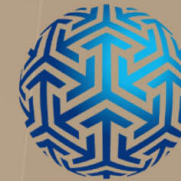




GOVERNMENT OF DUBAI
Department of Civil Aviation

DUBAI
WORLD CENTRAL



**Maintenance Repair and
Overhaul Hangars (MROs)
Fixed Base Operations Hangars (FBOs)**

*Development Guidelines
& Planning Regulations*

Dubai ■ Beirut ■ Cairo ■ London
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DUBAI
WORLD CENTRAL



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GLOSSARY OF TERMS

- **“ACI”** American Concrete Institute
- **“ANSI”** American National Standards Institute
- **“AMIA”** Al- Maktoum International Airport
- **“ASTM”** American Society of Testing and Materials
- **Building Height:** Denotes the height of a building in meters measured from the finished sidewalk level to the top of the roof parapet or to the top of the coping tile of the pitched roof. The building height is measured along the midpoint of the building elevation facing the street that provides access to the parcel. In cases where the parcel is bounded by more than one street, the façade facing the main street, (or if not applicable, the façade having the longest frontage to the street) will be taken for reference.
- **Building Line:** Denotes the vertical line that defines the outer face of the building façade.
- **“Building Completion Certificate”** is a certificate granted by the Authority acknowledging completion of construction and finishing and enabling connection to public utilities and occupation.
- **“DCA”** Department of Civil Aviation
- **“DIA”** Dubai International Airport
- **“DWC”** Dubai world Central
- **Floor Area Ratio (F.A.R):** Coefficient that denotes the ratio of the total built up area of buildings and structures on a given parcel over the total land area of the parcel. When calculating the F.A.R, the areas of the following shall not be counted as part of the total built up area:
 - i. Basement floors with no direct natural lighting intended for use for parking, building services and storage,
 - ii. Balconies, terraces, garden sheds (of up to 2.20m clear height) and non enclosed shade structures (i.e. completely open on 2 sides at least),
 - iii. Elevator rooms, stairwells and areas reserved for water tanks and other mechanical equipment on the roof,
 - iv. Roof Attics or parts thereof, which are not used and cannot be converted for habitation.
 - v. Mezzanine floors which have access only through the ground floor and not from any common stair or lift lobby.
- **“HACCP”** Hazard Analysis Critical Control Point
- **“Hazardous Goods”** means:
 - i. Any compressed, liquefied or dissolved gases.
 - ii. Any substance which becomes dangerous by interaction with water or air.
 - iii. Any liquid substance with a flash point below 75°C.
 - iv. Any corrosive substance or a substance which emits poisonous concentrations of fumes when heated.
 - v. Any substance liable to spontaneous combustion.
 - vi. Any radioactive material and any substance which readily emits heat or other harmful radiations when it changes state or decomposes.
 - vii. Sheds which contain vehicles loaded with hazardous materials.
 - viii. Any other substance considered hazardous by the suppliers..
- **“Habitable room”** means a room used for office, workshop or other purpose involving occupation by human beings for continuous periods of time, but not including a W.C.
- **“LEED”** is Leadership in Energy and Environmental Design, a certificate issued by the US Green Building Council for Sustainable Buildings.
- **“NFPA”** National Fire Protection Association
- **“Operation Fitness Certificate”** is a certificate granted by the Authority after a Building Completion Certificate is issued; acknowledging completion of installation and confirming the facility is safe for Operation.
- **“Permanent building or FACILITY”** means buildings or structures designed and constructed in reinforced concrete or steel with a combination of steel or pre cast concrete or reinforced bearing block walls or brick, or other durable material.

- **“Permanent building or FACILITY”** means buildings or structures designed and constructed in reinforced concrete or steel with a combination of steel or pre cast concrete or reinforced bearing block walls or brick, or other durable material.
- **Parcel Coverage** (P.C): Coefficient that denotes the ratio of the area of the building imprint (sum of the areas of the ground projections of the largest floor of all buildings on the parcel) over the total land area of the parcel. When calculating the parcel coverage, the areas covered by roof projections and balconies shall be counted as part of the building imprint. The areas covered by non-enclosed shade structures shall not be counted (i.e. car parking, gazebos, etc).
- **“PCI” Prestressed Concrete Institute**
- **“Regulations”** means the rules listed in this publication and other regulations issued by the “Authority” or any other rules issued in the future.
- **Setback:** Denotes the distance separating the building line from the parcel boundary line that must be left free of building. A setback may be specified as mandatory and in that case it will define a built to line. A setback may be specified as a minimum setback and in this case, the building line may adhere to it or be setback a distance larger than the specified minimum
- **The “Authority”** shall mean Dubai Civil Aviation Authority
- **The “Developer”** shall mean the lessee or his authorized Agent who submits an application to the Authority on behalf of the lessee.
- **The “Project”** means the construction of a permanent building, any other civil work on a plot reserved for Catering FACILITY Plot.
- **“Temporary Building or FACILITY”** means a temporary building used as a site office or to house construction equipment for the purpose of construction only.
- **“The Consultant”** means a locally registered consultant holding a valid consulting Engineers license from the Dubai Municipality.
- **The “Contractor”** means a registered contractor holding a valid contracting license from the Dubai Municipality and Dubai Chamber of Commerce for the type of works and classification therein.
- **“UBC”** Uniform Building Code

1. INTRODUCTION

1.1 SITE CONTEXT

The Dubai World Central (DWC) is located on the southern part of Dubai, near Jabel Ali free port zone as shown in Figure 1.1. The Preliminary Master Plan for DWC is composed of Al Maktoum International Airport and surrounded by the following varied urban developments:

- Dubai Logistic city (DLC); Staff Village
- Residential City; Staff Village
- Aviation City
- Golf City
- Commercial City
- East and West entrances
- Exhibition city
- Humanitarian City (DLC & Golf)

The Aviation City has been conceived as future regional headquarters for leading companies working in airline related industry including suppliers, maintenance specialists, manufacturers etc. Its main function is to provide support to the general aviation activities.

The General Aviation Area which lies on the southern side of Al Maktoum International Airport constitutes the airside part of the Aviation City.



Figure 1.1: DWC Site Location

1.2 AL MAKTOUM INTERNATIONAL AIRPORT

Al Maktoum International Airport is planned to be 10 times the size of the current Dubai International Airport and Dubai Cargo Village combined. It will have 5 to 6 parallel runways all of 4.5 km in length and have a passenger capacity close to 160 million passengers and a cargo capacity of 12 million tons per year (Atlanta, currently the world's busiest airport, had 89.4 million passengers in 2007)

Work has already been completed on the first all weather runway (CAT IIIB) and parallel taxiways serving the General Aviation.

1.3 GENERAL AVIATION AREA (MROs, FBOs)

The General Aviation Area, shown in Figure 1.2, is an airside facility located within the Aviation City close to the main airfield south of the airport. It is bounded by a double security fence with two gates at the Northeastern and Southwestern sides to provide access for employees and equipment. The need for access from the landside to the airside will have an effect on the overall spatial organization and the security concerns. The Executive Jets covered and uncovered parking and their Terminal are also part of General Aviation Area located on the Airside. However the focus of this document is to provide Development Guidelines and planning Regulations for the MROs and FBOs area.



Figure 1.2: General Aviation Location within DWC

1.4 SITE CONSTRAINTS

The following site constraints have been taken into consideration during the preparation of the General Aviation layout:

- Airport Security
- Airport Height Constraints and Obstacle Limitation Surfaces.
- Airport Flight Path and Safety Zones.

The above mentioned site constraints were considered in the planning and designing of General Aviation (MROs, FBOs) Area and have the major impact on the flexibility of the adopted planning approach.

The General Aviation Area has direct access to the Airfield due to its operational requirements. Special security measures concerning this area are taken into consideration while planning and designing this area.

1.5 DESIGN APPROACH AND PRINCIPLES

The five basic principles used in the General Aviation master planning are:

- Acknowledge contextual constraints and address site limitations
- Provision of necessary support facilities.
- Direct access provided to each MRO and FBO plot.
- Necessary support/safety facilities and utility services.
- Safety and security concerns.

1.6 LAND USE DEVELOPMENT CONCEPT

The General Aviation Area consists of MROs and FBOs area, Executive Jet Terminal Area and Opened and Covered Aircraft Parking. The MROs and FBOs hangars area will be used for the maintenance, repair and overhauling of aircrafts. It will be the major source of revenue generating activities for General Aviation Area. The FBOs will provide ground support service to the adjacent Executive Jet Terminal area along with other maintenance related services. The entire MROs, FBOs area will accommodate 5470 employees, staff and executives working per shift on its completion. The MRO and FBO area will be provided with fire fighting station and security measures to ensure the safe working environment in hangars.

The MROs and FBOs area shown in Figure 1.3 is mainly divided into three categories of plots such as:

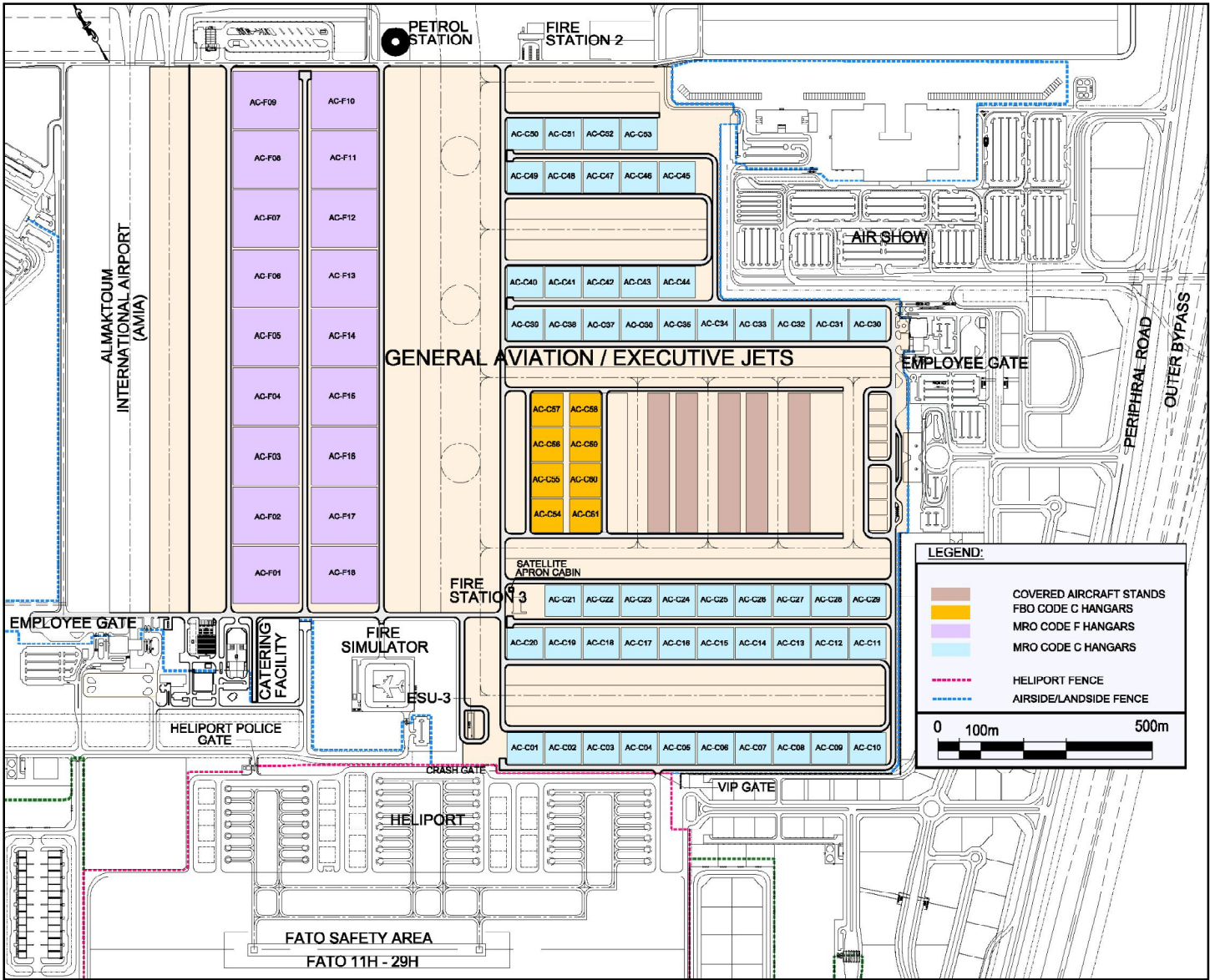


Figure 1.3: General Aviation Parcellation Plan

- a. Code "F" plots with plot size of 145mx166.75m covering an area of 24178.75 Square meters.
- b. Code 'C' plots with plot size of 80mx92m covering an area of 7360 Square meter.
- c. FBOs (Fixed Base Operators) plots close to executive jet terminal area with plot size of 80x85 m covering an area of 6800 Square meter.

In addition to these three categories of plots the executive jet terminal area and covered and opened aircraft parking are also planned in the General Aviation area.

1.7 SECURITY CONCERNS AND ACCESSIBILITY FROM LANDSIDE

The entry from landside to airside will be from two entry gates located on the Northeastern and Southwestern sides of the General Aviation Area. These gates are provided with sufficient number of parking spaces for cars, trucks and busses. Taking into consideration the security concerns of the police it was decided that no cars will be allowed to enter from landside to airside except for a very limited number after special permission. All the employees and staff will park their cars, company busses and vehicles at the gate and from the gate these staff and employees will be transferred to their respective hangar plots by airside vehicles and busses after screening and security check. The executives will park their cars in specially designed VIP car parking areas and use limousine service to reach their hangars after security checks.

The service trucks coming to the MROs, FBOs area for delivery of goods or machinery parts will unload their goods/parts at the entry gates. The goods will be loaded to airside trucks after screening and security checks. Exclusive areas are provided for loading and unloading of goods from the trucks.

Movement of all staff should be controlled and clearly defined. All MRO and FBO staff will be allowed to access the General Aviation Area only. No permission will be given to the staff to access other parts of the airfield. All MRO and FBO Hangars should be equipped with security facilities to prevent any administrative or other employees from accessing to the airside. Additional security measures like CCTV and other infrared sensors will be installed to detect any trespasser to unauthorized areas.

2. ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES

The Aircraft Hangars offer services for base maintenance repair and overhauling of the aircraft. The hangars mainly divided into two components such as:

- a. Offices and storage Area
- b. Hangar maintenance and Workshops Area

2.1 ENVIRONMENT

The working environment in the maintenance hangars should be such that the effectiveness of the personnel should not be impaired. To achieve this working environment, following measures must be ensured:

1. Air quality inside the hangar must be maintained such that personnel can carry out required tasks without any undue discomfort.
2. Dust and any other airborne contamination should be kept to minimum and not to be permitted to reach to a level in the work task area where visible aircraft/component surface contamination is evident.
3. Lighting should be such that maintenance and inspection work can be carried out in effective manner.
4. Noise shall not distract the personnel from carrying out the inspection tasks. Where it is not possible to control the noise source, such employees should be provided with the necessary personnel equipment to stop the excessive noise.
5. Where a particular maintenance task requires the application of specific environmental condition different from the foregoing, then such conditions should be observed.
6. Where the working environment deteriorates to an unacceptable level in respect of temperature, moisture, wind, light, dust/ other airborne contamination, the particular maintenance or inspection task must be suspended until satisfactory conditions are reestablished.
7. Secured storage facilities should be provided for components, equipment, tools and materials. Storage conditions should ensure the segregation of serviceable

components and materials from unserviceable materials, equipment and tools. The conditions of storage should be in accordance with the manufacturer instructions to prevent deterioration and damage of store items. Access to storage facilities should be restricted to authorized personnel.

The planning regulations of the MROs and FBOs shall comply as minimum requirements with GCAA CARs Part V – Chapter 3 – “CAR 145 Approved Maintenance Organizations”. However, where this national regulation might not be as extensive as worldwide applied ones, International Standards and recommended practices should be implemented such as “EASA 145 Regulation”.

Referring to GCAA CARs Part V – Chapter 3 –CAR 145.25 Facility Requirements, the organization shall ensure that:

1. Facilities are provided appropriate for all planned work, ensuring in particular, protection from the weather elements. Specialized workshops and bays are segregated as appropriate; to ensure that environmental and work area contamination is unlikely to occur.
 - a. For base maintenance of aircraft, aircraft hangars are both available and large enough to accommodate on planned base maintenance;
 - b. For component maintenance, component workshops are large enough to accommodate the components on planned maintenance.
2. Office accommodation is provided for the management of the planned work referred to in paragraph (1), and certifying staff so that they can carry out their designated tasks in a manner that contributes to good aircraft maintenance standards

2.2 NOISE AND VIBRATION

One of the significant sources of noise and vibration are from repair and maintenance hangars followed by variety of ground operations equipment including aircraft taxing, operation of supporting vehicles, and aircraft engine testing activities along with other maintenance activities. The other indirect source of noise generated from testing and repairing of mechanical parts of aircrafts in the hangar. To protect the employees exposed to noise should include the use of personnel hearing protection and implementation of work rotation programs to reduce cumulative exposure.

Following protective measures to be adopted for the safety of the employees,

- No employee working in the maintenance hangar should be exposed to noise level greater than 85 db (A) for a duration of more than eight hours per day without hearing protection. In addition no unprotected ear should be exposed to peak sound pressure level (instantaneous) of more than 140 db(C)
- The use of hearing protection should be enforced actively when the equivalent sound level over eight hours reaches 85 db(A), the peak sound level reach 140 db(C), or the average maximum sound level reaches 110 db(C). Hearing protective devices should be capable of reducing sound levels at the ear to at least 85 db (A). Prior to issuance of hearing protective devices as the final control mechanism, use of acoustic insulation materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.(Environmental, Health and Safety (EHS) Guidelines, World Bank Group)

Vibrations

Exposure to hand to hand-arm vibration or whole body vibration from surfaces on which the worker stands or sits, should be controlled through choice of equipment, installation of vibration damping pads or devices and limiting the duration of exposure. Limits for vibration and action values, (i.e. the level of exposure at which remediation should be initiated) are provided by the ACGIH-42. Exposure level should be checked on the bases of daily exposure time and data.

2.3 HAZARDOUS MATERIAL MANAGEMENT

Maintenance, repair and overhauling operations of hangars may include the storage of oils and fuels e.g. jet fuel, diesel and gasoline. These fuels may release during transfer or leaks due to tank and piping containment failure (e.g. corrosion of steel component or faulty construction and installation). The use of liquid combustible materials and fire suppression foams and powders in fire fighting drills may result in releases to soil and water resources. Hazardous materials should be managed to prevent the accidental release, fire or explosions as described in General Environment, Health and Safety Guidelines. Hangar operators should develop spill preventions and control plans and emergency preparedness and response plans. Fire fighting foam and powder or other environmentally hazardous fire extinguisher agents or polluted fire water from entering the storm water system. Water containing fire extinguisher agents and non combusted flammable materials should be treated prior to discharge to surface water. Hazardous waste storage should be specially be managed through specially trained employees who has received special training in handling and storage of hazardous waste;

- Labeling of each container for its contents.
- Limiting access to hazardous waste storage areas to employees who have received proper training.
- Conducting the periodic inspection of waste storage areas.
- Avoiding underground storage tanks and underground piping of hazardous waste.

2.4 SOLID WASTE

The quantities and characteristics of the solid waste materials highly depend on the nature of the individual activity from where they are generated.

Solid waste generated from maintenance and repair operations may include Municipal Solid Waste (MSW) typically generated at residential and commercial areas and may also include, to some extent, special waste that requires special handling procedures. The latter can be hazardous solid waste material in the form of used oils and other chemical containers, consumable waste from tires, batteries, filters, etc.

Solid Waste Management (SWM) practices should attain the following basic principles:

- Establishing the SWM practices based on acceptable norms to minimize potential Environmental, Health and Safety (EHS) impacts
- Adopting practical operational measures to minimize the generation of MSW and hazardous waste components
- Applying applicable guidelines for storage, transport, and disposal of the waste

The following Regulations and Technical Guidelines should be considered as part of the overall operations. Where applicable, these include enforcements and guidance related to waste inventories, minimization, storage, collection, and transport.

- Technical Guideline No. 2: 'Guidelines for Waste Audit Reports' - April 2003
- Technical Guideline No. 26: 'Requirements and Procedures for the Disposal of Hazardous Waste' - January, 2000
- Technical Guideline No. 28: 'Waste Minimization' - October 2000
- Technical Guideline No. 50: 'Requirements for the Transport of Hazardous Wastes' - April 2003

2.5 AIR EMISSION

The main air emission in maintenance repair hangars are from local ground transportation activities and Maintenance activities, vapors from fuel storage and handling. Other sources of air emission may include fuel combustion during fire training activities. Recommendations to prevent air emission include: Minimizing the fugitive air emission from oil and fuel storage and handling activities, selecting cleaner oil for firefighting drills and avoiding the use of waste oil or jet fuel to protect the short term impacts to the air quality.

2.6 STORM WATER AND WASTE WATER

Effluent from maintenance hangars mainly consist of storm-water runoff from paved surfaces and sanitary waste-water from employees services. This may include pollutants associated with leaks and spill of oils, diesel and jet fuel during operation and maintenance and fuel storage and handling activities. Storm-water drainage from the areas of potentially frequent leaks and spills of chemicals and fuels shall be treated through oil/water separator prior to discharge to surface water bodies.

3. SITE AND SERVICES

3.1 GENERAL

- 3.1.1 Provision of any utility and necessary reservation on any hangar plot will require liaising between the hangar operator and responsible authorities.
- 3.1.2 The finished level of any paved road, parking or footpath should not be less than 150 mm above the finished level of the approach road to the site and shall have an adequate fall towards the front side/aircraft stands side.
- 3.1.3 The utility lines of any type will not be placed under hangars, parking lots, sidewalks and other paved areas.
- 3.1.4 Provisions for future expansion should be incorporated at the planning and design stage of utilities.

3.2 UTILITY SERVICES

3.2.1 Utility Requirements:

Each hangar operator shall provide the following within the plot boundaries of the hangar:

- a. Water supply, sewerage and sanitation services to the hangar building in compliance with the standards set out by the relevant Service Authorities.
- b. Electrical power distribution installations in compliance with the Regulations set out by the Service Authority and Telephone network.
- c. Storm-water drainage and disposal, in accordance with the recommendations and regulations of the relevant Service Authority.
- d. Utility Services shall be designed and installed in accordance with the Dubai World Central Authority standards.

The MRO operator has the right with agreement of the Dubai World Central Authorities to do some works outside the plot boundaries in order to connect to the infrastructure networks.

3.2.2 Water Supply

- a. Dubai World Central will be responsible to provide water supply for every hangar plot for both the fire protection and the daily domestic water demand requirement.

A water connection will be provided for every plot from the back road. A fire fighting connection for internal fire fighting will be provided from the front side of the hangars. These networks will be supplied from tanks and pumps located at CUC-Cargo.

- b. The Developer shall provide fire hydrants facing the aircraft stands for apron fire protection as approved by DCA.
- c. The Developer shall submit a request for a service connection for water supply and fire fighting to the Dubai World Central Authority documents upon completion of construction.
- d. The Developer shall submit a request for a service connection to the Dubai World Central Service Authority documents upon completion of construction.
- e. All installations shall be subject to testing by the Dubai World Central Authority in accordance with the relevant regulations.
- f. The operator shall indicate their daily domestic water demand and fire fighting water requirement at the time of water connection request and pay a one-time water connection charge and all other charges in application to the Dubai World Central Authority Regulations.

3.2.3 Waste-water

- a. Wastewater installations shall comply with the Dubai World Central Authority, the Authority requirements and British Standards.
- b. The hangar operator may connect the domestic sewer directly to the trunk sewer along adjacent back road, but industrial sewer consisting of oil, grease or waste substance will first be separated by separators and then connected to the trunk line.
- c. Sewers must be of durable material and construction and watertight under all conditions. The internal diameter of any sewer pipe shall not be less than 200 mm.
- d. Service connection between the main inspection chamber of a serviced hangar site and the public infrastructure shall be paid for by the hangar operator.
- e. Drains shall be laid in straight lines manholes. Maximum distance between manholes shall be 30 m. Manholes must be provided at each change of direction or gradient.
- f. All installations shall be subject to testing and approval of the Authority.
- g. The hangar operator shall pay a one-time connection charge and all other charges thereof in accordance with Authority charges.

3.3 STORM-WATER DRAINAGE

- 3.3.1 Storm-water installations shall comply with the Dubai World Central Authority and the British Standards.
- 3.3.2 Roof drainage network shall be designed to a frequency return period of five years and a minimum rainfall intensity of 75 mm per hour.
- 3.3.3 Roof finish shall have a gradient capable of directing storm water to suitable outlets or down pipes, which shall discharge freely at ground level.
- 3.3.4 Channels, gutters, outlets or down pipes shall be of durable material with suitable watertight joints, in accordance to Authority standards.
- 3.3.5 Down pipes shall be securely attached to the hangar building.
- 3.3.6 The stormwater drainage system including the gutters, drains, inlets, pipes and c channels to carry the anticipated runoff designed to a minimum rainfall intensity of 64 mm per hour and a minimum time of concentration of 10 minutes. The stormwater drainage system shall be connected to the system at the front side of the hangars.
- 3.3.7 Gravel trenches provided along the back roads shall be maintained uncovered except locally at entrances to plots and over a maximum length of 20m per plot.
- 3.3.8 Service connection between the serviced hangar drainage system and the public infrastructure shall be paid for by the hangar operator.
- 3.3.9 Drains shall be laid in straight lines between manholes. Manholes must be provided at each change of direction or gradient.
- 3.3.10 All installations shall be subject to testing and approval of the Authority.

3.4 REFUSE DISPOSAL

- 3.4.1 Refuse from each hangar building shall be sorted out neatly in tight bags and disposed of at nearby refuse containers designated for the purpose. The refuse containers will be provided by the Authority throughout the area.

- 3.4.2 Items that cannot be contained in bags such as bulky items, tires, Metallic Parts, wood, metallic container etc. shall be disposed in special containers designated for the purpose
- 3.4.3 Refuse shall be collected from the refuse containers by the Authority appointed Service Company.
- 3.4.4 The operator shall pay for collection charge thereof in accordance with the Authority charges.

4. GENERAL PLANNING REGULATIONS

4.1 GENERAL PROVISION

The regulations described in this document apply to developments of MROs and FBOs zone within the General Aviation Area in Dubai World Central. These regulations will have to be applied side by side with the building regulations currently under application in Dubai.

The planning regulations shall comply with GCAA CARs Part V – Chapter 3 – “CAR 145 Approved Maintenance Organizations” as minimum requirement. Otherwise, international standards and recommended practices should be implemented for the areas that are not covered under the same.

Every individual building must be connected to the internal utility network provided by the authority.

The proposed wet infrastructure systems in the General Aviation Area, including MROs area, are part of the Airport networks. Consequently, the same party in charge of the operation of the infrastructure associated to the Airport buildings shall be also responsible for the operation in the General Aviation Area.

The General Aviation Area constitutes all types of activities generated by or related to business aviation and passenger/cargo airlines. It houses code F Maintenance Repair and overhauling hangars (MRO), Code C MRO, Code C FBO hangars and covered & opened aircraft parking.

The development shall meet the requirements of “Green Building” by acquiring a minimum level of “LEED certified” following the US Green Building Council LEED rating system or equivalent certification level from an internationally recognized rating system. The developer shall contact Emirates Green Building Council to inquire about the appropriate Green Rating System that applies to the project. The developer shall comply with all the Design and Construction requirements of the Rating System and shall submit proof of certification towards the end of construction.

4.2 CODE F MRO HANGARS ZONE

4.2.1 General

The area reserved for the code F Hangars in the General Aviation Area contemplates 18 plots associated with aircraft stand taxilanes, Aprons and Apron GSE Roads. All the hangars are

located airside and are arranged along the western border of the General Aviation area in close proximity to the third party cargo terminals and the Aviation City Light industrial area. These hangars and their associated aprons are mainly dedicated for maintenance and repair activities MRO operators. Each hangar can accommodate one code F aircraft and/or a combination of other aircraft.

