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# Health Facility Guidelines: Planning, Design, Construction and Commissioning

*June, 2009*

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## **Glossary**

CCTV	:	Closed Circuit - television
CSSD	:	Central Sterilization
DHA	:	Dubai Health Authority
DHCC	:	Dubai Health Care City
EIS	:	Environmental Impact Statement
HVAC	:	Heating, Ventilation and Air Conditioning
HV/LV	:	High Voltage/Low Voltage
HRA	:	Health Risk Assessment
ICRA	:	Infection Control Risk Assessment
LPG	:	Low Pressure Gas
MEP	:	Mechanical, Electrical and Plumbing
PHC	:	Primary Health Center
UPS	:	Uninterrupted Power Supply

## **Acknowledgment**

These guidelines for the Planning, Design, Construction and Commissioning of the Health Facilities are developed through a consensus process from the Dubai Health Authority - Health Facilities Design Standards Committee. Membership includes public sector Dubai Health Authority (DHA), Dubai Health Care City (DHCC), private sector, health facility regulators, project and facility managers, and an independent health project consultant. The challenge in writing this guideline has been to keep the content as simple and practical as possible while at the same time incorporating essential information on a much larger scale of facilities guidelines. The Healthcare Facilities Design Standards Committee Members are:

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Dubai Health Authority (DHA) also appreciate efforts of many other individuals contributed their time and skill to review this publication to reflect better healthcare services in the 21<sup>st</sup> century.

## **1 Introduction**

These Guidelines embody fundamental conditions for all healthcare facilities in Dubai. They are the basic principles which govern the planning, design, construction and commissioning of a health facility. Guidelines may be amended by the Dubai Health Authority Director General without prejudice to the licensed health facilities in Dubai

### **1.1 Applicability**

These Guidelines apply to all health facility projects where

- \* A new facility is constructed;
- \* An existing facility is renovated <sup>1</sup>
- \* A new health care service or procedure is introduced to an existing facility
- \* A change in health facility ownership<sup>2 3</sup>

### **1.2 About this document**

These Guidelines for the Planning, Design, Commissioning and Construction of the Health Facilities are developed through a consensus process from the Dubai Health Authority - Health Facilities Design Standards Committee.

Membership includes public sector (DHA), private sector, Dubai Health Care City, health facility regulators, project and facility managers, and an independent health project consultant.

### **1.3 Use of this document**

Availability of these Guidelines is made to both public and private users. Typically users include health facility design and planning consultants, contractors, developers, investors, owners and operators of health facilities. References are made to codes and standards effecting facility designs and local regulatory authorities' rules and regulations, which govern health facility construction and occupancy. For user completeness, additional sections are included covering Dubai Design Considerations, Design Submission – Compliance and Review Process, Health Facility Licensing and Pre Qualification of Design Consultants. Users of this document should seek advice of competent professional consultants familiar with its content, and with local customs including the requirements of Authorities Having Jurisdiction for health care projects in Dubai.

### **1.4 Disclaimer**

Although the information listed herein has been compiled with reasonable care and is believed by Dubai Health Authority to be accurate, accuracy or completeness cannot be guaranteed. No judgment has been made by the DHA concerning the accuracy of

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<sup>1</sup> Excludes minor alterations, not changing function or introducing additional risks or not changing more than 20% of the space the altered functional unit occupies.

<sup>2</sup> It is a specific requirement of the health authority that facilities that change ownership comply with current licensing standards. Some exceptions may be granted where risk management can be demonstrated to guarantee an equivalent health care environment, and where clinical procedures are aligned with current regulations

<sup>3</sup> Refer to appendix 10.4 - Federal Law no 2 of 1996 concerning Private Health Establishment, article number 13

information including language and intent from other *Authorities Having Jurisdiction*<sup>4</sup> listed herein. In no event shall DHA be liable for any loss of profits or income, direct, indirect, incidental, or consequential damages of any kind whatsoever with respect to the services, provided by any of the consultants listed or its employees, agents, representatives or independent contractors.

Updates and version changes to this document can be found on the Dubai Health Authority website [www.dha.gov.ae](http://www.dha.gov.ae)

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<sup>4</sup> Refer to Section 9 – Local codes and Standards Authorities Having Jurisdiction (AHJ)



## 2 Accreditation

Facility design, structure, contents and construction processes must meet the requirements and standards of regulating and accrediting organizations. Guidelines are aligned to specific standards that address the planning, design construction and commissioning phases for health facilities. Typically,

- \* **Planning** for the type of building and building process developed from master planning to a pre design course of action
- \* **Designing** for safety, security, emergency management, life safety and infection control. Facility designs must focus on producing environments for the needs of patients that through evidence based design, promote improving quality care, customer service and patient satisfaction
- \* **Construction (new and renovations)** processes include efforts to ensure patient, staff and visitor safety is preserved during construction including risk assessment that includes operational infection control arrangements, and overall project safety measures.
- \* **Commissioning** procedures that ensure the built facilities, engineering services and medical equipment address standards required to deliver best practice in health quality and safety.

DHA policy regarding facility accreditation can be viewed on DHA website [www.dha.gov.ae](http://www.dha.gov.ae)

### **3 Planning, Design, Construction and Commissioning**

#### **3.1 General**

These Guidelines are a resource to assist in the planning, design construction and commissioning of health facilities for Dubai. The information provided, places the capital planning process within a framework that depends on prior, and thorough service planning. Facility design and construction should take due consideration of the cost of maintenance as part of the overall lifecycle costs of the facility, and value engineering methodology in evaluating cost and functionality during projects. Guidelines apply to new purpose-built facilities, or existing buildings that require renovation, or in a combination of both. The design should be selected with consideration of the factors relating to integrating new designs within an existing old facility/building. Therefore building design must be flexible and adaptable to enable varying client and service needs, and allow for future service delivery changes.

#### **3.2 Planning**

##### **3.2.1 Scope**

Facility planning considerations in the scope of this document include pre-design planning issues such as functional requirements, safety, space allocation, equipment needs and scheduling. It is recognized any such planning considerations incorporated into concept designs, must evolve from an organizational master plan, linking the goals and strategies that determine health service needs into the future.

##### **3.2.2 Assumptions**

This guideline assumes organizations have as a pre-requisite, undertaken a thorough feasibility study research and needs analysis, assessing requirements for each department or service within a health facility project. Typically needs analysis should be reexamined once concept designs are developed and explained to the client and/or client representatives. For any changes and new concepts that are introduced, consideration should be given to commencing a design stage sign-off process, which audits design changes from the client, and determines client checking and design approval responsibilities as further design activity is progressed.

##### **3.2.3 Effort**

The investment in the planning effort is crucial for successful design and ultimately a built facility that best matches health service delivery operational requirements. Typically these form operational policies which have a major impact on facility requirements and the capital and recurrent facility costs. Policies should be clearly articulated so that the facility design can reinforce the new practices.

#### **3.3 Design**

### 3.3.1 General Conditions

Hospital buildings should be free standing<sup>5</sup>, not adjacent to any building or shopping arcade and should have ready access to roads for emergency cases. Current licensed hospitals not fulfilling this requirement will be given **three years** period from the date of official issuing of this guideline to comply or relocate.

### 3.3.2 Health Facility categories

1. Addiction Rehabilitation Facility
2. Adult Day Healthcare Facility
3. Air Ambulance Services
4. Ambulatory Care Facilities
5. Assisted Fertilization Centre
6. Audiology and Speech Center
7. Blood Bank Service Center
8. Convalescence House (also referred as Nursing Facility)
9. Cord Blood Center
10. Day Surgical Centre (DSC)
11. Dental Clinic
12. Dental Laboratory
13. Dieting and Weight Control Centers
14. Drug Store
15. Emergency Medical Services provider
16. First Aid Services Training Center
17. General Clinic
18. General Hospital
19. Geriatric Center
20. Home Healthcare Agency
21. Laser Cosmetic Centre
22. Medical Fitness Center
23. Medical Laboratories
24. Medical Spa (MedSpa) Centre
25. Mobile Healthcare Facility
26. Optical Center
27. Pharmacy
28. Physiotherapy Center
29. Polyclinic
30. Primary Health Center (PHC)
31. Prosthetic and Orthotics Centre
32. Psychological Counseling Centre
33. Radio-Diagnostic Center
34. School Clinic
35. Smoking Cessation Center
36. Special Needs Center

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<sup>5</sup> Free standing building assumes independent access/egress, Heating, Ventilation and Air Conditioning (HVAC), MEP and Fire Services

37. Specialty Clinic
38. Specialty Hospitals
39. Telemedicine Consulting Centre
40. Thalassemia Center
41. Traditional, Complementary and Alternative Medicine Centers (TCAM)
  - Ayurveda Center
  - Chiropractic Center
  - Hijama (Cupping Therapy) Center
  - Homeopathy Center
  - Naturopathy Center
  - Osteopathy Center
  - Ozone Therapy Center
  - Therapeutic Massage Center
  - Traditional Chinese Medicine Center
  - Unani Medicine Center

Please refer to DHA website [www.dha.gov.ae](http://www.dha.gov.ae) for details regarding definitions of health facility categories and its licensing procedures and fees.

