B Mm Bay Width	Dimension C Mm Bay Length to wall or high kerb with no overhang	Dimension C Mm Bay Length to low kerb which allows 600 mm overhang	Dimension C Mm Bay Length with wheelstops*	Aisle Width mm
Employee & Commuter parking; staff only(all day)	2400	3400	5200	4800	5500	3900
Hospital and Medical Centres (mix of patient and staff parking)	2600	3700	5200	4800	5700	3500

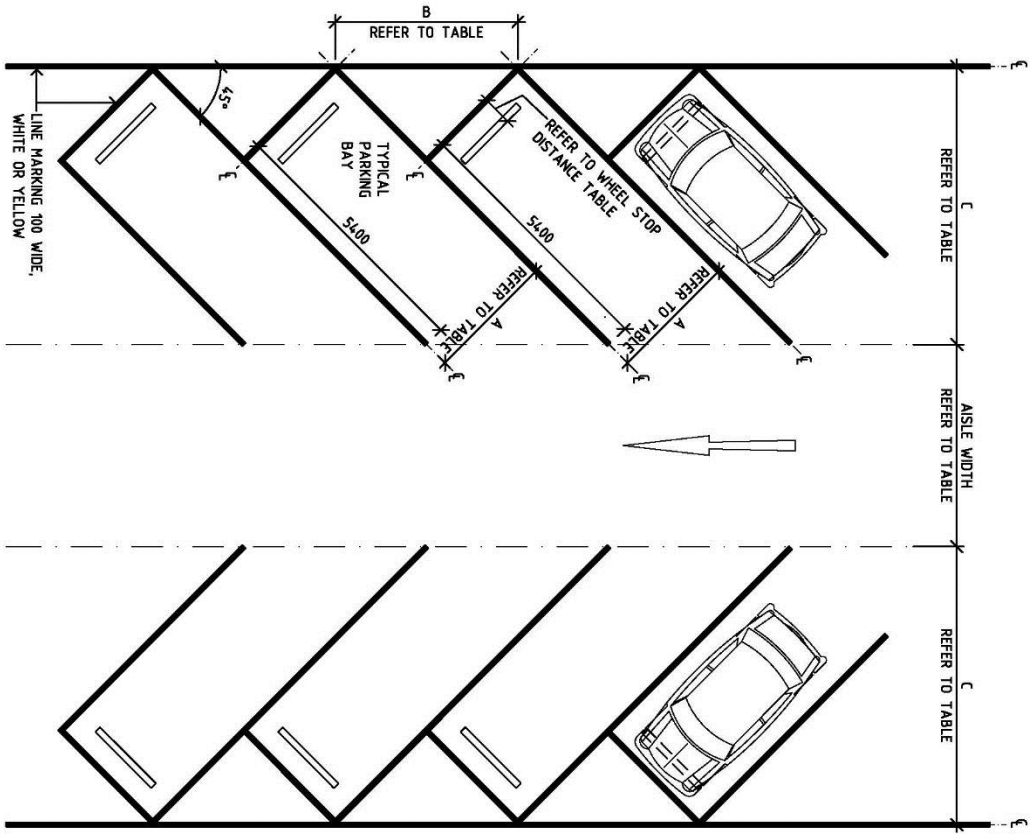

Figure 11: Typical Carparking Bays at 45°

Bays at 60º

Classification	Dimension A mm Bay Width	Dimension B mm Bay Width	Dimension C mm Bay Length to wall or high kerb with no overhang	Dimension C mm Bay Length to low kerb which allows 600 mm overhang	Dimension C mm Bay Length with wheelstops*	Aisle Width mm
Employee & Commuter parking; staff only(all day)	2400	2750	5700	5100	5900	4900
Hospital and Medical Centres (mix of patient and staff parking)	2600	3000	5700	5100	6000	4300