4.2.2 Code F Plots

The plots assigned for the 18 code F hangars (AC-F01 to AC-F18) shown in Figure 4.1 shall include:

1. One bay hangar with a minimum area of 18,000m²
2. The associated maintenance workshops which mainly includes:
 - Workshops area
 - Technical offices area.
 - Main stores area.
3. The external structure of the facility.
4. Parking spaces. These shall comprise parking for any vehicle or bus operating within the General Aviation.
5. The hangar sliding doors totally extended (fully opened).

The settings out data of the code F plots are shown in Figure 4.2.

These Hangars are assigned a plot area of 145 x 166.75m. Maximum plot coverage is 85%

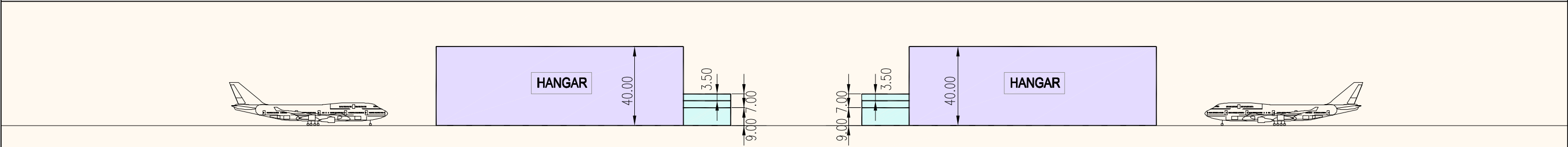
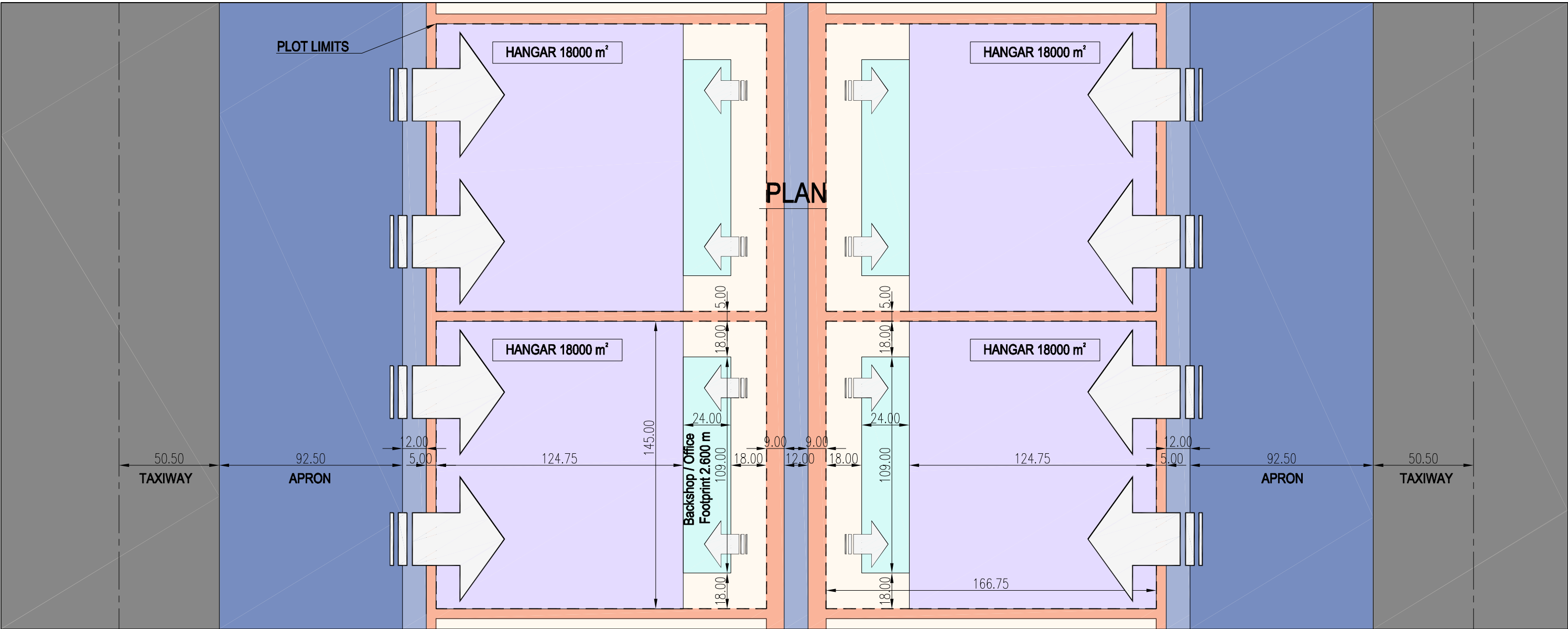
The adjacent plots are separated by 5.0 meters buffer zone to provide a minimum separation distance in case of fire incidence. It is also utilized to provide utility services connection to each hangar. The plots are laterally separated by a distance of 5.0 meters from the 12.0m Apron GSE road, running in front of the hangars, to satisfy the drainage requirements and fire safety issues in case of apron fuel spillage. The back side of these plots is separated by a distance of 9 m from the 12 m Back GSE Road. This allows for the crossing of the services along this road.

4.2.3 Permitted Uses

In this zone all the maintenance activities as well as ancillary offices to serve them are permitted to the satisfaction and approval of the authorities.

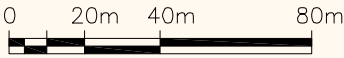
4.2.4 Maximum Building Height:

- a. Overall building height measured from the mean finished level of the ground floor to the top of the roof parapet or the top of the coping tile of the pitched roof must not exceed 40m.
- b. For all buildings the clear height of each floor measured from the finished floor level to the ceiling should not be less than:
 - 2.80m for offices.

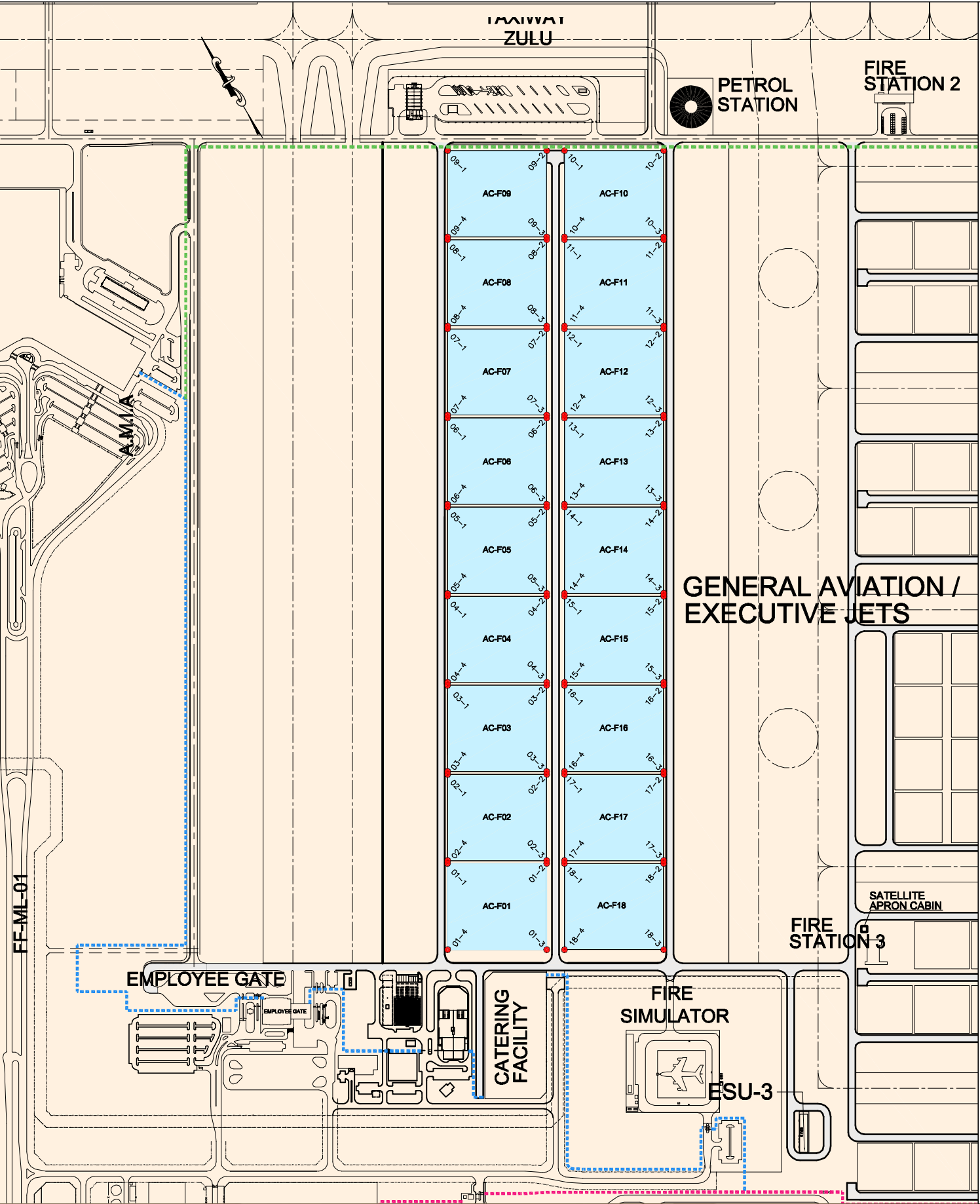


SECTION

MRO CODE F Land area 24178.75 m² Plot Coverage 85%
BUAs : Offices 750 m²
Workshops 3500 m²
Hangar 18000 m²



CODE F MRO PLANNING GUIDELINES



ZONE	PLOT	PT.	X	Y	AREA (m) ²
AC-F	AC-F01	01-1	482508.788	2752309.477	24178.75
		01-2	482651.246	2752222.809	
		01-3	482575.883	2752098.933	
		01-4	482433.425	2752185.601	
	AC-F02	02-1	482586.750	2752437.625	24178.75
		02-2	482729.208	2752350.957	
		02-3	482653.845	2752227.081	
		02-4	482511.387	2752313.749	
	AC-F03	03-1	482664.712	2752565.773	24178.75
		03-2	482807.170	2752479.105	
		03-3	482731.807	2752355.229	
		03-4	482589.349	2752441.897	
	AC-F04	04-1	482742.674	2752693.921	24178.75
		04-2	482885.132	2752607.253	
		04-3	482809.769	2752483.377	
		04-4	482667.311	2752570.045	
	AC-F05	05-1	482820.637	2752822.069	24178.75
		05-2	482963.094	2752735.401	
		05-3	482887.731	2752611.525	
		05-4	482745.273	2752698.193	
	AC-F06	06-1	482898.599	2752950.217	24178.75
		06-2	483041.057	2752863.549	
		06-3	482965.693	2752739.673	
		06-4	482823.235	2752826.341	
	AC-F07	07-1	482976.561	2753078.365	24178.75
		07-2	483119.019	2752991.697	
		07-3	483043.655	2752867.821	
		07-4	482901.198	2752954.489	
	AC-F08	08-1	483054.523	2753206.513	24178.75
		08-2	483196.981	2753119.845	
		08-3	483121.617	2752995.969	
		08-4	482979.160	2753082.637	
	AC-F09	09-1	483132.485	2753334.661	24178.75
		09-2	483274.943	2753247.993	
		09-3	483199.580	2753124.117	
		09-4	483057.122	2753210.785	

ZONE	PLOT	PT.	X	Y	AREA (m) ²
AC-F	AC-F10	10-1	483300.573	2753232.401	24178.75
		10-2	483443.030	2753145.733	
		10-3	483367.667	2753021.856	
		10-4	483225.209	2753108.524	
	AC-F11	11-1	483222.610	2753104.253	24178.75
		11-2	483365.068	2753017.585	
		11-3	483289.705	2752893.708	
		11-4	483147.247	2752980.376	
	AC-F12	12-1	483144.648	2752976.105	24178.75
		12-2	483287.106	2752889.437	
		12-3	483211.743	2752765.560	
		12-4	483069.285	2752852.228	
	AC-F13	13-1	483066.686	2752847.957	24178.75
		13-2	483209.144	2752761.289	
		13-3	483133.781	2752637.412	
		13-4	482991.323	2752724.080	
	AC-F14	14-1	482988.724	2752719.809	24178.75
		14-2	483131.182	2752633.141	
		14-3	483055.819	2752509.264	
		14-4	482913.361	2752595.932	
	AC-F15	15-1	482910.762	2752591.661	24178.75
		15-2	483053.220	2752504.993	
		15-3	482977.856	2752381.116	
		15-4	482835.399	2752467.784	
	AC-F16	16-1	482832.800	2752463.513	24178.75
		16-2	482975.258	2752376.845	
		16-3	482899.894	2752252.968	
		16-4	482757.436	2752339.636	
	AC-F17	17-1	482754.838	2752335.365	24178.75
		17-2	482897.295	2752248.697	
		17-3	482821.932	2752124.820	
		17-4	482679.474	2752211.488	
	AC-F18	18-1	482676.876	2752207.217	24178.75
		18-2	482819.333	2752120.549	
		18-3	482743.970	2751996.673	
		18-4	482601.512	2752083.340	



4.2.5 Aprons

The Aprons of the code F maintenance hangars shall cater for a combination of one A380-800 and one B727-200 or a combination for one Code E aircraft associated with a smaller code C aircraft. The apron is 92.50 deep and shall comprise the 85meter apron depth and the 7.50 nose clearance/ short term parking area. Each hangar is assigned an aircraft stand located the apron in direct contact with its corresponding plot.

The Aprons, which shall be constructed by the Authority, shall be the property of the Authority. Nonetheless, it is the responsibility of the hangar operator to provide floodlighting on the hangar structure to light the contact apron.

4.2.6 Apron GSE Roads

A 12.0 meter GSE Road is planned in front of the code F plots and is set at a distance of 5.0 meters in front of the plots. This road shall service the ground handling vehicles to directly service the aircraft and the associated hangar. It connects to the GSE Road network at its northern and southern ends.

The Apron GSE Road shall be constructed by the Authority. However, it shall be lit from the floodlighting associated with the contact Hangar.

4.2.7 Hangars Back Road

A 12m back road runs between the two rows of Code F hangar plots from the back sides to provide direct access to the employees and service vehicles into the hangars workshops, stores and offices. This road is planned as dead end road to prevent MRO end users from accessing the rest of the airfield. Bollards will be installed at the dead ends to prevent any vehicle from accessing the airfield. The road has total corridor of 30 meters which includes the road section 12m and the 9m buffer from the adjoining plots to run the necessary utilities.