### **3.3.3 Environment**

Health facilities shall be developed, structured, and maintained to support quality health care. Facilities need to respond to and adapt to the changing requirements for accommodations. The health care environment should enhance the dignity of the patient through features that permit privacy and confidentiality. Facilities should be designed where ever possible to minimize stress to patients, family and staff and account through flexible design, changes in technology. The designed environment must provide for performance efficiencies and productivity of staff, without compromising a safe environment of care

### **3.3.4 Evidence Based**

Architects and Design Consultants are encouraged to use evidence based design strategies to improve patient outcomes in the creation of a healing environment. Evidence indicates improved patient outcomes, staff performance and overall satisfaction where the following principles are incorporated into a design philosophy:

- \* Build single private room accommodation with external views
- \* Reducing noise – refer to section 4.2.4
- \* Incorporate nature – glazing with natural lighting and ventilation, internal landscaping
- \* Way finding systems – use of color and texture for the visually impaired
- \* Improved air quality – minimum standards required - refer to ASHRAE Std 62.1 2004 and Section 4.1.Dubai Design Considerations - Local Factors
- \* Encourage hand washing – use of wash hand basins per patient room
- \* Adaptability

### **3.3.5 Design Brief**

The healthcare provider shall produce a brief for the translation of health service delivery requirements into the design of a physical facility. Typically, a brief is formed around functional programs which includes, but is not limited to the following:

- \* The purpose of the project
- \* Required clinical and support services, their physical integration and accessibility
- \* Projected demand or utilization of the facility – occupancy loads, numbers and type (staff, patients, visitors, etc), operating hours
- \* Delivery of care model and functional relationships adopted for incorporation into the designed environment, e.g. proximity of diagnostic services to critical care areas
- \* Department interfaces and operational relationships – shared services opportunities
- \* Circulation patterns - staff, patients, public, access to medication storage, handling of confidential patient information and clean/ dirty materials
- \* Asepsis and infection controls – includes method of cleaning
- \* Layout and operational planning considerations
- \* Space requirements including potential future expansion and demand for services
- \* Required equipment and services to operate the facility
- \* Site and building equity of access requirements (external/internal), incorporating incoming/outgoing environment, safety and security
- \* Functionality protocols between clinical specialties and support services
- \* Retail services
- \* Controls of environmental elements - air quality temperature/humidity, lighting, acoustics for intrusive noise, privacy, etc
- \* Aesthetics for the proposed activities
- \* Regional cultural requirements
- \* Wider community interface requirements

### **3.3.6 Site Infrastructure**

Site civil design shall provide appropriate grounds infrastructure including:

- \* Roadways to all entrances and loading/unloading areas
- \* Walkways for pedestrian traffic
- \* Parking for patients, public and staff
- \* Directional signage
- \* Emergency access from public roads – ambulance, civil defense, etc
- \* Helicopter landing area and support services
- \* Security systems
- \* Landscaping
- \* Grounds lighting
- \* In ground services including electrical mains, water mains, fire mains, sewerage, stormwater, communications, bulk medical oxygen, medical gases and LPG tanks

- \* Underground storage tank systems
  - \* Service culverts
  - \* Future building footprints and access to site infrastructure
  - \* Other considerations – Requirements for Regulatory Authorities Having Jurisdiction.
- Further information can be found in *Chapter 9- Local Codes and Standards – Authorities Having Jurisdiction*, also refer to federal laws in *appendix 10.9*
- \* Access for the sick, handicapped and visually impaired - Federal Law – Rights of Special Needs Law # 29 for the year 2006 accessible in the Ministry of Social Affairs web site <http://www.msa.gov.ae> (Arabic version only)

### **3.3.7 Redundancy**

Facility design shall incorporate reliability, (availability), and redundancy in the provision and delivery of engineering services, in order to comply with statutory specifications, and duty of care in the delivery of essential life safety care. Back up of essential services are to be clearly defined and identified for critical areas and medical equipment, also refer to *Essential Engineering (MEP) Services and Equipment section 3.5.2* for further details

## **3.4 Construction**

Facility construction for free standing developments or additions/renovations to existing buildings, must have built in provisions for infection controls, life safety and protection of occupants. Construction programs shall include for risk mitigation management controls the following:

- 3.4.1 Environmental Impact Statement – **EIS**
- 3.4.2 Health Risk Assessment – **HRA**
- 3.4.3 Infection Control Risk Assessment – **ICRA**

### **3.4.1 Environmental Impact Statement - EIS**

Construction activities are subject to provisions of environmental pollution controls and regulations. Health facilities are required to submit to the regulatory authority an EIS before commencing construction.

The EIS shall provide an assessment which summarizes the projects potential impact to the environment, and identifies the operational controls employed on the construction site to minimize environmental pollution.

Further information can be found in *section 9.2.2 Local Codes and Standards Authorities Having Jurisdiction - Dubai Municipality – Regulations*.

### **3.4.2 Health Risk Assessment - HRA**

At the completion of design development, health facilities are required to conduct a health risk assessment which determines for the project any life safety, infection control, utilities, air quality, emergency management, noise and vibration issues. The assessment should include action plans and precautions which address each issue and the measures

undertaken, and for their introduction, and ongoing monitoring at the construction site. Typically these are included in preconstruction contract documents and by communicated by regular education sessions of workers during construction. Sessions are subject to regulatory body auditing and will require records being maintained of attendees and session content.

### **3.4.3 Infection Control Risk Assessment - ICRA**

The health facility shall provide an ICRA which determines the potential risk of transmission of various air and waterborne biological contaminants, and the specific mitigation recommendations for avoidance during renovations. Risk assessment shall be continuous and subject to on going monitoring to evaluate effectiveness. For construction works on occupied facilities recommendations shall typically include but not be limited to:

- Patient location and potential relocation
- Protective measures for adjacent areas
- Susceptible patients to airborne contaminants
- Temporary provisions for engineering services under modification
- Demolition barriers
- Communication protocols and responsibilities for notifications, interruptions and emergency stopping of work
- Work site isolation, including areas for building access construction traffic flow and cleanups
- Locations of known hazards
- Maintaining air quality and services to occupied areas
- Phasing of construction work to ensure a safe environment in patient care areas

Further information can be found in *Appendix 10.3 'Infection control During Construction Manual – Policies, Procedures and Strategies for Compliance '*

### **3.4.4 Site Controls**

For occupied areas undergoing redevelopment via renovations, the design consultant should have plans for each stage of the project the following:

- \* Fire Egress
- \* Access/Egress
- \* Security controls

Plans shall be developed with consideration of all site stakeholders typically including patients, staff, visitors, transportation, supplies, emergency services, contractors, site logistics and other authorities having jurisdiction.

## **3.5 Commissioning**

### **3.5.1 General**

This section provides a general approach to investing in the commissioning phase of a health care project. Future guidelines will provide a more detailed document, which interfaces healthcare facility engineering services commissioning with facility operations.

Commissioning provides for the validation of the built facility, equipment, engineering services and component infrastructure systems are constructed, installed, tested and are capable of being operated and maintained in conformity with the design intent, and as constructed documentation. (Drawings, manuals, test data, equipment certifications etc). The health facility must demonstrate commissioning outcomes which conform where applicable to commissioning guidelines for essential services

Further information can be found in *Appendix 10.3 'Commissioning Guidelines for Healthcare Facilities'*

Typically, commissioning is conducted at the completion of the construction phase or phases, and is a pre-requisite to practical completion and building occupancy. Commissioning must include the training of building operations staff and ongoing monitoring of system performance during defined defects liability periods. As an outcome, commissioning punch lists are required to be closed out in order for the built facility to be fit for occupation. Where commissioning has failed to follow guidelines delays in achieving operational status may result as non conformity issues are resolved.

***Commissioning of essential services shall be conducted by third parties, independent from the main consultant and contactor.***

### **3.5.2 Essential Engineering (MEP) Services and Equipment**

Commissioning of essential engineering services and equipment shall typically include but not be limited to the following:

- \* Electrical HV/LV Mains and Switchgear
- \* Emergency Power Plant
- \* UPS
- \* Emergency Lighting Systems
- \* Communication networks including PABX
- \* Call Systems - includes Emergency, Nurse, Public Address, Duress and Paging
- \* Vertical Transportation Systems
- \* Pneumatic Tube Carrier System
- \* Critical Central Plant
- \* HVAC Systems
- \* Building Management System - (hospitals and surgical facilities)
- \* Fire Safety and Security Systems - includes CCTV and Access Control Systems
- \* Medical Gas Systems
- \* Imaging and Diagnostic Equipment
- \* Sterilization and Decontamination Equipment
- \* Mains Water and Treatment plant
- \* Domestic Hot Water System
- \* Patient Isolation Room HVAC Systems



### **3.5.3 Patient Care Areas**

Commissioning includes all areas of the built facility. Patient care areas of particular importance to ensure design conformity of engineering services and equipment, prior to occupancy include:

- \* Critical and Intensive Care Areas
- \* Isolation rooms - includes air pressure differential and alarm monitoring
- \* Theatre Suites
- \* Catherization Laboratories
- \* Emergency Service Areas
- \* Diagnostics
- \* Accommodation wards
- \* Oncology support areas
- \* Dialysis Units
- \* Infusion Areas
- \* Hydrotherapy Areas

### **3.5.4 Operational Risk Management Plan**

At commissioning, the owner shall be required to provide evidence shall be required of an *Operational Risk Management Plan*, which applies risk measurement techniques, duty of care requirements, and due diligence reporting. The plan shall identify for the built facility the following:

- \* A risk register and rating of each essential utility and MEP service for normal and emergency operation and assignment of risk mitigation
- \* Training of staff assigned operational mitigation tasks – including outsourced human capital
- \* Establishment of mitigation quality control systems for operating and maintaining Services
- \* Management action plan for controls and practices that reduce risk tolerance levels
- \* Rehearsal of emergency operation mitigation.
- \* A systematic, evidence based, service performance review and improvement process
- \* Establishment of MEP services operating policies
- \* A disaster recovery and emergency preparation (both internal and external to the facility)

Further information and details can be found in *Section 4.9*

## 4 Dubai Design Considerations

### 4.1 Local Factors

Typical design factors for health facilities in Dubai include the following:

- \* Relatives access to recovery areas
- \* Separation of male and female recovery areas
- \* Separation of male and female waiting areas
- \* Larger family waiting areas
- \* Prayer rooms for each floor
- \* Independent male and female ward accommodation
- \* Occupied Areas - design temperatures <sup>6</sup>

Other considerations are from Authorities Having Jurisdiction (AHJ) for the compliance of health facilities planning, design and construction, and are tabulated in *Chapter 9 Local Codes and Standards – Authorities Having Jurisdiction*. Tabulation includes contact details and relevant information of codes and standards for which jurisdiction applies.