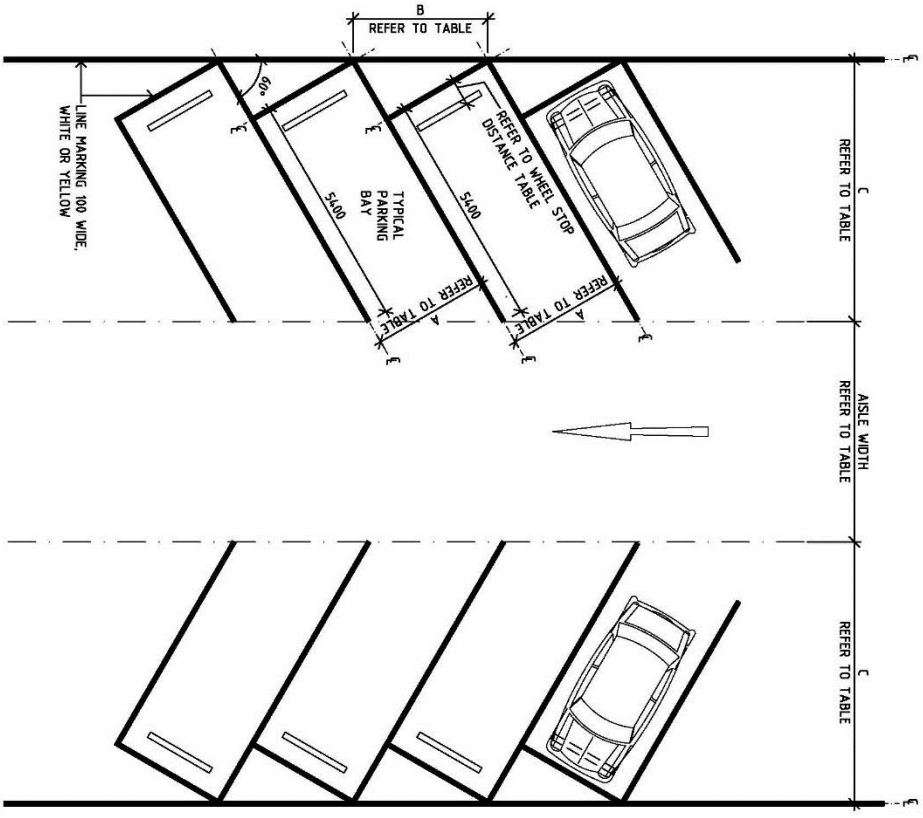

Figure 12: Typical Carparking Bays at 60 º

Bays at 90°

Classification	Dimension A mm Bay Width	Dimension B mm Bay Width	Dimension C mm Bay Length to wall or high kerb with no overhang	Dimension C mm Bay Length to low kerb which allows 600 mm overhang	Dimension C mm Bay Length with wheelstops*	Aisle Width mm
Employee & Commuter parking; staff only(all day)	2400	2400	5400	4800	5400	6200
Hospital and Medical Centres (mix of patient and staff parking)	2600	2600	5400	4800	5400	5800