4.3 CODE C MRO ZONE

4.3.1 General

The area reserved for the Code C MRO Hangars comprises 53 Code C maintenance hangars, associated with aircraft stand taxilanes, Aprons and Apron GSE Roads. The 53 maintenance

hangars lie adjacent to the Code F Hangars from the east and are grouped in close proximity with the aviation city to receive immediate support from the light industrial area. Some of these hangars can also be occupied by FBOs (Fixed Base Operation) depending on market needs. Each Code C hangar is designed to accommodate two Code C aircrafts of BBJ2 type (critical in width) or a combination of code C, B and A aircraft.

4.3.2 Code C MRO Plots

The plots assigned for the fifty three Code C maintenance hangars (plots AC-C01 to AC-C053) shown in Figure 4.3 shall include:

1. One bay hangar with a minimum area of 5000m²
2. The associated maintenance workshops and offices
3. The external structure of the facility.
4. Parking spaces. These shall comprise parking for any vehicle or bus operating within the General Aviation
5. The hangar sliding doors totally extended (fully opened).
6. A hangar set back of 1.5 m at two sides of the plot

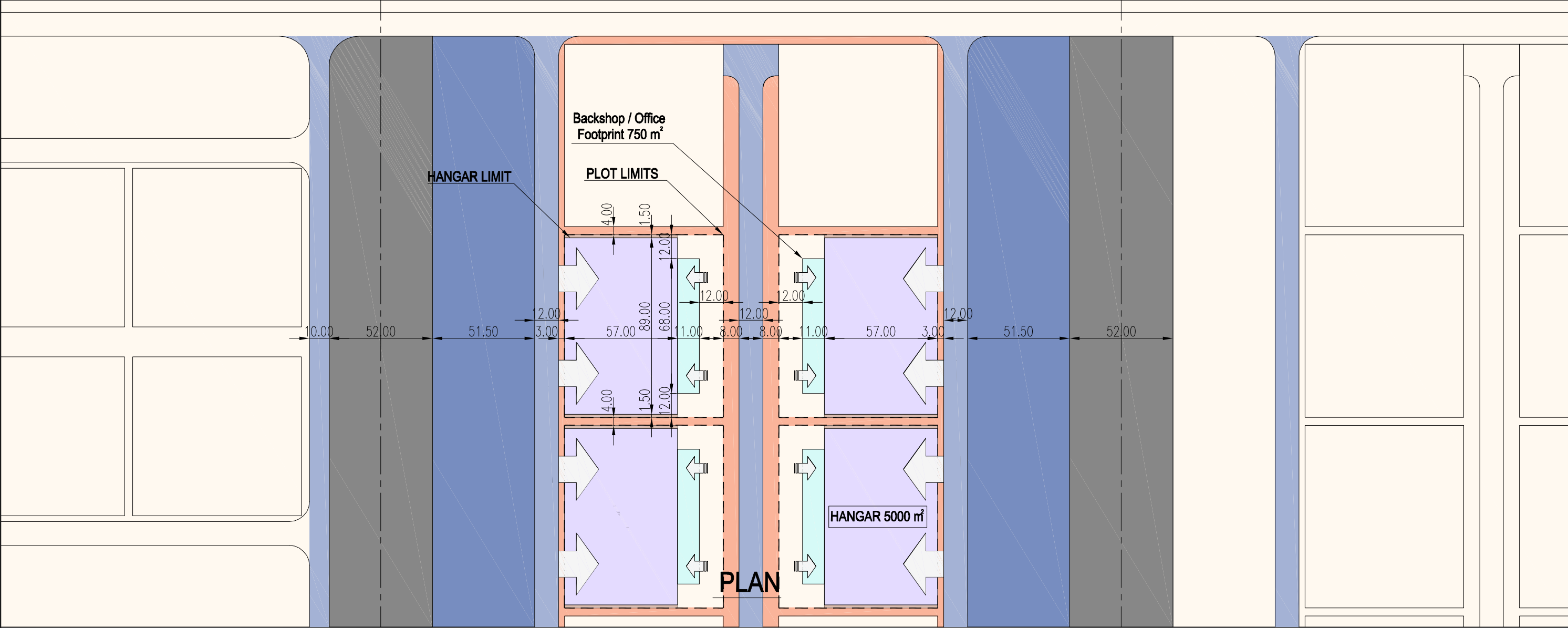
The settings out data of the code C plots are shown in Figure 4.4.

These hangars are assigned a plot area of 80x92m. Maximum plot coverage is 80%

The adjacent plots are separated by 4.0 meters buffer zone to provide a minimum separation distance in case of fire incidence. It is also utilized to provide utility services connection to each Hangar. The plots are laterally separated by a distance of 3.0 meters from the 12.0m Apron GSE road, running in front of the hangars to satisfy the drainage requirements and fire safety issues in case of apron fuel spillage. The back side of these plots is separated by a distance of 8 m from the 12 m Back GSE Road. This allows for the crossing of the services along this road.

4.3.3 Permitted Uses

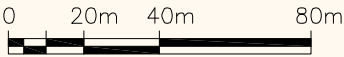
In this zone all the maintenance activities as well as ancillary offices to serve them are permitted to the satisfaction and approval of the authorities. These facilities can also be used for fixed base operations (FBOs) whose permitted uses are described below.



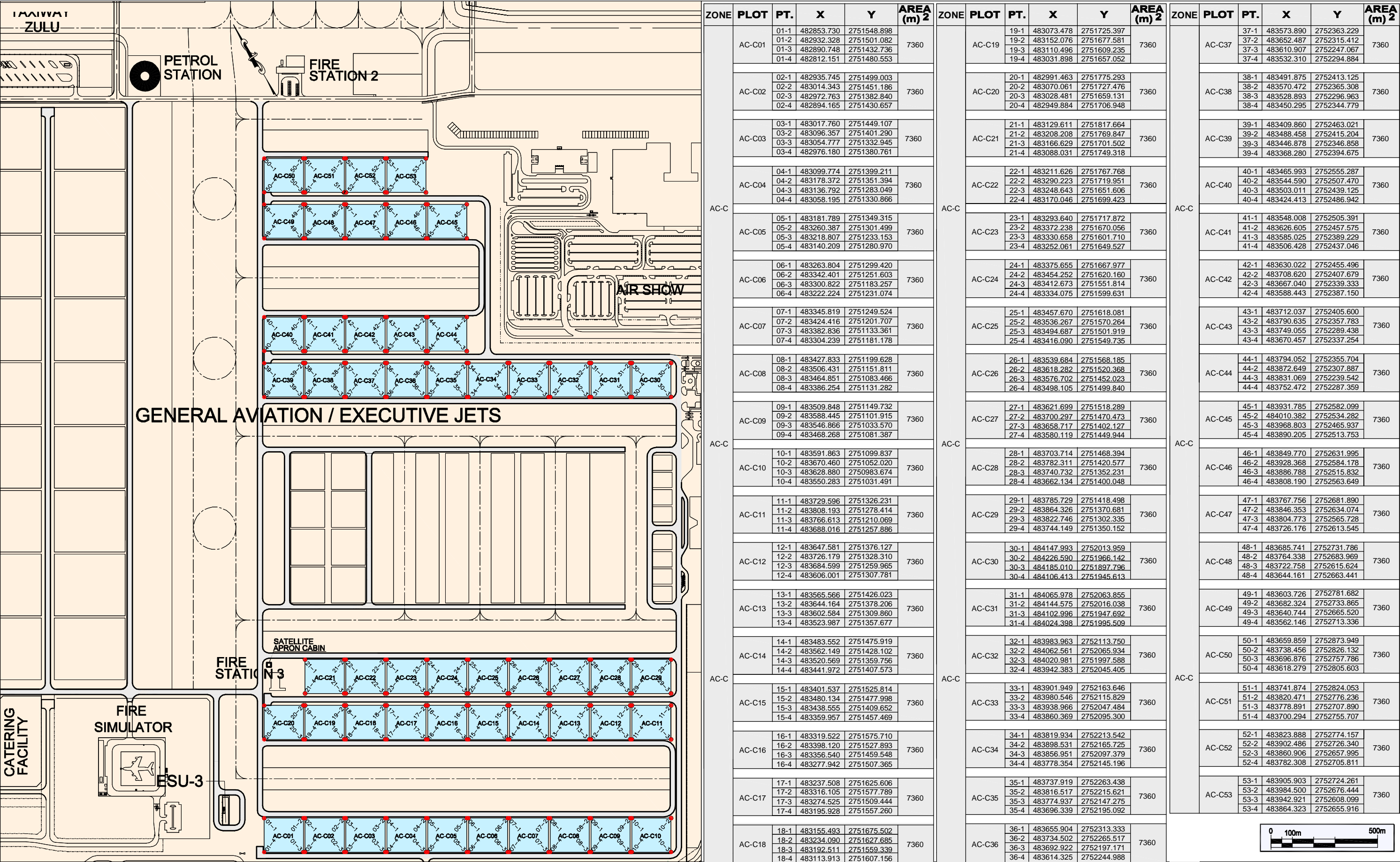
SECTION

MRO CODE C Land area 7360 m²
BUAs : Offices 250 m²
Workshops 2000 m²
Hangar 5000 m²

Plot Coverage 80%



CODE C MRO PLANNING GUIDELINES



4.3.4 Maximum Building Height:

- a. Overall building height measured from the mean finished level of the ground floor to the top of the roof parapet or the top of the coping tile of the pitched roof must not exceed 25m.
- b. For all buildings the clear height of each floor measured from the finished floor level to the ceiling should not be less than:
 - 2.80m for offices.

4.3.5 Aprons

The Aprons of the code C MRO hangars shall cater for one B727-200 (code C aircraft critical in length) or a combination of Code C, B and A aircraft. The apron is 51.50 m deep and shall comprise the 47 meter apron depth and the 4.50 nose clearance/ short term parking area. Each hangar is assigned an aircraft stand located the apron in direct contact with its corresponding plot.

The Aprons shall be constructed by the Authority. Nonetheless, it is the responsibility of the hangar operator to provide floodlighting on the hangar structure to light the contact apron.

4.3.6 Apron GSE Roads

A 12.0 meter GSE Road is planned in front of the code C MRO plots and is set at a distance of 3.0 meters in front of the plots. This road shall service the ground handling vehicles to directly service the aircraft and the associated hangar. It connects to the GSE Road network at its western end.

The Apron GSE Road shall be constructed by the Authority. However, it shall be lit from the floodlighting associated with the contact hangar.

4.3.7 Hangars Back Road

A 12m back road runs between the two rows of Code C MRO hangar plots from the back sides to provide direct access to the employees and service vehicles into the hangars workshops, stores and offices. This road is planned as dead end road to prevent MRO end users from accessing the rest of the airfield. Bollards will be installed at the dead ends to prevent any vehicle from accessing the airfield. The road has total corridor of 28 meters which includes the road section 12m and the 8 m buffer from the adjoining plots to run the necessary utilities.

4.4 CODE C FBO ZONE

4.4.1 General

The area reserved for the Code C FBO (Fixed Base Operation) hangars comprises 8 Code C FBO hangars, associated with aircraft stand taxilanes, Aprons and Apron GSE Roads. The eight FBO hangars are situated in the heart of the General Aviation Area and are bordered by the code C MRO hangars from the north and south, the code F MRO hangars form the west and the code C covered aircraft parking and executive jets terminal from the east. These hangars will be operated as Fixed Base Operation (FBO) facilities and will act as small terminals coupled with boarding lounges, duty free shops, offices and briefing rooms for pilots. Each Code C FBO hangar is designed to accommodate two code C aircrafts of B727-200 type and/or a combination of smaller aircraft.

4.4.2 Code C FBO Plots

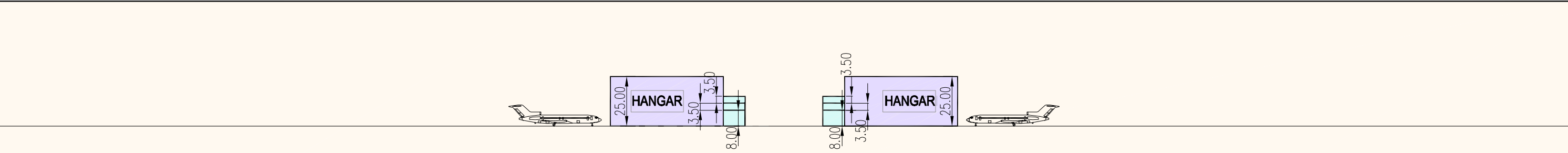
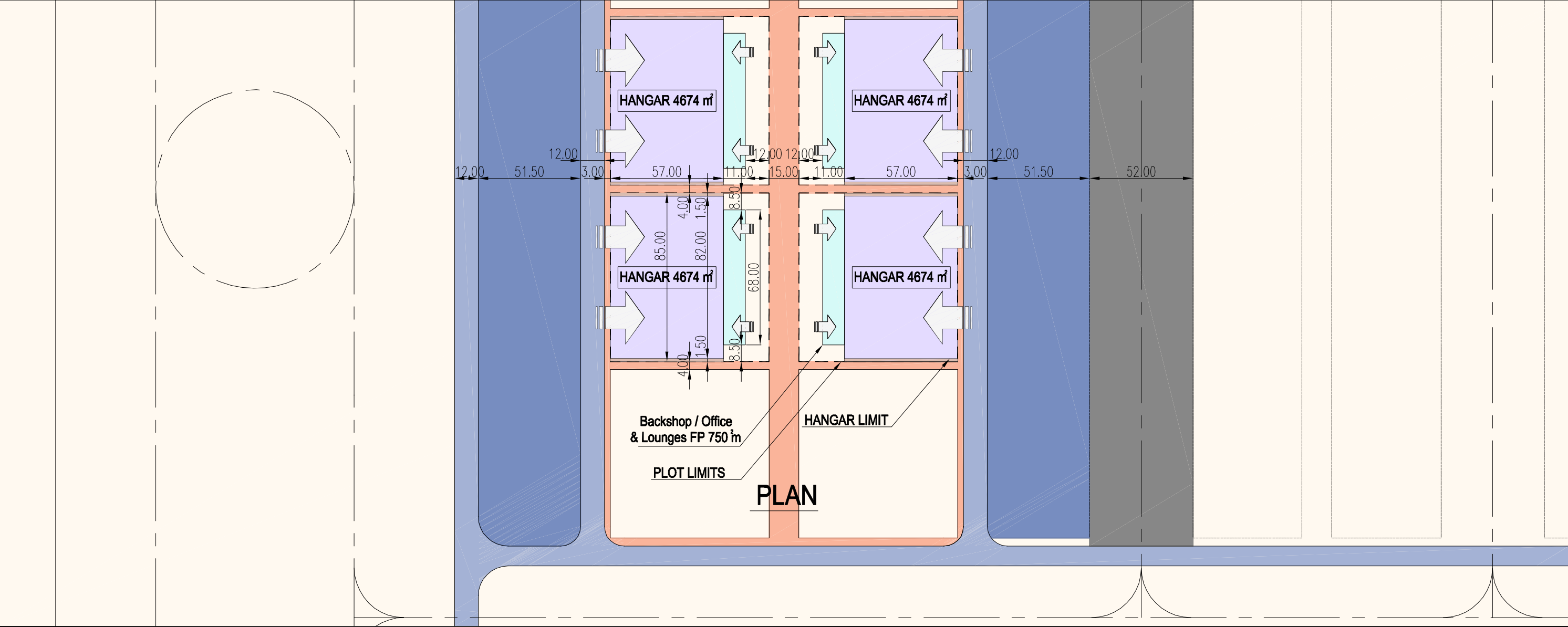
The plots assigned for the eight Code C FBO hangars (plots AC-C54 to AC-C61) shown in Figure 4.5 shall include:

1. One bay hangar with a minimum area of 4674m²
2. The associated maintenance workshops, lounges and offices
3. The external structure of the facility.
4. The hangar sliding doors totally extended (fully opened).
5. A hangar set back of 1.5 m at two sides of the plot.