Typically construction periods in Dubai are fast tracked with construction commencing prior to the detailed design approval and the introduction of new civil and construction technologies. Shorter project completion times can impact on healthcare operational preparedness in terms of the project business plan, and the effect on lead times for medical equipment, staff recruitment and set up requirements

### 4.2 Sustainability

#### 4.2.1 General

Every consideration shall be taken to ensure the planning, design and construction approach to projects provides for environmental stewardship, social responsibility and economic viability.

Architects and Design Consultants should recognize the effects of ‘Design Decisions’ and the resulting impacts on the environment. Environmentally friendly building projects can be assessed for compliance in the following categories:

- \* Sustainable site life cycle
- \* Water Efficiency
- \* Energy conservation, and controls on atmosphere pollutants
- \* Materials and Resources
- \* Indoor Environmental Air Quality
- \* Innovation and Design Process

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<sup>6</sup> Patient Care Areas - 22 deg C +- 2 deg C Support and Administration Areas - 23 deg C +- 2 deg C

#### **4.2.2 Design**

As part of the challenge of dealing with the current environmental challenges and the Dubai Strategic Plan 2015 announced by Sheikh Mohammed Bin Rashid, new healthcare building specifications must comply with ratings under the US Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system.

Typical sustainability considerations for design and construction phases include, but are not limited to the following:

- \* Construction waste management systems
- \* Include recycling centers into building layouts
- \* Use of recycled/recyclable building materials to minimize landfills
- \* Use of energy efficient materials for building envelopes and interior finishes
- \* Building orientation
- \* Efficient use of insulator materials to ductwork and pipe work systems carrying energy emitting gases and fluids
- \* Ceiling and under slab insulation
- \* Building orientation and glazing systems
- \* Use of local materials to reduce transportation distances
- \* Use of low emitting materials to minimize free volatile organic polluting compounds, (toxins) into the atmosphere
- \* Landscaping to shade buildings and reduce solar energy gains on air conditioning system
- \* Water efficient landscaping
- \* Use of energy efficient lighting, lighting controls and equipment
- \* Time schedules for HVAC and Lighting controls
- \* Energy economy controls for unoccupied Operating Theatres
- \* Use of natural lighting
- \* Solar heating for hot water systems
- \* Water saving devices to shower heads and tap ware
- \* Dual flush toilet cistern systems
- \* Selection of energy efficient central plant and control systems including boilers, chillers, pumps, fans, compressors and HVAC systems
- \* Use of variable speed drives
- \* recycling waste water schemes for irrigation purposes
- \* Storm water management systems

For further information please see *Appendix 10.2* (Dubai Municipality External Circular # 161 concerning Green Building) and Environment, Health and Safety (EHS) in Dubai World website <http://www.ehss.ae/departments.php?MIO=12&DID=13&SID=40>.

#### **4.2.3 Resource Information**

Resources for Sustainable Design information for health projects and facilities include:

- \* American Society for Health Care Engineering (ASHE) <http://www.ashe.org>

- \* US Green Building Council (USGBC) <http://www.usgbc.org>
- \* Hospitals for a Healthy Environment (H2E) <http://www.h2e-online.org>
- \* Healthy Building Network <http://www.healthybuilding.net/healthcare>
- \* US Green Building Council <http://www.leedbuilding.org>

### 4.3 Operational Considerations for Planning and Design

Health facilities must anticipate, address and manage operational requirements in a facility planning and design. These include:

**Safety** - Incorporate a safety focus into the design and planning process

**Emergency Management** – Provide design layouts that support emergency preparedness such as incident command center and decontamination facility (internal and external)

**Security** – Address security risk mitigation through appropriate building design

**Life Safety** – Designs for buildings shall adequately provide life safety features relative to fire, storm, collapse and aid life safety in similar emergencies

**Infection Control** – Facilities and fixtures must be included in design layouts to patient care areas that helps prevent and control the spread of infection

**Risk Assessment** – Introduce a project design risk assessment to identify risks which impact on the patient care environment, and whose effect can be reduced or eliminated through appropriate design changes – other factors to be addressed include human stress, fatigue, distractions, interruptions, errors, etc

**Utilities Management** – Infrastructures and engineering systems that provide for best practice in the management of utility services. This includes servicing of mains plant and equipment without major outages and energy management systems

**Medical Equipment Management** – For fixed equipment assess access, future installation and/or replacement requirements, to be incorporated into the building and services design. *Also refer to Section 4.4*

**Building Facades** – Designers must consider and incorporate into specifications the on going requirements for accessing the façade of buildings, including maintenance and window cleaning.

### 4.4 Special Considerations for Planning and Design

#### 4.4.1 Hazardous Materials and Waste Management Planning

##### General

Facilities shall be provided for the safe storage and disposal of hazardous materials and waste. Design requirements will be determined by the facilities functional program and operational planning studies, including identifying processes for selecting, segregating, handling, storing, transporting, using, and disposing of hazardous materials and waste from receipt or generation through use or final disposal.

Floor layout and the location of waste collection points are important in facilitating best waste management practice. Waste storage areas should be designed to secure the material, reduce organic decomposition, contain odors and allow hygienic cleaning of storage areas and carts.

Larger institutions may benefit from the installation of a mechanized bin washing facility. Reticulated steam, pressure cleaning systems and air blow drying facilities may be appropriate in these locations. Liquid waste emanating from disinfection procedures will require stabilization before disposal in sewerage systems.

## **Regulations**

For Health facilities Dubai Municipality (DM) regulations apply legislative compliance requirements for environmental protection and occupational safety and health for the following:

- \* Identification, evaluation, and inventory of hazardous materials and waste used or generated
- \* Managing chemical waste, chemotherapeutic waste, radioactive waste, and regulated medical or infectious waste, including sharp
- \* Providing adequate and appropriate space and equipment for safe handling and storage of hazardous materials and waste
- \* Reporting and investigating all hazardous materials or waste spills, exposures, and other incidents
- \* Monitoring and disposing of hazardous gases and vapors

Architects and Design Consultants must be familiar with regulations and their impact on facility planning and design requirements. Further information can be found in *section 9.2.2 Local Codes and Standards Authorities Having Jurisdiction - Dubai Municipality - Regulations, Federal Laws, Guidelines and Codes of Practice*

## **4.5 Ionizing Radiation and Non- Ionizing Radiation Safety**

### **4.5.1 Ionizing Radiation Uses in Medicine:**

The use of ionizing radiation in medicine for diagnostic and therapeutic purposes is governed by the “Federal Law No. (1) of 2002 Regarding the Regulation and Control of the Use of Radiation Sources and Protection Against Their Hazards” and the subsequent National Radiation Protection Regulations of 2003 related to: 1/ “Basic Regulations for Protection Against Ionizing Radiation”; 2/ “Radioactive Waste Management”; 3/ “Transport of Radioactive Material”.

Furthermore, supplemental instructions relevant to design, functionality and safety of radiation facilities, including the safety of workers, are contained in DHA radiation protection policies and guidelines. In this respect, all medical practices in healthcare facilities involving the use of ionizing radiation must comply with the administrative and technical requirements referred to in the federal legislation (Law and Regulations) and DHA policies, in conformity with the international radiation safety and quality standards issued jointly by international organizations

[International Commission for Radiological Protection (ICRP), International Atomic Energy Agency (IAEA), World Health Organization (WHO), International Labor Organization (ILO), International Electrical Commission (IEC).

The following elements compromise of technical details and major tools relevant to radiation licensing:

- \* Administrative requirements (Organization of radiation protection, legal user, radiation protection officer, safety records, safety culture, etc.)
- \* Design of the radiation facility (facility layout, dimensions, radiation shielding, storage rooms, patient rooms, etc.)
- \* Qualifications and skills of radiation workers
- \* Protection of workers against radiation
- \* Training of radiation workers
- \* Protection of patients against excessive radiation doses
- \* Radioactive Waste Management
- \* Environmental Surveillance around radiation facilities
- \* Certification of radiation machines and radioactive sources
- \* Quality Control of radiation equipment (survey monitors, medical imaging modalities, etc)

#### **4.5.2 Non-ionizing Sources in Medicine:**

Non-ionizing radiation sources used in the medical field are mainly laser, microwave, Magnetic Resonance Imaging (MRI), radio frequency waves, diagnostic ultrasound, and therapeutic ultrasound. In the absence of national non-ionizing safety regulations, DHA adapt the safety requirements of non-ionizing sources recommended by the International Commission of Non-Ionizing Radiation Protection (ICNIRP).

#### **4.5.3 Regulations**

Compliance with the standards assists possession licensees in ensuring that the health and safety of persons are not adversely affected by exposure to radiation. Architects and design consultants must be familiar with regulations and their impact on facility planning and design requirements.

Currently radiation protection team in DHA provides radiation safety assurance in health facilities including radiation standards and safety. The team also provides scientific and technical advice and training on all ionizing and non-ionizing radiation safety matters in the interest of minimizing health risks and protection of the environment. In this respect, the team responsibility includes the following main tasks:

- \* Providing technical assistance in the implementation radiation protection and quality control programs in health facilities
- \* Reviewing license applications and issuing recommendations regarding their approval
- \* Inspecting periodically radiation facilities and issuing inspection reports
- \* Providing technical assistance in radiation protection training

\* Evaluating the safety of equipment and material used in medical facilities.