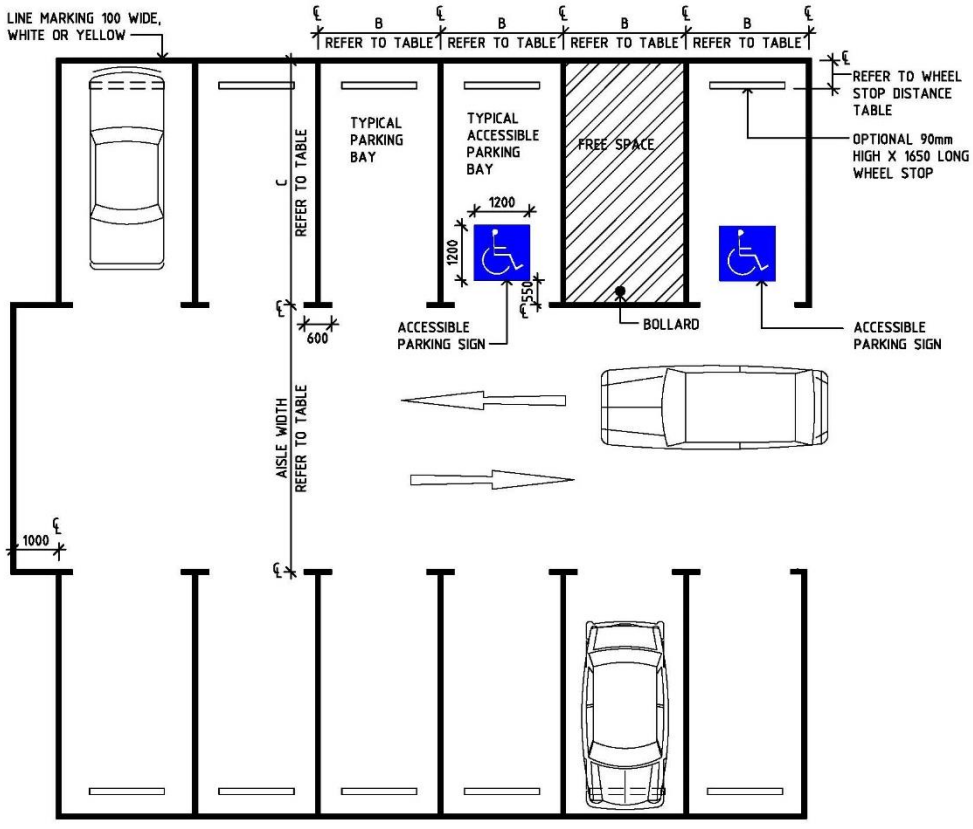

Figure 13: Typical External Use Parking Bays at 90°

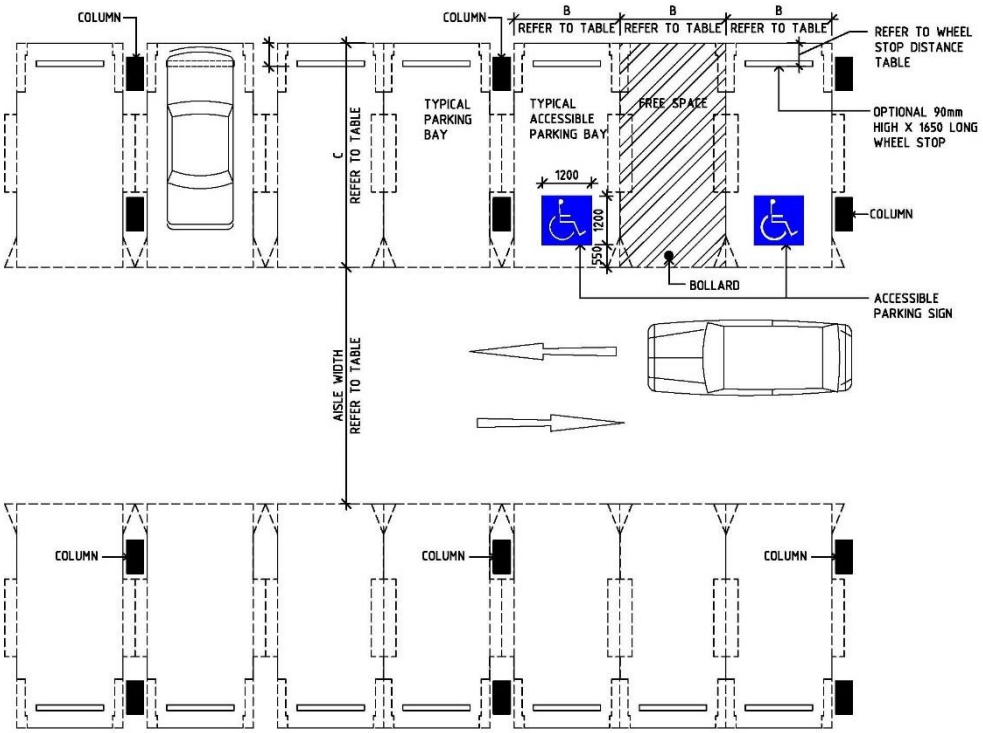

Figure 14: Typical Internal Use Parking Bays at 90º showing clearances for obstructions

Parallel Parking Bays

Provide the following minimum dimensions for parallel parking with a one way aisle:

Aisle Width One way W	Space Length L	Space Length Obstructed end spaces L0	Space Length Unobstructed end spaces Lu
3000	6300	6600	5400
3300	6100	6400	5400
3600	5900	6200	5400

Parallel spaces shall be located at least 300 mm clear of obstructions higher than 150 mm such as walls, fences and columns. If the opposite side of the aisle is bounded by obstructions higher than 150 mm then the aisle width (W) should be increased by at least 300 mm.