The setting out data of the code C FBO plots are shown in Figure 4.6.

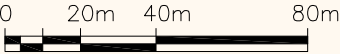
These Hangars are assigned a plot area of 80x85m. Maximum plot coverage is 80%

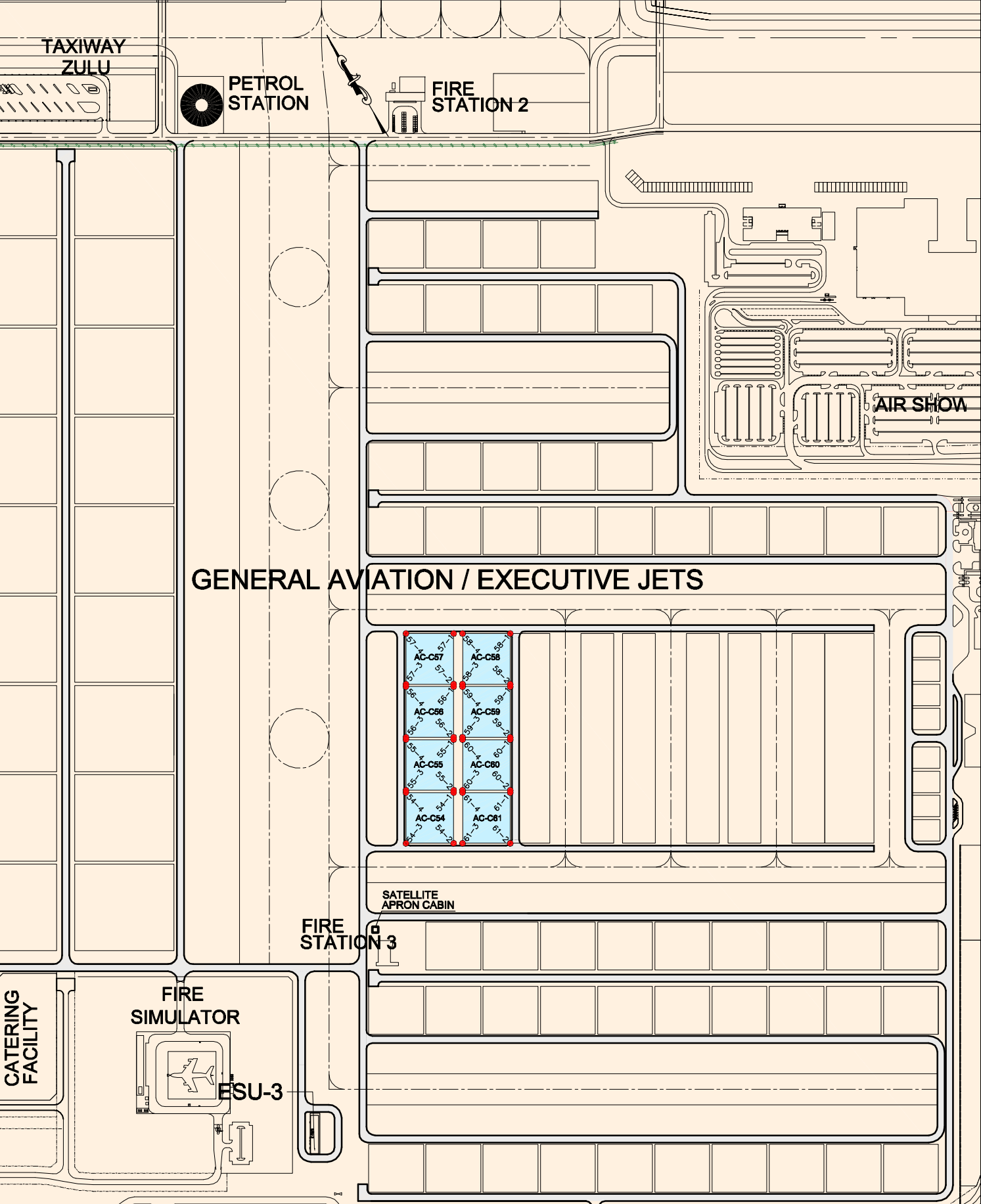
The adjacent plots are separated by 4.0 meters buffer zone to provide a minimum separation distance in case of fire incidence. It is also utilized to provide utility services connection to each hangar. The plots are laterally separated by a distance of 3.0 meters from the 12.0m Apron GSE road, running in front of the hangars, to satisfy the drainage requirements and fire safety issues in case of apron fuel spillage. The two rows of the FBO plots are separated by a distance of 15 m to provide direct access and services to the back side of the hangars, and to provide access for the fire truck in case of emergency.



SECTION

FBO CODE C Land area 4674 m² Plot Coverage 80%
BUAs : Offices 50 m²
Workshops 500 m²
Lounges 500 m²
Hangar 4674 m²





ZONE	PLOT	PT.	X	Y	AREA (m) 2
AC-C	AC-C54	54-1	483282.382	2751979.310	6800
		54-2	483238.203	2751906.693	
		54-3	483169.858	2751948.273	
		54-4	483214.036	2752020.890	
	AC-C55	55-1	483328.639	2752055.345	6800
		55-2	483284.461	2751982.728	
		55-3	483216.115	2752024.307	
		55-4	483260.294	2752096.925	
	AC-C56	56-1	483374.897	2752131.379	6800
		56-2	483330.718	2752058.762	
		56-3	483262.373	2752100.342	
		56-4	483306.551	2752172.959	
	AC-C57	57-1	483421.155	2752207.414	6800
		57-2	483376.976	2752134.796	
		57-3	483308.630	2752176.376	
		57-4	483352.809	2752248.993	
	AC-C58	58-1	483502.315	2752158.038	6800
		58-2	483458.136	2752085.420	
		58-3	483389.791	2752127.000	
		58-4	483433.969	2752199.617	
	AC-C59	59-1	483456.057	2752082.003	6800
		59-2	483411.879	2752009.386	
		59-3	483343.533	2752050.966	
		59-4	483387.712	2752123.583	
	AC-C60	60-1	483409.800	2752005.969	6800
		60-2	483365.621	2751933.352	
		60-3	483297.276	2751974.931	
		60-4	483341.454	2752047.549	
	AC-C61	61-1	483363.542	2751929.934	6800
		61-2	483319.364	2751857.317	
		61-3	483251.018	2751898.897	
		61-4	483295.197	2751971.514	



4.4.3 Permitted Uses

In this zone all the requirements of the fixed base operations are permitted to the satisfaction and approval of the authorities.

4.4.4 Maximum Building Height:

- a. Overall building height measured from the mean finished level of the ground floor to the top of the roof parapet or the top of the coping tile of the pitched roof must not exceed 25m.
- b. For all buildings the clear height of each floor measured from the finished floor level to the ceiling should not be less than:
 - 2.80m for offices.

4.4.5 Aprons

The Aprons of the Code C FBO hangars shall cater for one B727-200 (code C aircraft critical in length) or a combination of Code C, B and A aircraft. The apron is 51.50 m deep and shall comprise the 47 meter apron depth and the 4.50 nose clearance/ short term parking area. Each hangar is assigned an aircraft stand located the apron in direct contact with its corresponding plot.

The Aprons shall be constructed by the Authority. Nonetheless, it is the responsibility of the hangar operator to provide floodlighting on the hangar structure to light the contact apron.

4.4.6 Apron GSE Roads

A 12.0 meter GSE Road is planned in front of the Code C FBO plots and is set at a distance of 3.0 meters in front of the plots. This road shall service the ground handling vehicles to directly service the aircraft and the associated hangar. It connects to the GSE Road network at its northern and southern ends.

The Apron GSE Road shall be constructed by the Authority. However, it shall be lit from the floodlighting associated with the contact Hangar.

4.5 LANDSCAPING

1. Wherever feasible in respect to site safety, the Developer is encouraged to allocate a small proportion of his plot from the back side for greenery and landscaping. The Developer cannot carry out any landscaping works outside his plot boundary.

2. All areas reserved for car parking inside the plot boundary must be paved with grey interlocking blocks with colored interlocking blocks used to define parking limit for each type of vehicle.
3. Landscaping is prohibited on the airside portions of the plot i.e. between the hangar Airside Line and the GSE Road.
4. Plantation should be such that it should not attract the birds.

5. PROCEDURAL REQUIREMENTS FOR HANGAR DEVELOPMENT

The Development Guidelines and Planning Regulations and Standards contained in this booklet are intended for use by the MROs and FBOs operators seeking to construct maintenance hangars towards General Aviation area on serviced plots. They should be applied in conjunction with the local and international standards and codes of building construction.

The regulations contained in this document shall be considered to be the minimum requirements. Operators shall comply with these regulations along with all relevant legislative requirements of the Authority.

The Authority reserves the right to change any of these regulations as and when required and it shall be the duty of the consultants, and contractors to ensure that they possess the latest updated guidelines.

5.1 GENERAL

- 5.1.1 The Operator wishing to erect a hangar building on a serviced plot in the MROs, FBOs area of Aviation City must apply to the Authority, stating his intended development program. All development within MROs and FBOs area must comply with the development guidelines and planning regulations stated in this booklet.
- 5.1.2 The Operator must appoint a qualified Architectural / Engineering Consultant, registered in Dubai, and approved by the Authority, to carry out the design tasks connected to his project, and to act on his behalf regarding all technical matters related to the design, construction and completion of his project.
- 5.1.3 The Operator shall comply with all the Design and Construction requirements and shall submit proof of certification towards the end of construction.
- 5.1.4 The Operator must apply, prior to commencing any construction works for the following:
 - a. A building permit from the Authority.
 - b. No objection certificates (N.O.C) from the Authority and/or from the Service Authorities in charge.

- c. Demarcation and Demarcation Certificate.

- 5.1.5 The Operator must appoint a Contractor to carry out construction works related to his project. The appointed Contractor must observe the procedures for construction set out in this booklet and any other locally applicable Regulations.
- 5.1.6 No buildings or facilities may be occupied after construction prior to obtaining from the Authority a Building Completion Certificate.
- 5.1.7 All Operators should approach the Authority with the initial design documentation, in order to obtain the approval on the hangar volume, built up area, external character and skin finishing material specification.

5.2 REQUIREMENTS FOR A HANGAR BUILDING PERMIT

- 5.2.1 A hangar building permit shall be issued subject to:
 - a. Obtaining the no objection certificate from the Service Authorities for water, electricity and telephone.
 - b. Fulfilling the submission requirements of the Dubai Civil Aviation Authority.
 - c. Building Permit Fees and any other fees as stipulated in the Planning Permission Charges Document.
- 5.2.2 The building permit shall remain valid for the period of a year and renewable annually if acceptable reasons are provided. However, construction on site must start within 3 months after obtaining the building permit.
- 5.2.3 Any amendments to approved drawings or deviations from the conditions stipulated in the building permit shall not be allowed unless explicit and written consent of the Authority is granted. In case of violation, the Authority reserves its right to demolish any illegal addition to the hangar buildings or part thereof. The cost of demolition shall be borne by the developer.
- 5.2.4 Documents to be submitted to the Authority for obtaining a building permit must include:
 - a. Letter of appointment of the Consultant and a copy of the consultancy agreement.
 - b. Letter of appointment of the contractor from the Consultants.
 - c. Copy of the Contractor's Trade License and DWC or Dubai Chamber of Commerce Registration.

- d. Lease drawing showing the coordinates of the plot.

e. No objection certificates from the Service Authorities.

f. A written statement outlining the project profile, the intended uses and a list of the drawings including:

▪ Colored perspective

▪ Architectural drawings & schedule of finishes

▪ Structural drawings

▪ Plumbing layout drawings

▪ Electrical layout drawings

▪ Mechanical drawings

▪ Fire protection and fire alarm layout drawings

▪ layout drawings

▪ Egress Plan

▪ Technical Specifications

5 sets

2 sets

2 sets

2 sets

2 sets

2 sets

2 sets

2 sets

2 sets

All of the afore-mentioned drawings shall be 1/100 scale.