Also see *Appendix 10.1 DHA - 'Forms, Policies and Procedures'*

## 4.6 Vertical Transportation Analysis

### 4.6.1 General

Any building of more than one storey that does not have ground level access to all levels shall have adequate lifts to provide safe and reliable vertical transport between levels for all conditions of persons and goods needing to move between levels. The number of lifts and their size speed and load carrying capacity shall be determined by a professional analysis of their anticipated usage. Dependant on the functional program<sup>7</sup> for the facility, a guide for the *minimum numbers* shall comply with the following:

- \* 1 to 60 patient beds at least one lift shall be provided
- \* 61 to 200 patient beds at least two lifts shall be provided
- \* 201 to 350 patient beds at least three lifts shall be provided
- \* Greater than 350 patient beds as determined by professional analysis but not less than three lifts shall be provided.

Typically vertical transportation system designers must provide segregation between functions, such as patients, visitors and materials handling.

### 4.6.2 Other Design Considerations

From each building fire zone at least one lift shall be accessible without passing through another occupied fire zone, i.e. access shall be directly from each fire zone to the lift lobby or via a fire rated corridor to the lift lobby.

Each lift shall accommodate the largest option available for equipment or patient circumstances requiring transport, e.g. a patient bed with all attachments, attendant trolleys and attendant staff that are needed for worst case safe patient movement. The facilities functional program shall define the lift dimensions needed to fulfill this condition and ***shall be not less than***: clear internal dimensions, measured clear of all obstructions including handrails etc: 2280mm long x 1600mm wide x 2300mm high; door clear opening size shall be: 1300mm wide x 2100mm high. The number of lifts shall not limit the efficiency of medical treatment nor increase the risks of patient health treatment outcomes. The lift transportation system shall be able to operate during a normal power failure event The number of lifts sequenced to operate concurrently will depend on the sites emergency power supply capacity and other factors including patient safety, emergency transportation needs and fire zone boundaries. Designs shall consider these issues and the need for redundancy to achieve required reliability of production and appropriate risk management.

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<sup>7</sup> Numbers are for patient transportation only and exclude consideration for other support services such as materials handling, visitors and special lift systems (ambulatory, VIP, etc)

An additional goods lift should be considered if any lift carries a large portion of the hospitals goods traffic.

#### **4.7 Acoustics Analysis**

Health facilities should provide comfort to both patients and medical staff over 7x24 periods - one of the many design factors to consider is acoustics. The acoustic environment is controlled by the performance of elements such as room or ward shape and size and the inter-relationship between these areas.

Construction materials, surface finish and furnishings need to be selected carefully to minimize noise build-up. The sound transmission class specification of doors, walls and ceiling constructions, is necessary to block out unwanted noise without sacrificing other important design aspects.

Consideration also needs to be given to the impact of services such as plumbing, electrical and mechanical systems like air-conditioning as well as external noise intrusion, particularly from traffic noise.

Acoustic design factors include:

- \* Effective use of light weight building materials
- \* Insulation of sound between adjacent rooms or areas
- \* Avoidance of cross-talk via duct work between adjacent rooms
- \* Minimization of air-conditioning and plumbing noise
- \* Adequate privacy for areas such as bathrooms
- \* Isolation of external noise sources, both air- and structure borne, from traffic, kitchen areas or elevators
- \* Privacy conditions between rooms
- \* Room conditions for speech intelligibility
- \* Specifications for audio visual systems if required
- \* Minimization of sound leakage from consulting rooms to other areas to ensure patient confidentiality.

For larger projects the design consultant shall provide an independent acoustic engineering review of all factors, calculations, assumptions, material selections, standards, etc.

#### **4.8 Residual Life Cost Planning**

Designers and building owners should consider all aspects of residual life cycle costs for operating, maintaining and the on going redevelopment of the proposed facility. Typically analysis includes modeling residual life costs over the planned economic life of a facility. Outcomes which can impact on design deliverables include:

- \* A forecast of facility cash flows, net present cost and what the economic life will be
- \* Estimates of returns on the costs of owning and operating the facility
- \* Facility economic viability forecast
- \* Forward budgets required to deliver minimized residual life costs



- \* Achieving best returns on investment and avoid operating facilities beyond their useful economic life

Further information can be found in *Appendix 10.3 'Facilities Residual Life Cycle Cost Planning Guidelines'*

#### **4.9 Facilities Risk Management Planning**

A Facilities Risk Management Plan provides includes a register of all identified facilities risks and specifies risk mitigation required for compliance with duty of care. Design Consultants should consider 'designing out' as an approach to mitigation through consultation with all stakeholders

Typically, the *Facilities Risk Management Plan* should include, but not be limited to provide mitigation for:

- \* Health care risks related to quality and performance of facilities
- \* Exposure to healthcare hazards
- \* Performance risks associated with maintaining the quality of facilities service outputs
- \* Unavailability risks associated with the failure of essential utilities or consumables
- \* Safety risks associated with continuing to operate facilities during additions or alterations to existing facilities
- \* Safety risks related to the non availability of trained resources necessary to operate and maintain services and equipment

For further details see *Appendix 10.3 'Facilities Risk Management Plan Guidelines'*

#### **4.10 Support Service Areas**

##### **4.10.1 Pharmacy Services**

For Pharmacy Services areas, designers should familiarize themselves with DHA/MOH regulations and standards and the impact on layouts and services. Pharmacies design considerations include:

- \* Needs of pharmacy staff and their involvement in the planning and design process
- \* Location of the pharmacy for integration and access by other departments
- \* Use of building pneumatic tube systems to deliver medicines
- \* Proper air handling
- \* Hand –wash sinks
- \* Pharmaceutical delivery
- \* Location and functionality of imprest rooms and drug distribution stations
- \* Work Flows
- \* Storage (dry and refrigerated)
- \* Management of radiopharmaceuticals
- \* Security
- \* Areas for IV Fluid and Cytotoxic Drug Preparation Clean Rooms and Safety Cabinets
- \* Management of controlled drugs and requirements for dose packaging systems

- \* Automated drug delivery systems

#### **4.10.2 Laboratory Services**

For Laboratory Services areas, designers should familiarize themselves with current laboratory standards and regulations that impact on layouts and services. Because of the nature of work provided in laboratories there are special planning and design considerations for safety and security, ventilation, storage and acoustics including:

##### **Safety and Security**

Potential bio-hazard level and hazardous material containment

- \* Bio-safety level designations 1 – 4 and scope of safety precautions
- \* Negatively pressurized areas
- \* Bio-safety Cabinet and hoods classification selection and location
- \* Completely cleanable space
- \* Hands free hand-wash stations
- \* Door holds open devices
- \* Emergency showers and eyewash

##### **Ventilation**

- \* HVAC unit to provide proper filtration, humidity, temperature control, and air changes
- \* Air pressure differentials between corridors and adjoining work areas
- \* Air recirculation restrictions
- \* Sealing of all openings in building fabrics to prevent infiltration

##### **Storage**

- \* Ergonomic storage design – (OSH)
- \* Segregation of deliveries and waste collection areas
- \* Pharmaceutical refrigerated storage – including bulk cool rooms and product separation

##### **Acoustics**

- \* Identify all potential noise sources – automated equipment, centrifuges and work processes
- \* Use of building materials and fabrics for sound insulation

Health facility designers must consider the introduction of new equipment and services and the future expansion of the laboratory. Allowing an open footprint for the laboratory will provide flexibility for future needs.

Laboratory representation should be included throughout the design process, including advising on the future requirements for services before the facility is completed. Further information can be found in *Appendix 10.1 –DHA Private Laboratory Standards*

#### **4.10.3 Catering Services**

For Catering service areas, designers should familiarize themselves with Dubai Municipality regulations and standards, and the impact on layouts and services. Design requirements will be determined by the facilities functional program for food services for inpatients/outpatients, staff, and visitors. Requirements are for in-house catering facilities only.

*Catering service space design considerations include:*

- \* Kitchens bulk storage and dry storage locations must be located to delivery and interior transportation, (lifts) plant
- \* Building fabrics and finishes shall be selected for cleanability, and the on going maintenance of sanitary conditions
- \* Food preparation clean areas with separation boundaries from other process areas
- \* Assembly and distribution areas
- \* Cart distribution areas – including loading, storage, distribution, returns receipt and cart sanitizing
- \* Cooked chill services and functionality with outsourced service providers
- \* Dining Areas
- \* Washing and stacking facilities
- \* Equipment sanitization
- \* Specific engineering services including ventilation, steam, cooking gas, drainage including grease traps access and location
- \* Fire protection systems
- \* Vending services
- \* Administration areas
- \* Pest controls
- \* Kitchen waste collection, segregation and removal from site
- \* Emptying of grease and waste traps
- \* LPG Storage and Leak Detection System

#### **4.10.4 Housekeeping Services**

Exclusive housekeeping rooms shall be located within each patient treatment areas. Rooms should contain cleaning sinks, cleaning equipment and storage areas. Further information can be found in *Section 4.2.1*

#### **4.10.5 Engineering Services**

Engineering services and maintenance require sufficient space and access to HVAC Plant, Central Plant, workshop and equipment areas. Typically these include:

- \* Plant rooms
- \* Electrical Transformer and Switchboard Rooms
- \* Standby Generator Rooms
- \* Cooling Tower Compounds
- \* Medical Gas Cylinder and Manifold Room
- \* Bulk medical oxygen compound for tanker access
- \* Cold Water Storage Tanks
- \* Administration
- \* Workshops readily accessible to building lift systems
- \* Biomedical Engineering Equipment Workshop
- \* Engineering Supply Store
- \* Outside Equipment Storage
- \* Deliveries and service parking area

#### **4.10.6 Security Services**

For Security Services, typically the extent of service needs to be considered include:

- \* Access control systems
- \* Asset tracking systems
- \* Video surveillance systems
- \* Crime prevention through environmental design
- \* Door intercommunication systems
- \* Intrusion detection systems
- \* Security lighting
- \* Security screens and fences
- \* Duress systems
- \* Secure parking
- \* Security response resources and procedures
- \* Radio Communication systems
- \* Patient tracking systems
- \* Police post (for governmental hospitals only)

#### **4.10.7 Materials Management Systems**

Building space requirements will be determined by the facilities functional program for the daily supply of goods and materials including adequate receiving and storage for central and localized imprest areas. Materials Management System design requirements typically consider the following:

- \* Areas to accommodate delivery trucks and other vehicles
- \* Loading dock segregation from outgoing materials
- \* Sterile stock segregation, access and storage
- \* Access to service lifts
- \* Sorting and storage of incoming supplies
- \* Centralized warehousing requirements

- \* Additional imprest storage and delivery routes within the building
- \* Potential for off site storage
- \* Building vertical transportation of goods to imprest areas

#### **4.10.8 Sterile Supply Services**

Sterile Supply Services design and workflow layout considerations include:

##### **Central Department Areas**

- \* Sterilization and washing/decontamination equipment, loading/unloading and service access separation
- \* Decontamination and washing
- \* Preparation and Packaging
- \* Clean/sterile storage
- \* Case Cart Holding/Dispatch
- \* Linen work room
- \* Staff Support
- \* Access to operating theatres and outsourced sterile supplies
- \* Department expansion requirement in line with projected facility growth in clinical services

##### **Clinical Areas**

- \* Soiled and clean work rooms
- \* Equipment and Supply Storage
- \* Clean assembly work rooms

Designs shall be determined by the functional programs for each area, with physical separation between dirty and clean work processes. Equipment redundancy and connection to emergency electrical power supply systems should also be a design consideration.

