

**AIR TRAFFIC AND NAVIGATION SERVICES CO. LTD**

**REPUBLIC OF SOUTH AFRICA**



**REQUEST FOR PROPOSALS:**

**ATNS/FAOR/RFP0034/2024/2025/TWR CONSOLES**

**APPOINTMENT OF SERVICE PROVIDER TO SUPPLY, INSTALL  
AND COMMISSION TOWER (TWR) CONSOLES AT O.R. TAMBO  
INTERNATIONAL AIRPORT (FAOR).**

**VOLUME 2**

**TECHNICAL SPECIFICATIONS**

**November 2025**

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## TABLE OF CONTENTS

ABBREVIATIONS .....	4
1 GENERAL INSTRUCTIONS TO BIDDERS .....	5
2 SCOPE OF WORK .....	6
3 PRELIMINARY .....	6
4 SYSTEM DESCRIPTION .....	7
5 EXISTING CONSOLE LAYOUT .....	8
6 PROPOSED CONSOLES .....	8
6.1 Tower Equipment .....	8
6.2 Proposed Console Layout .....	10
6.3 Transition Principles .....	11
CHAPTER 1: TECHNICAL SPECIFICATIONS .....	13
1 CONSOLE SPECIFICATIONS .....	14
1.1 Supply, Delivery and Installation .....	14
1.2 Design Life .....	14
1.3 Material .....	15
1.4 Modularity .....	18
1.5 Ergonomics .....	19
1.6 Electrical .....	21
1.7 Disposal .....	22
1.8 Console Design .....	22
1.9 Adjacent Consoles .....	26
1.10 Flight Strip Board .....	26
1.11 Flight Strip Slider Track .....	29
1.12 Equipment Cabinets .....	31
1.12.1 General .....	31
1.12.2 Console Equipment Cabinet .....	34
1.12.3 Freestanding Equipment Cabinet .....	35
1.13 Freestanding General Use Cabinets .....	36
1.14 KVM Extenders .....	37
1.15 LED Desk Lamps .....	39
1.16 Auxiliary or Special Modules .....	40
1.16.1 1U Blank Panel Module .....	40
1.16.2 Emergency Very High Frequency (VHF) Radio (Dittel) module .....	41
1.16.3 T6 Controller Modules .....	42
1.16.4 Headset connecting ports module .....	43
1.16.5 Crash Alarm Module .....	44
1.16.6 File Storage Module .....	45
1.16.7 Fire Crash Alarm System Module .....	46
1.17 Cable Management .....	47

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1.17.1 Cable Routes.....	47
1.17.2 Cable Separation.....	48
1.17.3 Cable Routing Mechanism/s .....	48
1.17.4 Cable Supply .....	49
1.17.5 Raised Floor .....	50
<b>1.18 Display/Monitor Mounting Arm .....</b>	<b>51</b>
<b>1.19 VCCS Mounting Solution .....</b>	<b>54</b>
<b>1.20 Temporary Desks .....</b>	<b>55</b>
<b>1.21 Equipment required for Transition .....</b>	<b>57</b>
<b>2 TOWER CAB SPECIFICATIONS .....</b>	<b>58</b>
2.1 Tower Cab Consoles and Equipment Fitting Requirements .....	58
2.2 Flooring .....	59
2.3 Air Conditioning Ducting .....	62
2.4 Temporary Raised Floor .....	63
<b>CHAPTER 2: GENERAL SPECIFICATIONS .....</b>	<b>66</b>
<b>3 GENERAL SPECIFICATIONS .....</b>	<b>67</b>
3.1 Project Execution and Compliance .....	67
3.2 Console Mock Setup .....	68
Appendix A .....	69
VCS Components .....	69

**ABBREVIATIONS**

ACSA	Airports Company South Africa
ASMGCS	Advanced Surface Movement Guidance and Control System
ATC	Air Traffic Controller
ATNS	Air Traffic and Navigation Services
ATS	Air Traffic Services
ATSO	Air Traffic Service Officer
AWOS	Automated Weather Observing System
CAMU	Central Airspace Management Unit
CLD	Clearance Delivery
CNS	Communication, Navigation and Surveillance
DAID	Digital Airfield Information Display
DB	Distribution Board
EIA	Electronic Industries Association
FAOR	OR Tambo International Airport
GMC	Ground Movement Control
GPS	Global Positioning System
IEC	International Electrotechnical Commission
KVM	Keyboard, Video, Mouse
PDU	Power Distribution Unit
PVC	Polyvinyl Chloride
RWY	Runway
SABS	South African Bureau of Standards
SP	Spare
SUP	Supervisor
TWR-E	Tower-East
TWR-W	Tower-West
VCCS	Voice Communication and Control System
VCS	Voice Communication System
VESA	Video Electronics Standards Association
VHF	Very High Frequency