If a single space is obstructed at both ends the dimensions of the space shall be increased by 300 mm.

For parallel parking on both sides with a two-way aisle, the aisle width identified for one way traffic (W) above, shall be doubled.

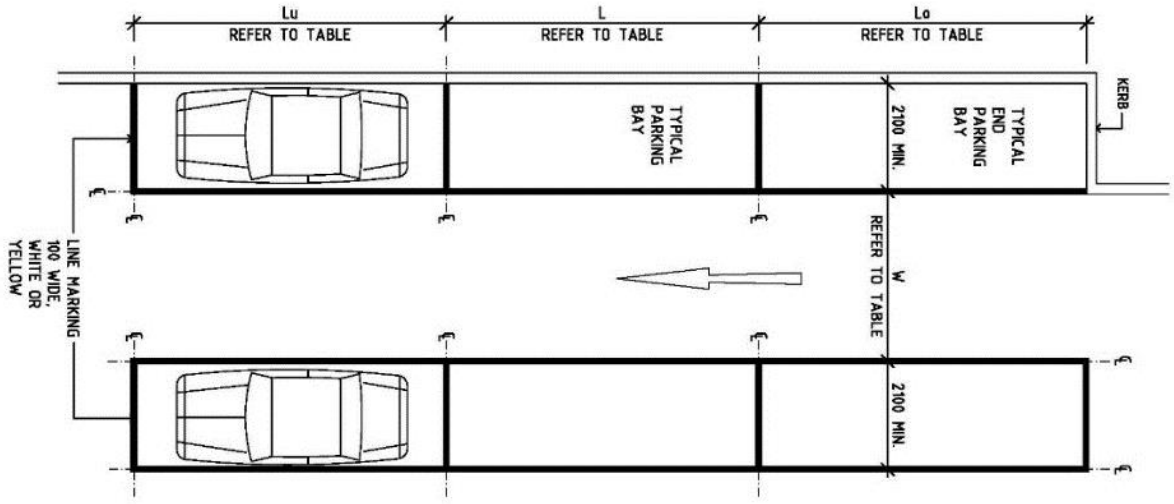

Figure 15: Parallel parking on both sides of a one way aisle

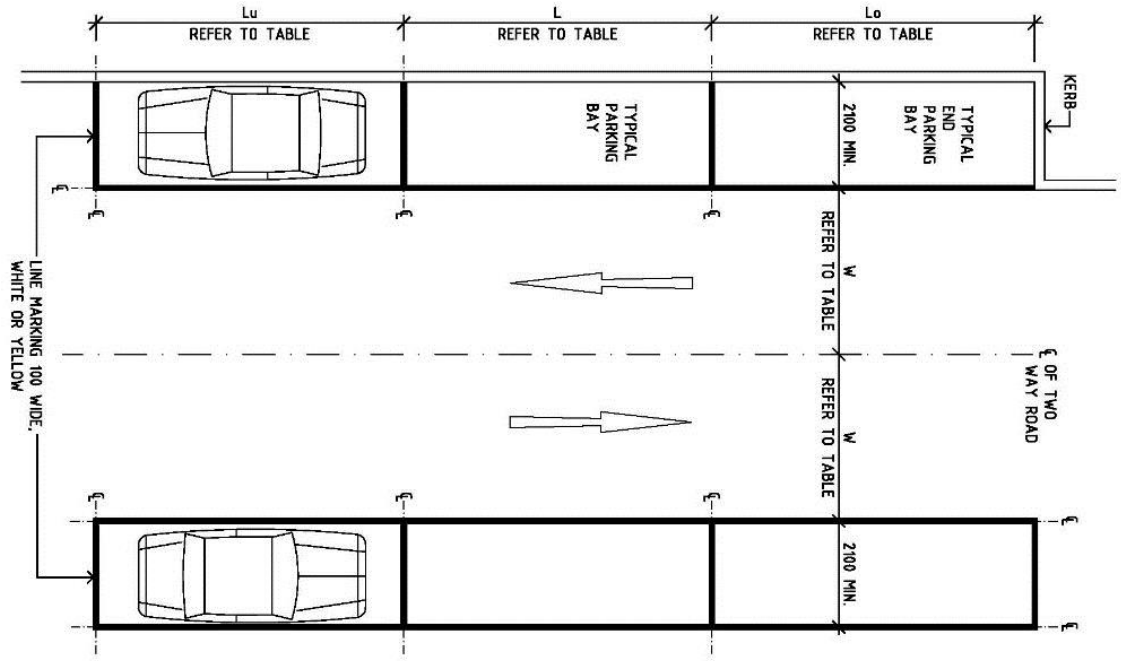

Figure 16: Parallel parking on both sides of a two way aisle

Design Envelope for Internal Parking Bay

Use the template below to ensure clearance around columns, walls and obstructions

This template must fit into any internal parking bay without obstruction for columns, walls and bollards.

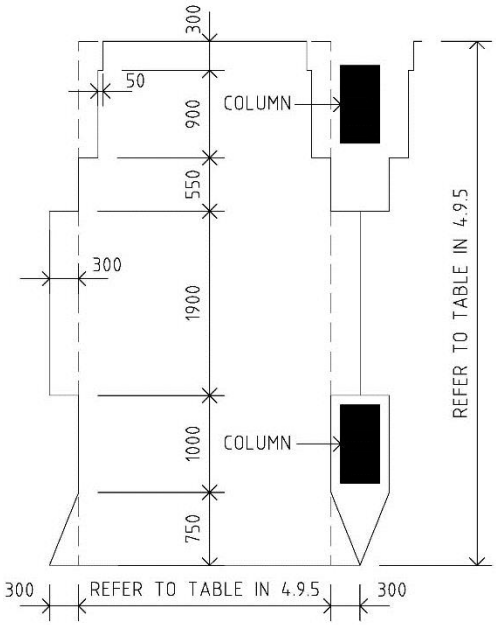

Figure 17: template for clearances within parking bay

Parking Aisles

Aisles for 90º bays need to allow for two-way traffic. Aisles for 30º, 45º or 60º angled bays shall be one-way traffic. Parallel parking bay aisles may be either one way or two-way traffic. The width of aisles for angled parking bays will vary according to the width of the parking bays, wider bays require less aisle width.

Where there are blind aisles, the aisle shall extend 1 metre beyond the last parking bay. If the last parking bay is bounded by a wall or a fence, it should be widened by 300 mm.

Wheel Stops

Wheel stops may be provided if necessary to limit the travel of a vehicle. Wheel stops should not be used in situations where they are in the path of pedestrians moving to and from parked vehicles or where pedestrians cross a car park. If required, wheel stops are installed at right angles to the direction of parking or where the ends of angled parking form a sawtooth pattern

If wheel stops are required, install according to the front of the carparking space according to the following dimensions:

Parking Direction	Wheel stop distance to front of parking space			
	Parking to Kerb < 150 mm high		Parking to Kerb > 150 mm high or wall	
	90 mm high wheel stop	100 mm high wheel stop	90 mm high wheel stop	100 mm high wheel stop
Front in parking	630 mm	620 mm	830 mm	820 mm
Rear in parking	910 mm	900 mm	1110 mm	1100 mm

Accessible Parking Bays

Accessible parking bays shall have the following minimum dimensions with a clearance height of 2500 mm from the entry/exit to the bay:

Description	Width mm	Length mm
Angled Bays (45-900)	2600	5400
Parallel Bays	3200	7800

A shared area should be provided to the side of the accessible parking bay for loading and unloading; two accessible bays may be located either side of a single shared space.