#### **4.10.9 Linen Services**

Facilities shall have provision for storing and processing of clean and soiled linen as determined by the functional program for patient care services. As a minimum the following elements shall be provided:

- \* Soiled linen holding room
- \* Clean linen storage
- \* Linen cart storage area
- \* Hand-washing stations where unbagged soiled linen is handled
- \* Service entrance for outsourced linen supply
- \* Separated storage for clean and dirty linen in patient treatment areas
- \* Service routes for the delivery of clean and return of dirty linen from central storage/collection points to patient treatment areas

#### **4.11 Medical Technology**

Advances in state of the art medical technology have brought large benefits but have also been a major driver of increased health spending in recent years. In many cases, increased

expenditure on new medical technologies reflects improved treatment and a significant increase in the number of people treated.

Designers of new building support systems for new technologies, are encourage to undertake a systematic health technology assessment based on evidence of community needs for accessing new technologies, and promote overall cost effectiveness of healthcare, without unduly delaying their introduction.

Assessments should include but not be limited to:

- \* Diagnostic Technologies
- \* Imaging and interventional technologies
- \* New medical devices
- \* Advanced data recovery systems through hand held devices (patient records laboratory and radiology results)
- \* Telemetry Systems
- \* e-health information systems
- \* Infrastructures to support technologies for specific work tasks
- \* Convergence and alignment of different technologies
- \* Medical Equipment linking to facility computer networks and centralized information storage and retrieval systems
- \* Robotic technologies
- \* Relatively short life cycles for fixed medical equipment, requiring accessibility to be designed into the facility for regular replacement/upgrading

## **5 The Design Submission - Compliance and Review Process**

The design submission compliance review process applies in general to all facility types defined in section 3.3.2. Important pre-requisites for a successful design submission review process include the development of feasibility studies along with a realizable space program. Each design development phase will require a sign-off from all stakeholders, including end users, to minimize design changes during construction. Involving end-users is paramount; however individual preferences must be balanced holistically against all other design considerations that contribute to a successful project. The use of Room Data Sheets as part of the design development phases is recommended. Refer to *section 5.2.12*

The DHA shall provide the resources for reviewing design submissions. Review fees will apply to each submission. The extent of design requirements described herein are a guide only, and require evaluating for applicability to each project

### **5.1 Schematic Design**

Schematic design stage typically includes:

- \* A narrative describing the design intent, scope of the project and links to the overall mission and values of the organization
- \* Building site positioning and circulation patterns
- \* The overall form and configuration of the building
- \* Building facades, materials and engineering systems
- \* Parking and access/egress points
- \* Floor to floor heights
- \* Plant room locations
- \* Functional areas
- \* Fixed medical equipment planning
- \* Project schedule charts
- \* Construction budgets

This phase should include concept drawings and developed alternative layouts with input from consultants, engineers, key stakeholders such as organizational leadership and key facility staff, and review from regulatory agencies. Drawings should be produced on a scale which that illustrates the overall project concept. Typically schematic design drawing submissions shall include:

#### **5.1.1 Site Plans**

- \* Affection Plan
- \* Building positioning and location to other facilities and services
- \* Road networks
- \* Parking zones
- \* Property Lines
- \* Setbacks
- \* Easements
- \* Land contours
- \* Zoning constraints

### **5.1.2 Floor Layouts - Functional Relations, Circulation and Major Equipment Areas**

- \* Building dimensions
- \* Layouts showing circulation patterns for patients, staff, work processes, and visitors
- \* Functional relationships
- \* Department boundaries and sizes
- \* Room/Area identification and sizes
- \* Major Equipment locations

### **5.1.3 Exterior Elevations**

- \* Appearance, size and shape of vertical elements \*
- Grades and slopes at the building face
- \* Roof profiles

### **5.1.4 Building Sections**

- \* Special sectional views
- \* Cross sectional views of critical areas
- \* Floor/ceiling and wall thicknesses

### **5.1.5 Preliminary Specifications**

- \* General description of work for major building components and systems (architectural, civil, structural, electrical, mechanical, hydraulic)
- \* Basic materials selection

### **5.1.6 Approvals**

The schematic design phase shall require a sign off process prior to design development and production of final designs. This process will typically include:

- \* Regulatory reviews and approval from Authorities Having Jurisdiction
- \* Building Permit
- \* Payment of Authority Fees
- \* Client Approval

Further information can be found in *Chapter 9.2.2 Local Codes and Standards Authorities Having Jurisdiction - Dubai Municipality - Regulations, Federal Laws, Guidelines and Codes of Practice*

### **5.1.7 Schematic Design Resubmissions**

Design submissions that fail to meet the requirements here in and/or compliance requirements from Authorities Having Jurisdiction will be subject to re-submission fees accorded by the relevant authority.

## **5.2 Detailed Design**

Detailed, (Final), design development requires all elements established in the schematic design phase to be considered in greater detail. Authorities Having Jurisdiction should be



regularly involved during the detailed design development phase to keep abreast of design decisions and avoid regulatory problems and redesign

Decisions are required on component design descriptions and significant features such as type, size and selections. Important detailed design development features include:

### **5.2.1 Space Planning**

- \* Operational functionality
- \* Furniture and Equipment
- \* Standardization of room layouts and features in patient rooms for safety and efficiency
- \* Room data sheet development
- \* Requirements for local customs and practices

### **5.2.2 Interior Design**

- \* Selection and coordination of finishes (walls, ceilings floors) and best task fit applications
- \* Infection control requirements on finishes and material selection
- \* Fire and smoke ratings of finishes and materials
- \* Architectural Finishes and Fabrics (selection of anti bacterial materials)
- \* Signage
- \* Provisions for the healing environment

### **5.2.3 Medical Equipment Planning**

- \* Types, size and support service requirements
- \* Portability
- \* Operational requirements
- \* Accessibility for servicing and maintenance
- \* Upgrading and replacement impact on interior layouts
- \* Coordination requirements for the project construction phase
- \* Equipment delivery lead times
- \* Contractual responsibilities for equipment procurement and installation

Because of the specialties of medical equipment planning, design development aspects may require earlier inclusion into the schematic design phase. Also refer to *Section 4.6* Final design drawings development includes schematic design revisions and detailed design solutions typically for:

### **5.2.4 Site Plans**

- \* Project phasing
- \* Surface materials and landscaping proposals

### **5.2.5 Building Floor Plans**

- \* Built in joinery
- \* Plumbing fixtures
- \* Major Equipment Layouts and Services
- \* Legends
- \* Room names and numbers

### **5.2.6 Building Elevations and Sections**

- \* Enlargements
- \* Façade details
- \* Building element details
- \* Structural elements
- \* Mechanical space
- \* Wall/Floor profiles
- \* Interior space configurations
- \* Typical interior wall sections
- \* Raised Floor Areas
- \* Static Free Floors

### **5.2.7 Reflected Ceiling Plans**

- \* Ceiling systems and fixtures
- \* Ceiling mounted equipment (lighting, air conditioning diffusers, fire detection and sprinklers, speakers etc)
- \* Ceiling grid patterns and heights
- \* Above ceiling services coordination

### **5.2.8 Detailed Floor Plan Layouts**

- \* Patient Rooms
- \* Diagnostic and treatment areas
- \* Operating Rooms

### **5.2.9 Interior Elevations**

- \* Joinery and cabinet work
- \* Windows and openings
- \* Surface details
- \* Equipment mounting locations
- \* Services locations (plumbing, electrical, medical gases, call systems, etc)

### **5.2.10 Equipment Plans**

- \* Major medical and diagnostic equipment layouts
- \* Catering
- \* Central Plant and HVAC
- \* Laundry
- \* CSSD

### **5.2.11 Life Safety Plans**

- \* Fire walls
- \* Smoke barriers
- \* Corridors and emergency exits

### **5.2.12 Room Data Sheets**

Equipment and Services requirements must be prepared and identified on Room Data Sheets – A typical Room Data Sheet template is shown in Appendix 12.6 Sheets are generally linked to spreadsheet formats for reporting requirements and provisions for additional information (i.e. contractual responsibilities, technical specifications, etc)

### **5.2.13 Approvals**

Detailed designs shall require a sign-off process prior to production of construction drawings. This process will typically include:

- \* Regulatory reviews and approval from Authorities Having Jurisdiction,
- \* Client Approval

Further information can be found in *Chapter 9 - Local Codes and Standards Authorities Having Jurisdiction*

### **5.2.14 Design Resubmissions**

Design submissions that fail to meet the requirements here in and/or compliance requirements from Authorities Having Jurisdiction, will be subject to re-submission fees accorded by the relevant authority

## **5.3 Construction Documents**

### **5.3.1 Scope of work**

Construction document packages will provide a scope of work including

- \* The final approved design drawings
- \* Architectural and MEP Services Specifications
- \* General contract conditions
- \* Shop Drawings

### **5.3.2 Additions**

Additional documentation in the form of:

- \* Detailed plans and elevations
- \* Schedule of materials
- \* Phasing and demolition plans
- \* Life safety plans
- \* Non-architectural site improvements

### **5.3.3 Sub Contractor and Specialists Drawings**

Detailed sub contractor and specialist drawings for:

- \* Architectural finishes
- \* Equipment
- \* Structural
- \* Plumbing and drainage
- \* HVAC
- \* Electrical

- \* Communications and Data
- \* Fire protection

Dependant on the scale of the project, construction and final approved design documents may vary

#### **5.3.4 Design Changes during Construction**

Significant design changes during construction shall require consultation and approval of the Client and *Authorities Having Jurisdiction* where required. Significant is considered applicable where the intent of original functional program and scope of clinical services is subject to change.