5.3 CONSTRUCTION PROCEDURES

- 5.3.1

The Operator shall appoint a Contractor for the execution of his project. The Consultant shall supervise all construction works and shall liaise with the Authority regarding any problems encountered during execution. No direct communication concerning the management of the construction process shall be established between the Authority and the Contractor.
- 5.3.2

The Contractor shall demarcate the site in accordance with the setting out plan. This work shall be checked by the Consultant and approved by the Authority prior to any encasing or fencing works.
- 5.3.3

The Contractor shall obtain approval from the authority after submitting his mobilization plan showing layouts and details of his temporary offices, fencing, sign boards, storage facility, etc.
- 5.3.4

The Contractor shall execute the project in accordance with the approved working drawings and specifications. The Contractor shall be allowed to erect temporary offices or porta-cabins during the construction stage. He will provide the written undertaking to remove them at the completion of construction.

- 5.3.5

The Operator shall apply to the Authority and/or relevant service Authority and pay all charges associated with temporary electrical, water, drainage including dewatering, safety procedures, fencing, storage and telephone installations and connections during the construction period. All temporary installations and connections must comply with the Authority and/or relevant Service Authorities standards and must be terminated following the completion of construction with suitable local isolation switches.
- 5.3.6

Prior to initiating any construction work, the Operator shall pay the Authority a refundable deposit or unconditional bank guarantee. The amount of this deposit or bank guarantee shall be fixed by the Aviation City Authority in local currency based on their plot area. The deposit shall be refunded upon completion of the works and upon the satisfaction of the Authority that the Contractor has completed the clearance of all debris from the site.
- 5.3.7

The Contractor shall collect the Construction Environmental Management Guidelines (CEMG) from the Authority. The Contractor is responsible to comply with the requirements of the CEMG document.
- 5.3.8

The Contractor must present the following documents to the Authority in order to commence construction:

a. Letter of appointment signed by the Operator and his Consultant.

b. A notice of intent to carry out the works.

c. An invoice for the payment of the refundable deposit.

d. Three sets of revised shop drawings which incorporate any previous amendments or comments by the Authority on previous submissions.

5.4 COMPLETION PROCEDURES

- 5.4.1

A Building Completion Certificate must be applied for by the Consultant upon completion of building works with external finishes and basic electrical, mechanical and fire installations.
- 5.4.2

The Authority shall authorize the following services and utilities to be connected to the building only after the issue of the Building Completion Certificate from the relevant Services Authority:

a. Water supply

- b. Power supply
 - c. Chilled water
 - d. Fire protection
 - e. Sewerage discharge
 - f. Telephone
 - g. Data lines (fiber optics)
- 5.4.3 The Building Completion Certificate shall be issued following a satisfactory inspection visit by the Authority and/or relevant Service Authority. If the inspection of the buildings reveals that further work has to be carried out, the Building Completion Certificate shall be delayed until those works are completed.
- 5.4.4 The application for a Building Completion Certificate must be accompanied by the following documents:
- a. Letter from the Consultant stating the completion of the building in accordance with the approved drawings.
 - b. Two sets of the following as built drawings accompanied by an electronic copy of the same:
 - i. Site layout showing the location of service installations.
 - ii. Floor plans, elevations and sections.
 - iii. Electrical layouts.
 - iv. Mechanical Layouts
 - v. Fire protection layouts.
 - c. Fire and perils insurance for the building.
 - d. Inspection certificate for mechanical and lifting equipment from an approved third party.
- 5.4.5 For Electric and Water Supplies, the Contractor shall be required to submit to the relevant Service Authority "Inspection Certificates" in accordance with the prescribed forms. All installations and equipment installed therein shall be subject to the Service Authority inspection, testing and final approval before connecting the power supply. All relevant documents shall be submitted to the Authority after the final approval by the Service Authority.

5.5 BUILDING OPERATIONS

- 5.5.1 All building operations must be confined within the boundary fence or wall of the plot. Construction sites are required to be enclosed with temporary hoarding during the period of construction to avoid any hazard to adjacent hangar buildings.
- 5.5.2 The Operator must obtain the approval of the Authority for the sitting of temporary buildings and sheds required during construction and must ensure that adequate provisions for safety and the prevention of health hazards related to sanitation, dusting and drainage disposal are taken.
- 5.5.3 All necessary safety precautions shall be taken to protect existing buildings and fences from damage due to excavations, earthworks or any other building operation. The operator and his agent are entirely responsible in case of damage.
- 5.5.4 The Authority shall have free and uninterrupted access to the construction site at any time.
- 5.5.5 The Operator or his agent must give the Authority no less than seven days notice following the completion of the hangar building for inspection and prior to obtaining a building completion certificate.
- 5.5.6 All construction works must be adequately supervised, and a signed copy of the approved drawings and hangar building permit must be kept on site during construction.
- 5.5.7 Any deviation from the approved drawings, or commencement of a construction operation without approval shall be fined. The payment of this fine shall not absolve the Operator from correcting the deviation.
- 5.5.8 Labor accommodation shall not be permitted within the site premises.

5.6 PROCEDURE FOR ADDITION AND ALTERATION

- 5.6.1 For any alterations or additions to existing hangar the Operator shall be required to get the no objection certificate (N.O.C.) by the Authority. To obtain an N.O.C for alteration works, the Operator must present the same set of

drawings required for a building permit, covering the areas of proposed alterations.

5.6.2 Prior to occupation, the Operator must obtain a hangar building Completion Certificate to the satisfaction of the Authority.

5.6.3 Any extensions or alterations to the electrical installations shall require the approval of the relevant Service Authority.

5.7 AUTHORITY POWERS, RESPONSIBILITIES AND DISPUTES

5.7.1 It is the discretion of the Authority to cancel the Building Permit if:

- a. Work was carried out in contravention of the conditions of the Building Permit or any regulations issued by the Authority.
- b. If the Authority subsequently revealed that the Building Permit was issued on the basis of erroneous information supplied by the Operator or his agent.

5.7.2 Hangar Building Permit shall not be withheld unreasonably, but the Authority shall have the discretionary power, while issuing a Building Permit to attach such special conditions thereto as related to all or any of the following matters:

- a. Filling or Excavation within the plot.
- b. Construction of the external appearance of the hangar building, in relation to fitness to its intended purpose and location.
- c. Disposal of soil, waste and rain water.
- d. Health and safety of personnel and environmental conditions of the workplace and surroundings.
- e. The engineering standards to which any process installation is constructed

5.7.3 The Authority is empowered to change, amend, replace and/or update the regulations without prior notice. It is the Operators responsibility to obtain updated regulations and ensure compliance.

5.7.4 It is the responsibility of the Operator to apply in accordance with the up- to-date regulations, the Authority notices, etc. that may supersede ones mentioned in these regulations.

5.7.5 The Authority reserves the right to reject the appointment of consultants or contractors for particular jobs if they are not deemed competent enough to fulfill the related responsibilities

5.7.6 The Authority reserves the right to suspend a consultant or a contractor for non compliance with the regulations.

5.7.7 Responsibilities and Disputes

5.7.7.1 Neither the checking of the drawings, nor the checking of the structural calculations, nor inspection of the work during the progress of construction, shall be construed in any way to impose responsibility and/or liability on the Authority or their agents. The Operator and his consultants shall remain responsible for all errors in the design and execution of the project and for the stability of construction during the progress of the works and after completion.

5.7.7.2 All complaints and disputes concerning Hangar Building Permits and the erection of buildings shall be referred to the Authority. Any financial disputes shall be referred to Dubai courts.

6. STRUCTURAL REQUIREMENTS

- 6.1 A Geotechnical site investigation consisting of sufficient number of boreholes and test pits, in-situ and laboratory tests shall be conducted at the location of the building. The objective of the site investigation is to adequately characterize the subsurface of the location of the structure such that its engineering properties are identified (including physical, mechanical and chemical) to enable a successful design and construction of foundation system and to ensure its stability and serviceability. Site investigation works shall be performed in accordance with International Standards (e.g., ASTM, AASHTO or BS).
- 6.2 Geotechnical analyses and foundation design shall be developed in light of detailed project requirements and geotechnical design parameters obtained from the geotechnical field and laboratory tests. Foundations are to be designed to satisfy the stability and serviceability conditions of the buildings. The foundation system will be chosen so as to fulfill the specific project requirements such that it offers a safe, functional, economical and durable system.
- 6.3 The foundation system of the buildings shall be designed in accordance with Standards and codes of practice listed below under paragraph 6.8, such that safety and serviceability are maintained during the lifetime of the structures. The foundations are to be stable and maintain an adequate bearing capacity to support the maximum expected structural loads and any other loads deemed significant during the structural design of the building with an appropriate factor of safety. The expected total and differential settlements must be within the allowable limits dictated by the functional, architectural, structural, and mechanical conditions, and as dictated by the limits stated in the Authority's guidelines.
- 6.4 When applicable, the pavement works for building shall include the design of pavement to support the loads inside the building and the design of the parking lots adjacent to the building. Pavement design shall be performed in accordance with International Standards (e.g., AASHTO or BS). Authority approval of the pavement type and cross sections should be obtained.

- 6.5 The building shall be constructed that the total applied loads by following the load combinations of codes listed under paragraph 6.8, are safely transmitted to the ground without deformation and deflection of any part of the building, and without such ground movement impairing the stability of any part of another building. Building stability shall not be impaired by subsoil movement due to swelling or shrinking.
- 6.6 The structures shall be designed to have design strengths at all section at least equal to the required strengths calculated for the factored loads and forces in such combinations as stipulated in the ACI 318 Building codes for concrete structures and AISC code for steel structures.
- 6.7 Special consideration to the durability precautions against the aggressive environmental and to construction materials in the area should be respected in the design of building.
- 6.8 The structures shall be designed in accordance with the following standards and codes of Practice:

A- Reinforced Concrete Structures:

- ACI 318M-05 "Building Code Requirements for Structure Concrete".
- ACI 315-99 "Details and Detailing of Concrete Reinforcement".
- ACI 350.4R-04 "Design consideration for environmental engineering concrete structures.
- PCI MNL-120-04 " PCI Design Handbook – Precast & Prestressed Concrete".
- ACI 201.2R-01 " Guide to durable concrete.
- ACI 530-05 "Building Code Requirements for Masonry Structures".
- ACI 360R-06 "Design of slab on ground"
- UBC 1997 – Uniform Building Code 1997 Edition.

B- Steel Structures:

- American Institute of Steel Construction AISC/ASD-13th edition, 2005
- American welding Society ANSI-AWS-D1.1 latest edition
- Uniform Building Code UBC 1997
- Steel Structures painting Council SSPC-2000

1. The design and construction of the Structural works shall be based on the following:

Dead loads:

All structural members and all permanent materials forming part of the structures shall be considered as dead load.

2. Live loads

The Live Load for all structural members shall be calculated according to UBC 1997 edition.

3. Wind Loads

Wind pressures on the structures and buildings shall be calculated according to UBC 1997 edition with Basic Wind Speed of 80mph , exposure C.

4. Seismic Loads

Earthquake analysis is according to UBC 1997 edition and Seismic Zone 2A according to Dubai Municipality.

5. Temperature Variations: +/- 30 degrees C.

6.9 STRUCTURAL MATERIAL

1- Concrete

- All reinforced concrete should have a minimum crushing strength on cylinder at 28 days $F'_c=300 \text{ Kg/cm}^2$
- All plain concrete should have a minimum crushing strength on cylinder at 28 days $F'_c=140 \text{ Kg/cm}^2$.
- All exposed reinforced concrete structures shall be made with Ordinary Portland cement complying with ASTM C150 Type I.
- All buried concrete structures in direct contact with soil and water table shall be made with Moderate Sulphate Resisting cement complying with ASTM C150 Type II.
- All sewerage structures and septic tanks shall be made with Sulphate-Resisting Portland Cement complying with ASTM C150 Type V.

2- Reinforcement:

- All reinforcement shall be deformed high tensile steel having minimum yield strength $F_y= 420 \text{ N/mm}^2$ and shall conform to ASTM A615 grade 60 or BS4449 grade 460 type 2.

3- Structural steel

- Structural steel plates and hot rolled sections are to conform to ASTM A572 grade 50, with minimum yield stress 345 N/mm^2 or equal or to ASTM A36 grade 50, with minimum yield stress 250 N/mm^2 or equal
- Cold-Formed Structural Steel Tubing: ASTM A 500, Grade C. Having a minimum yield stress of 345 N/mm^2 or equal
- Anchor Bolts are to conform to ASTM A 572M, Grade 50 or Anchor Bolts are to conform to ASTM A 307, Grade C.
- High-Strength Bolts, Nuts, and Washers: ASTM A 490M, Type 1, or DIN 6914 grade 10.9 heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.
- Shear Connectors: AWS D1.1, type B, minimum yield strength 345 N/mm^2 [50 ksi] at 0.2% offset, made from steel to ASTM A108, with mechanical properties to ASTM A370.
- Welding Materials: Conform to AWS Code and AWS Filler Metal Specifications. Select materials that are suitable for use with types of steel to be joined. Unless otherwise indicated, connections are designed for:
- Metal-Arc Welding Electrodes: to E70XX series of the Specification for Mild Steel Covered Arc-Welding Electrodes, AWS A5.1, or the Specification for Low-Alloy Steel Covered Arc-Welding Electrodes, AWS A5.5.
- Bare Electrodes and Granular Flux used in the submerged-arc process are to conform to F7 X-XXXX AWS flux classifications of the Specification for Base Mild Steel Electrodes and Fluxes for Submerged Arc Welding, AWS A5.17, or A5.23 or the of AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings".

6.10 WATERPROOFING

Adequate waterproofing system will be applied depending on site condition.

- Cold applied damp-proofing coating should be applied to all reinforced concrete surfaces in direct contact with earth and that are not waterproofed.
- Full tanking system should be applied to all reinforced concrete structures under water table and up to 50cm above max. water table.
- Chemical waterproofing coating should be applied to internal surfaces of concrete water tanks.

6.11 Construction, Contraction and Expansion joints will be provided in Cast in situ reinforced concrete slabs in order to relief the structure from stresses due to the shrinkage and the temperature variations

- 6.12 The design and construction of pipelines, storage tanks, boilers, cranes, lifting equipment and pressure vessels shall be checked and certified by an independent third party inspection agency approved by the Authority.