Ambulance Bays

Provide the following minimum drive through area for ambulances with minimum width of 5200mm and minimum depth of 5500mm.

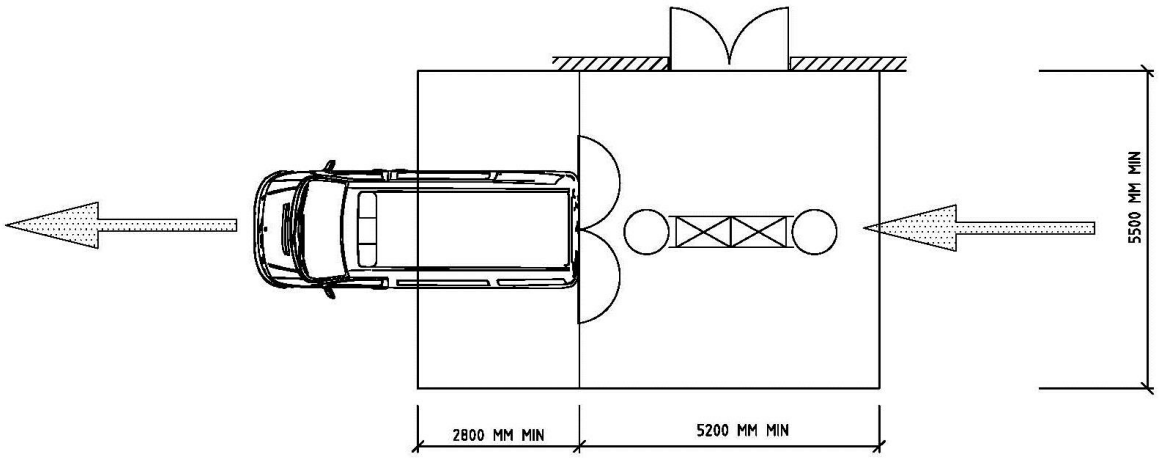

Figure 18: Ambulance Bay dimension and clearance requirement

The ambulance bay requires a covered space with a minimum length of 8000 mm and height of 3600 mm:

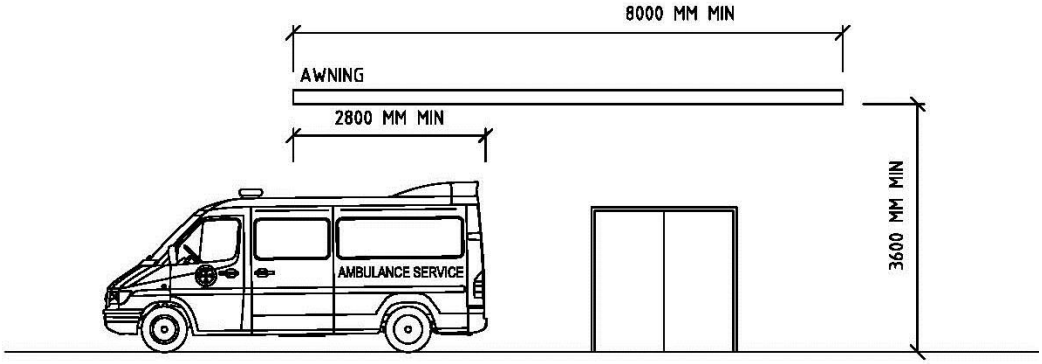

Figure 19: Ambulance Bay height clearance

Ambulance Turning Circle

Ambulances will require the following minimum radius for turning:

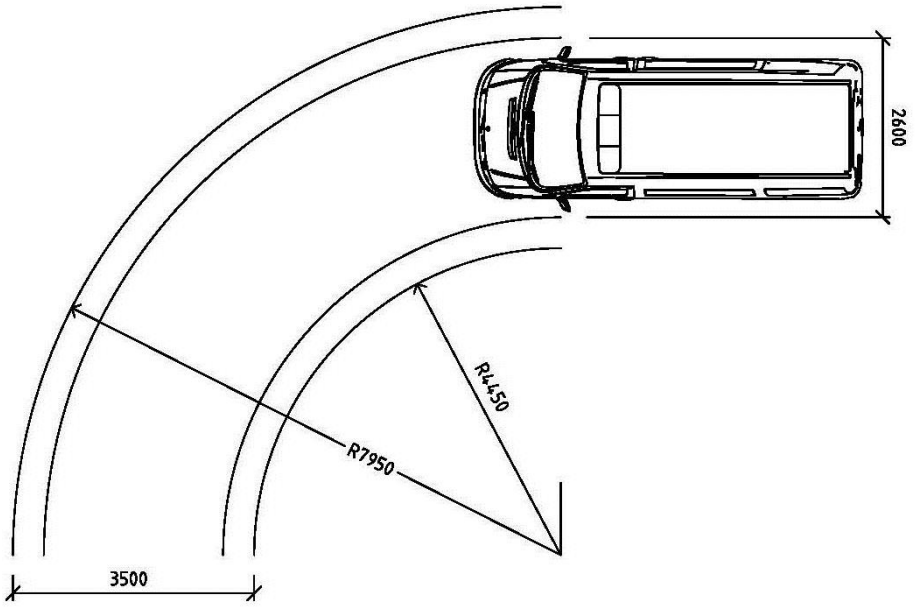

Figure 20: Turning circle of Ambulance

For additional information on ambulance unit and requirements refer to Emergency Unit FPU, in these Guidelines.

6. Further Reading

For additional reference, three other international guidelines may be considered:

- Dubai Universal Design Code, refer to:
  https://www.dha.gov.ae/Documents/HRD/RegulationsandStandards/Polocies/Dubai%20Universal%20Design%20Code%20Final%20Feb%202017.pdf
- Australasian Health Facility Guidelines, Australasian Health Infrastructure Alliance, 2009 refer to website: www.healthfacilitydesign.com.au
- DH (Department of Health) (UK) NHS Estates Health Building Notes, refer to:
  www.estatesknowledge.dh.gov.uk
- Guidelines for Design and Construction of Health Care Facilities, The Facility Guidelines Institute, 2010 Edition, American Institute of Architects (AIA): www.fgiguidelines.org

Where one guideline is deemed to be inadequate in the coverage of certain facility types, another guideline may be consulted. It should be noted that following another guideline wholly is not acceptable.

Another guideline can only be followed by exception where the subject is not covered by these guidelines.

7. Functional Planning Units

The following Functional Planning Units are available as separate chapters in Part B of these Guidelines:

10	Administration Unit
20	Admissions Unit & Discharge
30	Birthing Unit
40	Cardiac Investigation Unit
50	Catering Unit
60	Clinical Information Unit
70	Complementary and Alternative Medicine Centre
80	Coronary Care Unit
90	Day Surgery/ Procedure Unit
100	Dental Surgery Unit
110	Education Unit
120	Emergency Unit
130	Endoscopy Unit
140	Engineering & Maintenace Unit
150	Health Centres
170	Housekeeping Unit
180	Inpatient Unit - Bariatric
190	Inpatient Unit - General
200	Intensive Care Unit - General
210	IVF Unit (Fertilisation Centres)
220	Laboratory Unit
230	Linen Handling Unit
240	Main Entrance Unit
250	Maternity Unit
260	Medical Imaging Unit - General

270	Medical Imaging - Nuclear Medicine Unit & PET
280	Mental Health Unit - Adult
290	Mental Health Unit - Child & Adolescent
300	Mental Health Unit - Older Persons
310	Mobile Healthcare Unit
320	Mortuary - General
330	Oncology Unit - Medical (Chemotherapy)
340	Oncology Unit - Radiation
350	Operating Unit
360	Outpatients Unit
370	Pharmacy Unit
380	Public & Staff Amenities
390	Rehabilitation - Allied Health
400	Renal Dialysis Unit
410	Sterile Supply Unit (SSU)
420	Supply Unit
430	Waste Management Unit