#### **5.3.5 Existing Buildings and Services**

Where construction works require interface and connection to an existing building and services, documents must include details of existing building and services and the interface and connections proposed. Typically such requirements apply to facility refurbishments, additions and fit-out of shell and core buildings.

## **6 Project Timelines for Healthcare Facilities Licensing and Development**

The process for health facility licensing including: design registration and submissions, issuing of permits, compliance during construction, practical completion, licensing and pre-operating inspections are provided in separate document

Please visit the DHA website [www.dha.gov.ae](http://www.dha.gov.ae) for further details information

## **7 Pre Qualification of Architects and Design Consultant Organizations**

The DHA have adopted for evaluating design submissions for new and refurbished healthcare facilities in Dubai, the ‘**Guidelines for Design and Construction of Healthcare Facilities**’ published by the American Institute of Architects Academy of Architecture for Health.

In order to qualify for DHA project works, Architects and Design Consultant Organizations shall be required to demonstrate their technical capability and previous capacities in health facility designs using the AIA Guidelines associated codes and standards (NFPA, ASHRAE, etc)

Qualification shall be determined for the following services:

### **7.1 Architectural Services**

- \* Master Planning
- \* Feasibility Studies and Project Risk Management
- \* Design Conception
- \* Clinical Space – Best Practice Management
- \* Schematic Design
- \* Design Development
- \* Engineering Design Services Coordination
- \* Project Team Management
- \* Project Commissioning and Certification Pre and Post Occupancy
- \* Facilities and Asset Management

### **7.2 Engineering Services**

- \* Civil
- \* Structural
- \* Communications
- \* Electrical
- \* Hydraulic
- \* Mechanical and HVAC
- \* Medical Gases
- \* Security Systems
- \* Fire Safety
- \* Medical Equipment Planning
- \* Lift Transportation

### **7.3 Other Evaluation Factors for Prequalification**

Prequalification of prospective Architectural and Engineering Services Healthcare Consultants will be determined by how well they meet the following prequalification criteria:

- \* Organization Identity and details
- \* References
- \* Insurance
- \* Quality Assurance
- \* Prequalification Declaration
- \* Safety Record and Program

The DHA pre-qualification process may include, site inspection of the consultant premises to assess the existing capability and periodic business assurance audits shall be carried out to ensure that QHSE management system requirements are met and improved. The DHA will determine, solely at its own discretion, whether a consultant is prequalified. DHA shall reserve the right to reject any or all prequalification proposals and to waive non-material irregularities in any response received.

Any information submitted for prequalification evaluation will be considered official information acquired in confidence and DHA will maintain its confidentiality to the extent permitted by law. For a sample of the Consultants evaluation document refer to *Appendix 10.4 General Pre Qualification Questionnaire for Healthcare Consultants*.

#### **7.4 Certification**

Successful evaluation and payment of a pre qualification fee will result in the consultant being awarded a DHA qualified Design Consultant Certificate, based on the health facilities category types of

**Category 1** Outpatient Facilities – Single Clinic

**Category 2** Outpatient Facilities – Poly Clinic

**Category 3** Out Patient Surgical Facilities

**Category 4** General Hospital

**Category 5** Medical Gas Systems only

#### **7.5 Exclusivity**

Pre qualified Architects and Design Consultant organizations will be included on an exclusive list of service providers for DHA Health facilities to select for design services on upcoming projects. Listings shall be published on DHA official website

#### **7.6 Performance**

DHA reserves the right to suspend or remove non performing organizations from the service provider list. Once removed, an organization may re-apply after a period of time, as advised by DHA

## 8 Adopted Design Standards and Guidelines

Design standards adopted by DHA for evaluating new healthcare facilities are the American Institute of Architects Academy of Architecture for Health – Guidelines for the Design and Construction of Hospitals and Health Facilities.

Included are associated standards and codes, such as **NFPA** and **ASHRAE**. *Major* standards and codes are listed below. For healthcare facilities, **HTM 01-02** is the preferred standard for Medical Gas Pipeline Systems installations. Other NHS standards are listed for guidance purposes only.

Also refer to <http://www.tsoshop.co.uk> for additional standards

Standard/Code	Description
AIA	Guidelines for Design and Construction of Healthcare Facilities 2006
NFPA 70	National Electrical Code 2005
NFPA 80	Standard for Fire door, Fire Windows 2007
NFPA 221	Standard for Fire Walls and fire Barrier Walls 2006
NFPA 257	Standard on Fire Tests for Window and Glass Block Assemblies 2007
NFPA 90A	Standard for the Installation or Air Conditioning and Ventilation Systems 2002
NFPA 99	Standard for Health Care Facilities 2005
NFPA 110	Standard for Emergency and Standby Power Systems 1999
NFPA 801	Standard for Fire Protection for Facilities Handling Radioactive Materials 2003
NFPA 101	Life Safety Code 2006
NFPA 72	National Fire Alarm Code 2007
IESNA	IESNA Publication RP-29-06 Lighting for Hospitals and Health care Facilities
ASHRAE	Standard 62.1 2004 - Ventilation for Acceptable Indoor Air Quality
ASHRAE	Guideline 12 2000 - Minimising the risk of Legionellosis Associated with Building Water Systems
ASHRAE	Handbook - HVAC Applications 2003
ANSI/ASME	Safety Codes for Esculators and Elevators 17.1 2004
FPN3	Fire code laboratories on hospital premises
FPN4	Fire code hospital main kitchens
FPN5	Fire code commercial enterprises on hospital premises
HBN2	The whole hospital briefing and operational policies
HBN6	Facilities for Diagnostic Imaging and Interventional Radiology
HBN8	Facilities for Rehabilitation Services - accommodation for physiotherapy, occupational therapy and speech therapy
HBN10	Catering Department
HBN12	Ophthalmology Department
HBN12	Oral surgery, orthodontics, restorative dentistry - supplementary
HBN12	ENT and audiology clinics hearing aid centre - supplementary
HBN13	Sterile services department
HBN15	Accommodation for pathology services
HBN21	Maternity Department
HBN22	Accident and Emergency Department in an Acute General Hospital



Code	Description
HBN23	Hospital accommodation for children and young people
HBN25	Laundry Department
HBN26	Operating Department Facilities
HBN26	Facilities for Surgical Procedures Volume 1
HBN27	Intensive therapy unit
HBN29	Accommodation for pharmaceutical services
HBN36	Local healthcare facilities Supplement 1 Accommodation for professions allied to medicine
HBN40	Common activity spaces Vol. 4 Circulation areas
HBN40	Common activity spaces Vol. 3 Staff areas
HBN40	Common activity spaces Vol. 1 Public areas
HBN40	Common activity spaces Vol. 2 Treatment areas
HBN45	External works for health buildings
HBN52	Accommodation for day care Vol. 1 Day surgery unit
HBN52	Accommodation for day care day surgery unit Vol. 1:supplement 1 Review of schedules of accommodation
HBN53	Satellite dialysis unit
HFN06	Operational commissioning strategy a managers guide
HFN14	Disability access
HTM15	Laboratory fitting out system - supplement
HTM61	Flooring
HTM81	Fire code fire precautions in new hospitals
HTM82	Fire code alarm and detection systems
HTM 2005	Building management systems Design considerations
HTM 2007	Electrical services supply and distribution Management policy - Volume 1
HTM 2007	Electrical services supply and distribution Design considerations - Volume 2
HTM 2007	Electrical services supply and distribution Validation and verification - Volume 3
HTM 2007	Electrical services supply and distribution Operational management - Volume 4
HTM 2010	Sterilization Part 2 Design considerations
HTM 2011	Emergency electrical services Design considerations
HTM 2014	Abatement of electrical interference Management policy
HTM 2015	Bedhead services Design considerations
HTM 2022	Dental compressed air and vacuum systems
HTM 2024	Lifts Design considerations
HTM 2024	Lifts Validation and verification
HTM 2025	Ventilation in healthcare premises Design considerations
HTM 2025	Ventilation in healthcare premises Validation and verification
HTM 2027	Hot and cold water supply, storage and mains services Management policy
HTM 2027	Hot and cold water supply, storage and mains services Design considerations
HTM 2027	Hot and cold water supply, storage and mains services Validation and verification
HTM 2045	Acoustics Design consideration

## 9 Local Codes and Standards – Authorities Having Jurisdiction (AHJ)

Further information on AHJ Codes and Standards can be found on respective web sites below: Copies of Codes and Standards indicated with an asterisk \* can be found in Chapter 10 Appendices