7. MATERIALS

7.1 GENERAL

- 7.1.1 All materials used in any construction shall be of a type and quality that fulfills the purpose for which they are used. They must be safe and durable. Where and to the extent that materials, products and workmanship are not fully detailed or specified, they are to be of a standard appropriate to the works and suitable for the functions stated in or reasonably to be inferred from the project documents, in accordance with good building practice.
- 7.1.2 Products must be new and previously unused. For products specified to British or other approved standards, certificates of compliance shall be obtained from manufacturers. Where a choice of manufacturer or source of supply is allowed for any particular product, the whole quantity required to complete the work must be of the same type, manufacture and/or source.
- 7.1.3 Concerning basic workmanship; and where compliance with BS 8000 is specified, this is only to the extent that the recommendations therein define the quality of the finished work. Where BS 8000 gives recommendations on particular working methods or other matters which are properly within the province and responsibility of the Contractor, compliance therewith will be deemed to be a matter of general industry good practice and not a specific requirement of the Authority.

7.2 SCREEDS AND TOPPINGS

Cement screed shall be to BS 8204 and BS 8000 part: 9.

Heavy duty epoxy topping shall be composed of epoxy aggregate matrix and top coats to produce a dense, seamless and impervious topping, colors to be selected by the Consultant.

Epoxy concrete floor sealer to be solvent based epoxy floor coating providing abrasion, chemical resistant, colored, dustproof and sealed surface.

7.3 FINISHES

All finishes are to conform to relevant BS and BS code of practice.

7.3.1 Internal plastering is to be executed in accordance with BS 5492.

7.3.2 External rendering is to be executed in accordance with BS 5262.

7.3.3 Painting is to be in accordance with BS 6150 and BS 8000 pt: 12.

7.4 RIGID FLOOR AND WALL TILING AND SLABS

7.4.1 Ceramic tiles and fittings shall conform to BS 6431. Fixing of ceramic tiling and fittings is as per BS 5385: part: 1.

7.4.2 Terrazzo tiles and fittings shall conform to BS 4131, hydraulically pressed and steam cured. Joints to be true to line, continuous and without steps, and parallel to the main axis of the space or specified features.

7.5 CLADDING AND COVERING

7.5.1 Insulated composite cladding panels comprising outer skin of profiled sheet steel, hot-dip galvanized to BS 2989 -82 type G275. Sheets are to be coated with an anti corrosive epoxy primer and barrier coat on both sides and a protective colored coating. Profiled sheeting and ancillary materials are to be fixed neatly to manufacturer's recommendations to make the whole sound and weather tight.

7.5.2 External cladding shall be executed in accordance with BS 8298. Cladding is to resist all dead and live loads; wind loads are to be calculated in accordance with BS CP 3, chapter V, Part 2 based on prevailing site conditions.

7.6 GLAZING

Glass generally shall conform to BS 952. Glazing must be wind and water tight under all conditions to BS 6375 with full allowance made for deflections and other movements. Preparation of surrounds, dimensions of edge cover and clearance, positions and materials of distance pieces, setting and location blocks are to conform to BS 6262 and to glass and sealant manufacturers' recommendations. General glazing is to conform to BS 6262. Security glazing is to be to BS 5357.

7.7 METAL WORK GENERAL

Grades of metals, section dimensions and properties shall be prescribed in accordance with appropriate British standards. When not specified, grades and sections shall be appropriate for the purpose. Metalwork shall be carefully and accurately fabricated to ensure compliance with design and performance requirements using types, grades and sections of metal appropriate for the purpose. Finished work must be free from distortion and cracks.

7.8 WOODWORK GENERAL

All woodwork shall generally comply with British standards 1186 parts 1 and 2.

7.9 DOORS AND WINDOWS

- 7.9.1 Aluminum alloy windows and screens shall comply with the general requirements of BS 4873. Weather tightness shall be to BS 6375: Part 1 constructed from extruded aluminum sections made from alloy 6063 fully heat treated. Bearing devices, hardware and reinforcing members are to be from material that is corrosion resistant and compatible with aluminum. Weather-stripping is to be made from neoprene or EPDM rubber. Aluminum sections are to have electrostatically applied polyester powder coating or fluoro-polymer finish. Operation and strength characteristics to be to BS 6375: Part 2.
- 7.9.2 Flush steel doors shall be to BS 6510. Doors are to be flush, watertight, with closed tops and edges and reinforced internally with stiffeners welded and spaced not more than 150 mm over centers. Fire resisting steel doors are to satisfy the requirements of BS 476: Parts 20 and 22.
- 7.9.3 Wood semi-solid core flush doors are to be to BS 4787 part 1. Wood fire-resisting flush doors are to satisfy the requirements of BS 476: Parts 20 and 22;
- 7.9.4 Roller Shutters: Comprising curtain of interlocking galvanized steel with electrostatically applied polyester powder coating finish, supplied complete with barrel rollers, helical springs, vertical guides, operating gear for motorized operation, hoods, personnel doors, glazed panels and ventilation slots, as shown on the drawings, and with manufacturer's standard ironmongery, accessories and fixings.

- 7.9.5 All doors within a facility must be on a master key, a copy of which must be handed to the Authority.

7.10 FIRE RESISTANCE

The specified performance is to be the minimum period attained when tested for integrity in accordance with the relevant parts of the British standard (BS 476), U.L. standards and shall be listed for the intended function and use by an authorized third party approved by the Authority.

8. FIRE PROTECTION REGULATIONS

- 8.1 Provision of Fire Protection Facilities shall meet the recommendations, requirements and specifications of the National Fire Protection Association, NFPA and shall be approved by the Service Authority (Fire) and the Authority based on fire risk assessment and (UAE) Government Safety Regulations.
- 8.2 Every building shall be provided with adequate means of egress, and other safeguards which shall be specified in kind, number, location and capacity, taking into consideration type of occupancy, number of persons exposed type of building materials and other relevant factors that may affect the safety of occupants.
- 8.3 A minimum of two means of escape shall be provided in every building, and shall be arranged in such a way that will minimize the eventuality of both being rendered impassable during the same emergency conditions.
- 8.4 Every exit stair and other vertical opening between floors of a building shall be enclosed and protected as necessary to prevent the spread of fire, fumes and smoke through the vertical openings from floor to floor, giving enough time for the occupants to reach the means of escape.
- 8.5 The building shall be provided with fire detection alarm system to warn the occupants in the event of fire. The fire alarm system shall meet the recommendations, requirements and specifications of the National Fire Protection Association (NFPA) and shall be approved by the Service Authority (Fire). The fire alarm system shall be adequately connected to the Airport Fiber Optic Backbone Network. Fire detection will be solely provided by means of sprinkler water-flow where allowed by NFPA in case of buildings’ sprinkler system.
- 8.6 Manual Fire Extinguishers will be omitted where allowed by NFPA in case of buildings’ sprinkler system.
- 8.7 For industrial occupancy - fire protection and means of egress shall be provided as per their occupancy and hazard classifications, i.e.
- a. General industrial Occupancy or
 - b. Special Purpose Industrial Occupancy

- 8.8 For storage occupancy - fire protection and means of egress shall be provided as per their hazard contents classifications in compliance with NFPA requirements.
- 8.9 Every building shall be properly and fully fire protected by an approved fire protection system complying with NFPA requirement taking into consideration the type of occupancy and usage. Main fire protection system components such as fire pumps, controller, sprinklers and accessories as applicable shall be U.L. listed for the intended use and Factory Mutual approved.
- 8.10 Fire protection system for hangars shall meet the requirements of NFPA 409 Standard of Aircraft Hangars.
- 8.11 The following NFPA standards are found relevant to the project occupancy types and which will form the main core of the design approach:
- NFPA 10: Portable Fire Extinguishers
 - NFPA 13: Installation of Sprinkler Systems
 - NFPA 20: Centrifugal Fire Pumps

9. MECHANICAL INSTALLATIONS

9.1 GENERAL

9.1.1 All mechanical systems including plumbing, cold and hot water, drainage, rainwater, fire protection, refrigeration, ventilating and air conditioning, controls, compressed air, fuel and LPG (if applicable) systems, and materials shall be in accordance with the DCA Standards and in full compliance with, but not limited to, the following standards or any equivalent standard approved by the Authority.

- ASHRAE American Society for Heating Ventilation and Air Conditioning Engineer
- NFPA National Fire Protection Association
- ANSI American National Standards Institute
- ASPE American Society of Plumbing Engineers – North America
- NPC National Plumbing Code – North America
- UPC Uniform Plumbing Code
- IPC International Plumbing Code
- IMC International Mechanical Code
- AWWA American Water Works Association
- SMACNA Sheet Metal and Air Conditioning Contractors National Association
- ARI Air Conditioning and Refrigeration Institute
- AMCA Air Moving and Conditioning Association
- UL Underwriters’ Laboratories Inc.
- FM Factory Mutual
- AGA American Gas Association
- API American Petroleum Institute

9.1.2 All mechanical systems are to have an identification and color coding system in compliance with ANSI or any equivalent standard approved by the Authority.

9.1.3 Mechanical systems are to be designed in order to achieve LEED certification.

9.2 PLUMBING

9.2.1 Water supply, plumbing and sanitary drainage installations shall be in accordance with the requirements of the American Society of Plumbing Engineers (ASPE-North America) standards, the Uniform Plumbing Code (UPC)

USA and/or National Plumbing Code (NPC-North America), and other standards used and accepted by Authority.

9.3 VENTILATION AND AIR CONDITIONING

9.3.1 The design and installation of all air conditioning and ventilation systems shall be in accordance with latest guidelines of ASHRAE standards, ANSI, applicable NFPA standards, and other standards used and accepted by Authority.

9.3.2 The design of walls and roof shall take into account Ventilation and Air conditioning requirements. The purpose is to limit the accumulation of moisture and pollutants which originate in the building and which would otherwise become a health hazard. An adequate supply of fresh air is necessary to ensure the health and comfort of the occupants of buildings and to limit condensation.

9.3.3 The objective is to provide means of:

- a. Proper ventilation, either natural or mechanical, to ensure acceptable Indoor Air Quality (IAQ) and dilution of pollutants.
- b. Proper air conditioning to ensure comfortable indoor temperature.
- c. Proper extraction of moisture and control of contaminants.

9.3.4 Offices area/ Lounges/ Control rooms/ Electrical rooms

- a. Split room air conditioners will be used to provide cooling for various areas.
- b. Filtered and pre-treated fresh air will be supplied to all areas by means of packaged units.

9.3.5 Toilet rooms may be ventilated by mechanical extraction capable of providing 12 air changes/hour. Such mechanical extraction shall be communicated to the outside with point of discharge at least 3 m away from any fresh air opening.

9.3.6 The ventilation of industrial buildings shall be in accordance with ASHRAE HVAC Application Handbook – latest Edition and ASHRAE Standard 62-2004.

9.3.7 The hangars will be provided with a smoke management system as required by safety codes, and in compliance with NFPA92B.

10. ELECTRICAL INSTALLATION

10.1 GENERAL

10.1.1 All Electrical Installations shall follow the Service Authority (Electrical) Standards, in addition to British Standard (BS) and International Electrotechnical Commission (IEC) Codes (latest Editions) where not in contradiction with the local codes of practice and regulations.

10.1.2 All electrical equipment and materials shall be designed, specified and rated for a continuous and trouble free operation in the ambient conditions where the equipment is located.

10.1.3 The Developer shall provide to the Service Authority (Electrical), the maximum demand load in kVA required for his construction and operation. A copy of the Service Authority (Electrical) N.O.C. shall be forwarded to the Authority for their information.

10.1.4 The Developer shall also provide a detailed list of equipment to be supplied with electric power, indicating type of equipment/load, voltage, No. of phases, capacity in kW or kVA and applicable overall diversity factor, along with power single line diagrams and electrical substations' rooms and equipment layouts.

10.1.5 The Developer shall take the necessary steps to protect and keep safe any service corridor passing nearby the plot. In case of damage, the Developer shall report immediately to the Service Authority in concern.

10.1.6 The project shall be LEED certified, and accordingly the design and construction shall follow and comply with related LEED requirements.

10.2 APPLICATION TO THE SERVICE AUTHORITIES

10.2.1 Upon signing a lease for the allocated plot, the Developer shall apply to the Service Authority (Electrical) for his power connection and for the installation of his own 11 kV meter.

10.2.2 The Consultant must apply, prior to commencing any construction works for the following:

a. No Objection Certificate (N.O.C) from the Service Authorities.

10.2.3 The Contractor shall submit to the Service Authority (Electrical) "Inspection Certificates" in accordance with the Service Authority (Electrical) prescribed forms. All installations and equipment installed therein shall be subject to the Service Authority (Electrical) inspection, testing and final approval before connecting the electric supply. All relevant documents shall be submitted to the Authority after the Service Authority (Electrical) final approval.

10.3 POWER SUPPLY CONNECTION

10.3.1 The point(s) of supply to the allocated plot shall be decided by the Service Authority (Electrical), and shall be made available at defined location(s) within the plot/project, unless otherwise approved by the Service Authority (Electrical).

10.3.2 Power supply from the Service Authority (Electrical) network shall be subject to terms, fees and tariffs issued by the Service Authority (Electrical).

10.3.3 Power supply will be provided to the plot/building at 11 kV, 50Hz, through 3 core Medium Voltage cables. The power shall be stepped down to 400/230 Volts through electrical substations within the plot/building which location and layout shall be approved by the Service Authority (Electrical). The low voltage network within the plot/building shall be distributed at 400/230 Volts, 50 Hz, 3 phases, 4 wires with separate earth continuity conductor.

10.3.4 Electrical substation(s) within the plot/building shall meet the requirements of the Dubai World Central Authority (Electrical) substation based on the Service Authority (Electrical) approved details for the proposed substation(s) and DCA requirements. Provision for connection to the Airport SCADA system shall be provided as per the Service Authority (Electrical) requirements.

10.3.5 Electrical Substation(s) shall be according to the "DEWA - General Conditions for providing 11kV Supply to Consumer's Plot" and the Service Authority (Electrical) requirements and subject to the Service Authority (Electrical) approval.