### 9.1 Web Sites:

Abbreviation	Authority/Organization name	website
DHA	Dubai health Authority	<a href="http://www.dha.gov.ae">http://www.dha.gov.ae</a>
MOH	Ministry of Health	<a href="http://www.moh.gov.ae">http://www.moh.gov.ae</a>
DOHMS	Department of Health & Medical Services	<a href="http://www.dohms.gov.ae">http://www.dohms.gov.ae</a>
DM	Dubai Municipality	<a href="http://www.dm.gov.ae">http://www.dm.gov.ae</a>
DHCC	Dubai Health Care City	<a href="http://www.dhcc.ae">http://www.dhcc.ae</a>
CD	Civil Defense	<a href="http://www.dcd.gov.ae">http://www.dcd.gov.ae</a>
DEWA	Dubai Electricity & Water Authority	<a href="http://www.dewa.gov.ae">http://www.dewa.gov.ae</a>
ET	Etisalat - Telecommunications	<a href="http://www.etisalat.co.ae">http://www.etisalat.co.ae</a>
DU	DU - Telecommunications	<a href="http://www.du.ae">http://www.du.ae</a>
CA	Civil Aviation	<a href="http://www.dubaiairport.com">http://www.dubaiairport.com</a>
DED	Department Economic Development - Dubai	<a href="http://www.dubaied.gov.ae">http://www.dubaied.gov.ae</a>
RTA	Roads and Transport Authority	<a href="http://www.rta.ae">http://www.rta.ae</a>
DP	Dubai Police	<a href="http://www.dubaipolice.gov.ae">http://www.dubaipolice.gov.ae</a>
EHS	Environment, Health and Safety – Dubai World	<a href="http://www.ehss.ae">http://www.ehss.ae</a>
CED	Centre for Economic Development	<a href="http://www.ced.bg">http://www.ced.bg</a>

### 9.2 Dubai Municipality

#### 9.2.1 Regulations, Federal Laws, Guidelines and Codes of Practice

##### Regulations

Document Title	Year
* Building Regulations	2001

##### Health and Environment

Document Title	Year
Local Order 61 of 1991 concerning Environment Protection Regulations in Dubai	1991
Local Order 11 of 2003 concerning Public Health and Community Safety in Dubai	2003
Local Order 07 of 2002 concerning Waste Disposal Sites in Dubai (Arabic)	2002

##### Federal Laws

Document Title	Year
Basic Regulations for Protection Against Ionizing Radiation	2004
Final Air Pollution Law	2006
Regulations for Radioactive Waste Management	2004

Document Title	Year
Regulations for Safe Transport of Radioactive Materials	2004
Federal Law No. (24) of 1999 for Protection and Development of Environment	1999
Federal Law No. 23 of the Year 1999	1999

### Technical Guidelines

Document Title	Year
Discharge of Wastewater to Sewer, Land & Marine Environment	2003
Waste Audit Requirements	1993
Guidelines for Safety Audit Reports	1993
Preparation of Environmental Impact Statements for New Industrial Premises	1998
Oil Spill Response and Preparedness	2004
Industrial Compressed Gas Cylinders	1993
Heat Stress at Work	1993
Entry into Confined Spaces	1993
Electrical Safety at Work	1993
Guarding of Dangerous Machinery	1993
Approval of Swimming Pool Plans	1993
Requirements for Wastewater Separators	2003
Industrial Waste Water Disposal	1997
Procedures for testing the Leaching Characteristics of Hazardous Waste	1994
Sampling of Hazardous Wastes	1994
Annual Approvals for Hazardous Waste Disposal	2003
Waste Minimization	2000
Discharge of Waste Gases, Fumes and Dust to the Atmosphere	1994
Disposal of Outdated Pharmaceuticals & Medicines	1994
Health & Safety in Kitchens & Food Preparation Areas	1994
Design & Maintenance of Septic Tanks & Soakaways	1994
Examination and Certification of Boilers and Pressure Vessels	1994
Examination & certification of Cranes, Hoists, Lifts & other Lifting Appliances	1994
Placarding of Road Vehicles Carrying Dangerous Goods	2003
Requirements for the Reduction of Construction / Demolition Noise	1994
Clearance of Dangerous Goods	2003
Guidelines for the Disposal of Used Chemical Containers	1994
Hazardous Waste Exemption Policy	1994
Requirements for the Hazardous Waste Transport	2003
Environmental Impact Assessment procedures	1995
Establishment of EPSS EMS - Implementation of ISO 14001 in Dubai	1998
Management of Medical Waste from Clinic and Laboratories	1997
Safety, Health and Environment Requirements for Laundry Operations	1998
Liquefied Petroleum Gas Cylinders	1998
Protection Against Ionizing Radiation	1998
Swimming Pool Safety	1998

## Codes of Practice

Document Title	Year
Management of Legionella in Water Systems and Industrial Plants (Available in Dubai Municipality)	1994
Code of Construction Safety Practice	1995
Management of Dangerous Goods in the Emirate of Dubai	1997
Management of Medical Wastes from Hospitals, Clinics and Related Health Care Premises in Dubai	---

### 9.3 Civil Defense

#### 9.3.1 Codes and Standards

##### NHS Estates Fire Codes

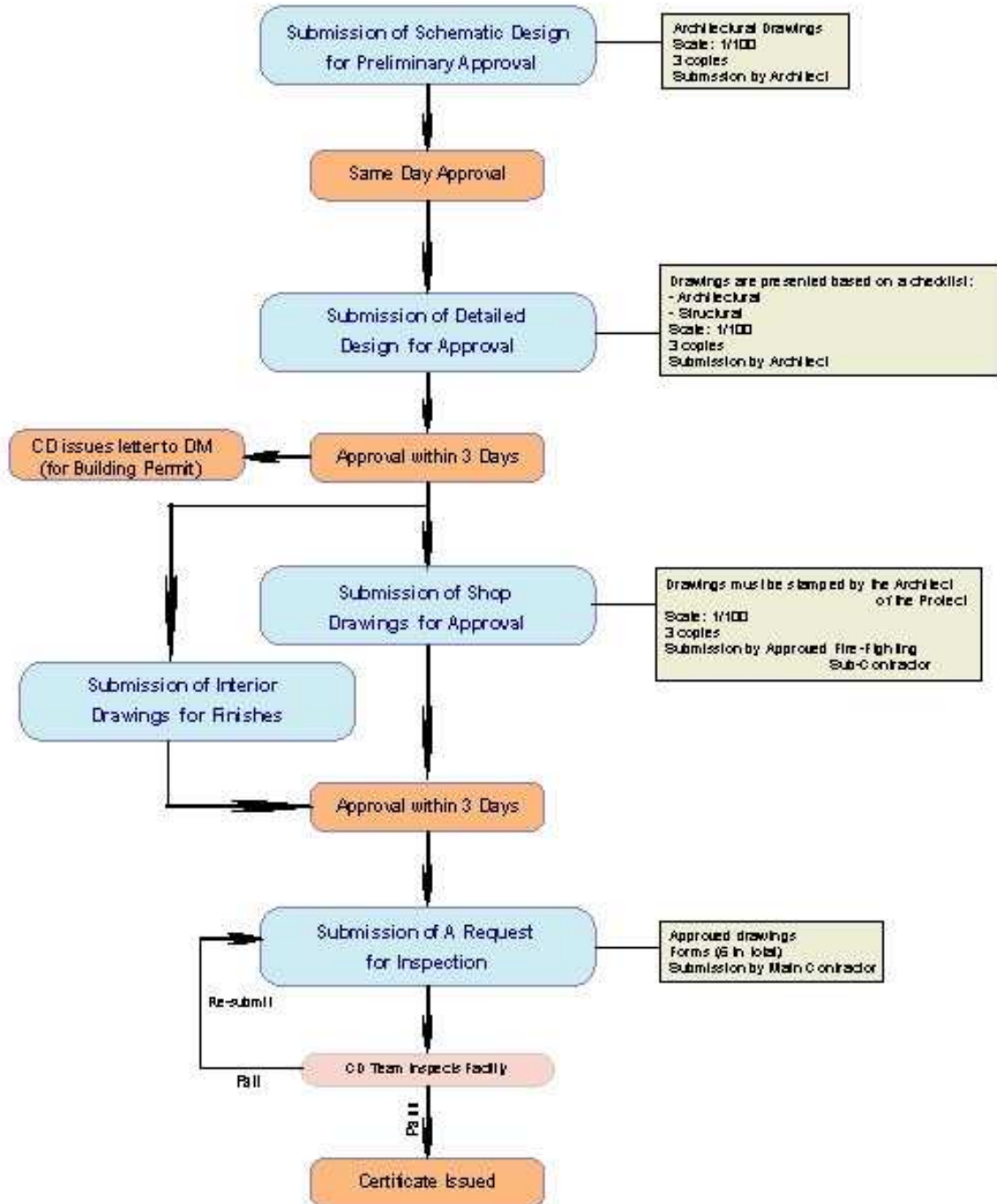
Document Title	Year
HTM 81 Fire code fire precautions in new hospitals	1997
HTM 82 Fire code alarm and detection systems	1996
FPN 10 Fire code laboratories on hospital premises	1996
FPN 4 Fire code hospital main kitchens	1994
FPN 5 Fire code commercial enterprises on hospital premises	1997

##### NFPA Codes and Standards

Document Title	Year
NFPA 101 Life Safety Code	2006
NPPA 80 Standard for Fire door, Fire Windows	2007
NFPA 221 Standard for Fire Walls and fire Barrier Walls	2006
NFPA 257 Standard on Fire Tests for Window and Glass Block Assemblies	2007
NFPA 801 Standard for Fire Protection for Facilities Handling Radioactive Materials	2003
NFPA 72 National Fire Alarm Code	2007
NFPA 99 Standards for Health Care Facilities	2005

9.3.2 Civil Defense Processes Flow Chart

Design Approval & Request for Inspection  
Civil Defence (CD Process)



Drawings are presented to the Engineering Office - Fire and Safety Department - Civil Defence  
Submitted on/ documents for Architects and contractors on alternating days  
It is recommended to call for an appointment: 04 207 3608/05410