- 10.3.6 The Developer substation(s) and associated 11 kV metering shall be installed in locations to which access is available at all times. Prior approval shall be obtained from the Service Authority (Electrical).
- 10.3.7 Space clearance around the electrical equipment shall be provided for safe operation, inspection, testing and maintenance, according to the Service Authority (Electrical) Regulations.
- 10.3.8 Electrical rooms and substations shall be properly ventilated/air conditioned, as applicable. In case, electronic equipment will be installed within the electrical rooms or substations, these shall be air conditioned to a max. temperature of 26 deg. C.
- 10.3.9 The Developer will be responsible for terminating the incoming supply cable at the Service Authority (Electrical) metering cabinet, in accordance to the Service Authority (Electrical) Regulations.
- 10.3.10 All tariff metering will be provided by the Service Authority (Electrical) and restricted to one for each consumer, unless otherwise approved by the Service Authority (Electrical).
- 10.3.11 All electrical installations shall be provided with separate earthing system. The earthing system shall comply with the British standards code of practice (latest edition) and shall have the TN-S earthing configuration. Clean and separate earthing system shall be provided for the Extra Low Voltage systems as required. The consumer's earthing system shall be approved by the Service Authority (Electrical).
- 10.3.12 A lightning protection system shall be designed to comply with the British Standards Code of Practice for the Protection of Structures Against Lightning (latest edition).

10.4 EMERGENCY POWER SUPPLY

- 10.4.1 If continuity of power is essential for the safe operation of the equipment, the Developer should apply to the Service Authority (Electrical) indicating the required essential power supply (at Medium Voltage level).

- 10.4.2 For Code F MROs, emergency power shall be available at the 11kV side up to 20% of the hangar maximum demand load. Load shedding arrangements shall be part of the hangars internal LV distribution in order to meet the 20% emergency supply criteria.

- 10.4.3 For Code C MROs and FBOs, it shall be the responsibility of the Developer to provide stand-by power supply. The stand-by generators shall not be synchronized with the Service Authority (Electrical) network at any time. Proper electrical and mechanical interlocks between circuit breakers shall be provided. Generator installation shall be permitted prior to the Service Authority (Electrical) approval.

- 10.4.4 Generator noise level shall not exceed 75 dBA at 3m outside the generator room enclosure. Generator characteristics and specifications shall comply with ISO standards and comply with local authorities for environmental restrictions.

10.5 INSTALLATION REQUIREMENTS

- 10.5.1 All the Electrical Installations shall follow the Service Authority (Electrical) Regulations, in addition to British Standard (BS)/ International Electro technical Commission (IEC) Codes (latest Editions) where not in contradiction with the local codes of practice and regulations.

- 10.5.2 Temporary power supply for plot construction shall be the responsibility of the Developer and subjected to the Authority approval.

- 10.5.3 The Developer shall maintain a power factor not less than 0.9 for the complete installation.

- 10.5.4 The Developer shall install an approved fire detection and alarms system in all his constructions. Fire Alarm system shall be installed in the premises in compliance to NFPA Code or relevant British Standards and according to the Local Authorities jurisdiction.

- 10.5.5 The Developer shall install 100mm UPVC ducts (number of ducts will depend on the facility requirements) to connect the plot with the outside service corridor for the telecommunication, control and fire alarm detection system.

- 10.5.6 The Developer shall install 150mm UPVC ducts (number of ducts will depend on the facility requirements) to connect the plot with the outside service corridor for the medium voltage supply.

10.6 LIGHTING INSTALLATION REQUIREMENTS

- 10.6.1 All lighting installations shall comply with the requirements of Chartered Institution of Building Services (CIBSE) in addition to any specific requirements of the Dubai World Central Authority (Electrical) and/or DCA.
- 10.6.2 Safety and emergency light fittings shall be installed in all areas and escape routes, as per NFPA requirements or relevant British Standards, local codes.
- 10.6.3 Apron floodlighting (for aprons serving the allocated plot) shall be provided as part of the hangar design (i.e. floodlighting shall be mounted on top of the hangar building with appropriate optics, ratings, mounting arrangements and levels). Achieved apron floodlighting levels shall be as per ICAO recommendations and DGCA CAR Part 9. Apron floodlighting calculations shall be submitted to DCA for approval.
- 10.6.4 The outdoor lighting shall be designed to minimize the light pollution in the area and be in compliance with the LEED requirements. Outdoor lighting design shall be submitted to the Authority for approval. Specific requirements for the outdoor lighting shall be followed, as per the Authority requirements.

10.7 COMPLETION CERTIFICATE

- 10.7.1 The Developer shall ensure the following for the Service Authorities inspection:
- The main electrical incoming supply arrangement is completed.
 - The electrical installation inside the plot is completed.
 - Fire detection and alarm system installation is completed.
 - Extra Low Voltage systems installation is completed.
- 10.7.2 On completion of satisfactory inspection by the Service Authorities, a building completion certificate shall be issued. This certificate is a pre-requisite for the connection of electrical installations to the Service Authority (Electrical) power supply grid and fiber optic backbone network.

11. TELECOMMUNICATIONS AND ELV SYSTEMS

11.1 INTRODUCTION

11.1.1 The Maintenance, Repair and Overhauling (MRO) hangars Telecommunications and ELV Systems shall be delivered via a converged network infrastructure and shall cover the following components:

- Structured Cabling Network for Voice, data and Video.
- Closed Circuit Television (CCTV), where applicable and/or required.
- Security and Access Control System (SACS), where applicable and/or required.
- Fire Alarm System.

11.1.2 Guidelines herein are provided only as a general procedure to be followed for the telecommunications and ELV installations; however, for further and detailed technical requirements and standards, refer to Local Codes and Regulations, Etisalat design guidelines documentations, and other relevant International Standards, which are adopted by the Authorities namely DCA/DWC.

11.2 TELECOMMUNICATIONS AND ELV SYSTEMS DESIGN CRITERIA

11.2.1 Design Codes and Standards

The design of the telecommunications and ELV systems shall comply with relevant requirements and recommendations of:

- The IEC or other equal and approved codes, taking into account that network cables with fitted accessories and connector and wiring have to be of fire rated type in accordance with all NFPA requirements codes (NFPA72 and extensions).
- System components, parts, and installation are to comply with the corresponding recommendations of the Electronic Industries Alliance (EIA), and the International Electro-technical Commission (IEC). In particular:
 - ISO/IEC 11801: latest edition regarding Information Technology and generic cabling for customer premise.
 - EIA/TIA 568, Commercial Building for Telecommunication Wiring Standard.

- EIA/TIA 569, Commercial Building for Telecommunication Pathways and spaces.
 - EIA/TIA 598-A, Optical Fiber Cable Color Coding.
 - EIA/TIA 455, Fiber Optic Test Procedures.
 - EIA/TIA 526, Standard Test Procedures for Fiber Optic Systems.
 - ITU-T G.650, Definitions and test methods for statistical and non-linear related attributes of single-mode fiber and cable.
 - ITU-T G.651, Characteristics of a 50/125 multimode graded index optical fiber cable.
 - ITU-T G.652, Characteristics of single-mode optical fiber and cable.
 - EIA/TIA TSB 140-4. Additional guidelines for field testing length, loss and polarity of Optical Fiber.
 - EIA/TIA TSB 67. Transmission performance specifications for field testing of unshielded twisted pair cabling systems.
 - EIA/TIA 606 for Telecommunications Infrastructure: this document provides the user with guidelines and choices of classes of administration for maintaining telecommunications infrastructure.
 - EIA/TIA 607 Commercial Building Grounding (Earthling) and Bonding Requirements for Telecommunications (ANSI/J-STD-607-A-2002).
 - IEC 60754-1 & 2 Test on Gases Evolved During Combustion of Materials from Cables and Test on Gases Evolved During Combustion of Electric Cables.
 - IEC 61034-1 & 2 Test and Measurement of Smoke Density of Cables Burning under Defined Conditions.
 - IEC 60331 part 11 & 12, Tests for Electric Cables under Fire Conditions.
 - IEC 60332 Tests on Electric Cables under Fire Conditions.
 - IEC 60364-1 Electrical Installations of Buildings, Fundamental Principles, Assessment of General Characteristics, Definitions.
- The latest issue of several material and test standards, which have been developed and published by Institute of Electrical and Electronics Engineers (IEEE) for data communications industry, but not limited to:
- 802.1 – Network Management Group,
 - 802.2 – Logical Link Control Group,
 - 802.3 – Carrier Sense Multiple Access/Collision Detection Group,
 - 802.6 – Metropolitan Area Networking Group,
 - 802.7 – Broadband Technical Advisory Group,
 - 802.8 – Optic Fiber Technical Advisory Group,
 - 802.9 – Integrated Voice and Data LAN Working Group,

<ul style="list-style-type: none"> - 802.10 – LAN Security Working Group, - 802.11 – Wireless Networks - 802.12 – Fast Ethernet. <ul style="list-style-type: none"> ▪ The latest issue of both ITU-T (International Telecommunications Union) recommendations and US standards. When standards are not compatible in both Europe and US (e.g. telecom interfaces SDH STMx vs. SONET OCx) detailed compatibility and interface availability shall be provided. ▪ European Telecommunications Standards Institute (ETSI). ▪ National Electrical Code (NEC). ▪ Building Industry Consulting Service International (BICSI). ▪ Underwriters Laboratories (UL). ▪ Comply with the latest issue of several material and test standards, which have been developed and published by Network Equipment Building System (NEBS). ▪ IETF: Internet Engineering Task Force. ▪ NFPA: National Fire Protection Association Standards. ▪ VESA: Video Electronics Standards Association. 	<p>11.3.2 The Contractor must apply, prior to commencing any construction works for the No Objection Certificate (N.O.C) from the Service Provider.</p>
<p>11.2.2 All electrical equipment, accessories and fittings employed in the telecommunications and ELV installations shall be designed, specified, and de-rated for a continuous trouble free operation in the ambient conditions where the equipments are located, and which are summarized as follows:</p> <ul style="list-style-type: none"> ▪ Max ambient temperature : 60 deg. C (Un-shaded) ▪ 50 deg. C (Shaded) ▪ Max relative humidity : 100 % ▪ Min relative humidity : 30 % ▪ Max Ground Temperature : 35 deg. C at 1m depth. ▪ Atmospheric conditions : Hot and humid atmosphere. 	<p>11.3.3 A complete data network shall be implemented throughout the MRO Hangars to provide high-speed data transmission suitable for local area networks (LANs) which support Data, Video and IP-Telephony (triple play). The system shall comprise of RJ45 data outlets and Category 6 copper cables for the horizontal distribution system and fiber optic cables for the backbone and direct villas/apartments connectivity (FTTH), including all related data passive equipment such as communication cabinets, which will house patch panels, horizontal cross connect and the like. The data cables network will be connected to patch panels which in turn will be connected to the fiber optic backbone cable network.</p>
<p>11.2.3 Nominal characteristics of power supply and distribution shall be as coordinated with the Local Service Authorities.</p>	<p>11.3.4 The connection to the outside service corridor should be through UPVC underground ducts of minimum of 2 No. 100 mm diameter and shall be defined on the drawings to the Service Provider requirements. Additional entry would be needed as per the Service Provider's requirements. Final number of ducts will depend on the facility requirements and to the Service Provider's approval.</p>
<p>11.3 STRUCTURED CABLING NETWORK FOR VOICE, DATA AND VIDEO</p>	<p>11.3.5 An adequate room shall be allocated for the telecommunications and IT systems termination equipment, with 24 hours access to the Service Provider's personnel, as per the Service Provider's requirements.</p> <p>11.3.6 The detailed design of the structured cabling network installations shall be submitted to the Service Provider for approval. All designs and materials to be used must be approved by the Service Provider.</p>
<p>11.3.1 All structured cabling network Installations for telecommunications and Information Technology (IT) systems shall follow the Service Provider Standards, namely Etisalat, unless otherwise required by the Client.</p>	<p>11.4 SECURITY AND ACCESS CONTROL SYSTEMS</p> <p>11.4.1 CCTV and Access Control Systems will mainly be part of a security policy which shall be proposed and discussed with the Client.</p> <p>11.4.2 The CCTV system shall give the security personnel the ability to view buildings' approaches, main entry doors, streets and public areas where applicable and/or required by the Client. Fixed and pan/tilt/zoom cameras are suggested for use in MRO Hangars, where applicable and/or required. Also, to include CCTV's to be mounted on some of the hangars by the Airport Authorities to control the taxi lanes and Aprons. Digital recording of all</p>

cameras throughout the facility on a 24/7 basis shall be required for historical video retrieval. All video signals transmission shall use the copper and fiber optic backbone; coaxial cables with necessary analog/digital converters could be used where distance limitations prevent copper connectivity.

11.4.3 The access control system shall allow authorized personnel to access the offices areas, general buildings' access points, and other restricted areas throughout the MRO Hangars, as applicable and/or required by the Client.

11.4.4 The access control system shall allow selective entry to secured areas and provide a historical record of personnel accessing secured areas.

11.4.5 The access control system shall allow for the immediate disabling of card keys that are lost or have expired, giving a higher level of security for restricted areas of a building.

11.5 FIRE ALARM SYSTEM

11.5.1 The MRO Hangars shall have a Fire Detection and Alarm System implemented. The system shall be designed to provide early detection, accurate localization of zones and points of origin, and automatic control of the ventilating air-conditioning systems. The system shall be of the analogue addressable type with voice command feature, microprocessor based, audibly and visually supervised, with detection and alert devices distributed where dictated by codes.

11.5.2 Various types of detectors shall be used for rapid and assured detection of fire hazards. In that extent, automatic initiation devices shall be of the addressable type. Following are the initiation devices to be used:

- Intelligent optical smoke detectors, with continual monitoring for changes in sensitivity due to environmental accumulation of dirt, shall be generally used to cover all areas like offices, service areas, stores, etc.
- Manual alarm box installed at the control desk (monitor office) and manual fire alarm boxes (Locked Type) provided near each final exit door and every 60 m.
- Heat Detectors shall be used in kitchens/pantries and the like.
- Beam detectors which detect smoke in wide spaces. It shall be applied in wide areas within the hangars where detector beams are not intercepted by high moving structures like a crane or a plane.

- Air sampling detection system shall be utilized in wide areas within the hangar open areas where beam detectors can't be used. It is a technology which sniffs the air and analyzes the sample to detect any fire smoke residues above the average and provide necessary alarm when needed.
- Monitor modules monitoring the water flow and tamper switches shall be used at each sprinkler zone.
- Monitor modules monitoring the water flow switch at manual hose reel station.
- Notification shall be based on a positive alarm sequence and signals that is audible above the ambient noise level. Horns with strobe light shall be provided.