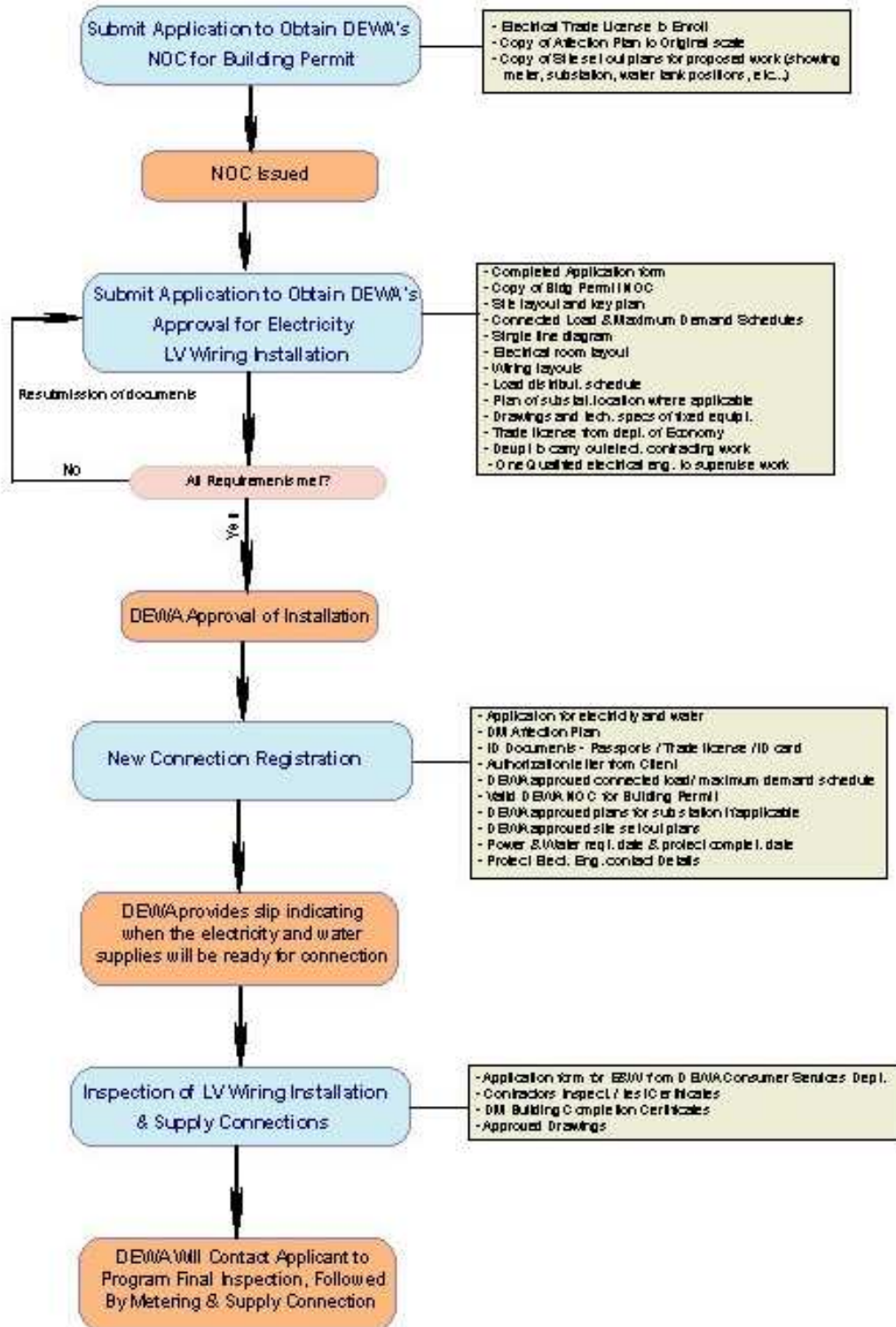
## 9.4 Dubai Electricity and Water Authority

### 9.4.1 Regulations

Document Title	Year
IEE Wiring Regulations 16 <sup>th</sup> Edition BS7671	2006
DEWA Wiring Regulations for Electrical Installations	2003

9.4.2 Dubai Electricity & Water Authority Processes Flow Chart

Dubai Electricity & Water Authority (DEWA)  
New Connections



**9.5 Etisalat (Telecommunications Provider)****9.5.1 Regulations**

Document Title	Year
* Etisalat Design Guidelines	2006

**9.6 DU (Telecommunications Provider)****9.6.1 Guidelines**

Document Title	Year
* Emirates Integrated Telecommunications Company PJSC Design Guidelines for Telecommunications Infrastructure - Version 3	2006

**9.7 Civil Aviation****9.7.1 ICAO Standards**

Document Title	Year
* International Standards and Recommended Practices Aerodromes Annex 14 – Volume II - HELIPORTS/HELISTOPS	2004



## 10 Appendices

### 10.1 DHA

Application Form/Document Title	Year
Application form for Authorization and Review Plans for Uses of X-Rays in Medicine	2005
Minimum X-Ray Room Surfaces and Shielding Thicknesses	2005
Application for Authorization and Review Plans for Uses of Unsealed/Sealed Radioactive Sources in Nuclear Medicine	2004
Instructions for Transporting of Radioactive Materials	2004
<b>Policy and Procedure</b> - Control of Radiation Doses Received by Pregnant Staff in DHA Governmental Facilities: Radiology, Nuclear Medicine and Laboratories Users of Radiation	2007
<b>Policy and Procedure</b> - Quality Control of X-ray Machines used in DHA Governmental Facilities: Diagnostic and Interventional Radiology	2007
<b>Policy and Procedure</b> - Control of Occupational Exposure in DHA Governmental Radiation Facilities: Radiology, Nuclear Medicine and Laboratories Users of Radioactive Sources	2007
<b>Policy and Procedure</b> - Control of Patient Doses in DHA Governmental Radiation Facilities :Diagnostic & Interventional Radiology and Nuclear Medicine	2007
<b>Policy and Procedure</b> - Radioactive Waste Management	2007
<b>Standard</b> – Private Laboratory Standard	

### 10.2 Dubai Municipality

Application Form/Document Title	Year
<b>Regulations</b> – Building Codes and Regulations – Arabic Version	2006
External Circular # 161 concerning Green Building	2008

### 10.3 Dubai Health Care City Library

Application Form/Document Title	Year
Facilities Risk Management Plan Guidelines	2007
Facilities Residual Life Cycle Cost Planning Guidelines	2007
Healthcare Facilities Commissioning Guidelines	2006
General Pre-Qualification Questionnaire for Healthcare Consultants	2006
Infection control During Construction Manual – Policies, Procedures, and Strategies for Compliance ‘	2004
Green Guide to Health Care	2007
Guidelines for a Healthcare Facility Feasibility Study/Business Plan	2007
Template - Typical Room Data Sheet	2007

#### 10.4 Ministry of Health

Document Title	Year
<b>Federal Law</b> – Concerning the Practice of Human Medicine Profession	1975

#### 10.5 DEWA

Application Form/Document Title	Year
<b>Guide</b> - Customer Supplies and Services – Third Edition	2003
<b>Form</b> – Application for Drawings Approval	2000
<b>Form</b> - Request for Inspection/Re-inspection/Final Inspection	2004
<b>Notification</b> – Chiller/Motor Loads to be Connected to DEWA’s Transformer	2004
<b>Notification</b> - Inspection of Consumer’s Low Voltage Wiring Installations	2004
<b>Notification</b> – Approval of Low Voltage Wiring Installation Drawings	2003
<b>Notification</b> – Safety of Capacitor Bank Installation	2001
<b>Regulation</b> – Location of Main Electrical Service Room in Buildings	2006
<b>Notification</b> - Using of good quality earth electrodes within Consumer Installations	2001
<b>Regulation</b> – Enforcement of DEWA’s Regulations for Electrical Installations at Consumer Premises	2003
<b>Notification</b> – DEWA’s Prescribed Application for Drawings Approval	2000
<b>Notification</b> – Provision for Connection of Mobile/Standby Generator	2001
Electrical Service Room in Residential and/or commercial Buildings	2001
<b>Notification</b> – Padlocking Arrangement for Circuit Breakers (MCCBs) Installed Before Tariff Metering	2002
<b>Circular</b> – Distribution Network Design Requirements & Guidelines for MV Supply	2006

#### 10.6 Etisalat

Document Title	Year
Etisalat Design Guidelines	2006

#### 10.7 DU

Document Title	Year
Emirates Integrated Telecommunications Company PJSC Design Guidelines for Telecommunications Infrastructure - Version 3	2006

#### 10.8 Civil Aviation Authority

Document Title	Year
International Standards and Recommended Practices Aerodromes Annex 14 – Volume II – 2 <sup>nd</sup> Edition HELIPORTS	<b>1995</b>

#### 10.9 Federal Laws - Other

Document Title	Year
Rights of Special Needs Law # 29 for the year 2006	2006

## 11 Selected Reading Material

The following reading materials are suggested by the committee members as useful reading material in the area of health facility:

1. Establishing Private Health Care Facilities in Developing Countries – a guide to medical entrepreneurs – *Seung-Hee and Egbe Osifo – Dawodu, MD* – World Bank Institute.
2. Green Guide to Healthcare – A best practices guide for healthy and sustainable building design, construction and operations Version 2.2 – *GGHC*
3. Planning, Design and Construction of Health Care Facilities – *JCIA*
4. Healthcare Strategic Planning 2<sup>nd</sup> edition by *Alan M. Zuckerman*
5. Healthcare Facility Planning: Thinking Strategically by *Cynthia Hayward*
6. Hospital and Healthcare Facility Design 2<sup>nd</sup> edition by *Richare L. Miller & Earl S. Swensson*
7. Medical and Dental Space Planning 3<sup>rd</sup> edition by *Jain Malkin*