## 1 GENERAL INSTRUCTIONS TO BIDDERS

The Bidder shall submit all responses, diagrams, project management documentation and drawings according to the GENERAL INFORMATION AND INSTRUCTIONS TO BIDDERS document and in the English language.

To assist Bidders only, each paragraph or article has been appended throughout with the letters “(M)”, “(D)”, “(O)” or “(I)”, to indicate whether the requirement is **Mandatory**, **Desirable**, **Optional** or for **Information** only.

**ALL RESPONSES TO THE REQUIREMENTS IN THIS DOCUMENT SHALL BE PROVIDED AS FOLLOWS:**

BIDDERS SHALL RESPOND IN FULL TO EACH ITEM IN THE FORMAT PROVIDED AND REFERENCES (CHAPTER, SECTION, PAGE NUMBER, PARAGRAPH NUMBER) TO DOCUMENTS AND RELEVANT INFORMATION SUPPORTING THE RESPONSES SHALL BE INDICATED IN THE SPACE PROVIDED. THIS INFORMATION WILL BE THE **ONLY RESPONSE USED FOR THE EVALUATION AND ASSESSMENT**.

Responses, provided in the space allowed, that are not clear or inadequate or the lack thereof shall be interpreted as **“Not Compliant”** even though the compliance column is declared as “Comply” and/or the Bidder’s offer meets the requirement. Bidder’s shall ensure that each response correctly addresses the requirement stated. Responses not addressing the requirement of the specific paragraph shall be interpreted as **“Not Compliant”**.

Bidder’s shall declare compliance to each and every paragraph of this document in the column labelled “Compliance” as follows:

C:	fully compliant	=	2 points:
PC:	partly compliant	=	1 point;
NC:	not compliant	=	0 points.

Noted: Noted and accepted (applicable to paragraphs marked as “I”, not containing requirements)

Bidder’s shall, for paragraphs declared “PC” or “NC”, include a statement as to the nature of the variation and may additionally supply supporting information in the space provided to demonstrate how the proposal meets the needs of ATNS.

Paragraphs marked “(M)”, indicates that the requirement is mandatory and proposals not compliant with the requirement shall be disqualified for further evaluation.

Paragraphs marked “(D)”, indicates that the requirement is desirable, and the Bidder is expected to declare their level of compliance, formal response and reference supporting documents.

Paragraphs marked “(I)”, indicates that the requirement is for information, however the Bidder is still expected to respond and provide information if requested. Any information gathered herein may form part of the contractual terms.

Paragraphs marked “(O)”, indicates that the requirement is optional, and the Bidder may decide how to respond.

## 2 SCOPE OF WORK

The scope of this project includes the decommissioning, uninstalling, removal and disposal of the old technical consoles; and the design, manufacture, delivery, installation and commissioning of new technical consoles at the OR Tambo International Airport (FAOR) control tower. The FAOR Tower Consoles project caters for air traffic control tower consoles, equipment cabinets, auxiliary modules and minor tower cab refurbishments. These deliverables shall be environmentally friendly, durable with a design life of at least 10 years and functionally compliant to the specifications detailed herein. Other activities included in the scope of work includes electrical work, cable reticulation and transitional activities. The control tower consoles will be installed for the listed positions:

**Table 1: List of Positions**

AIRPORT	NUMBER OF POSITIONS	POSITIONS
OR Tambo International Airport	7	<ul style="list-style-type: none"><li>• Clearance Delivery (CLD)</li><li>• Ground Movement Controller (GMC)</li><li>• Tower Controller West (TWR-W)</li><li>• Tower Controller East (TWR-E)</li><li>• Supervisor (SUP)</li><li>• Spare (SP)</li><li>• Tower Assistant (ATSO)</li></ul>

## 3 PRELIMINARY

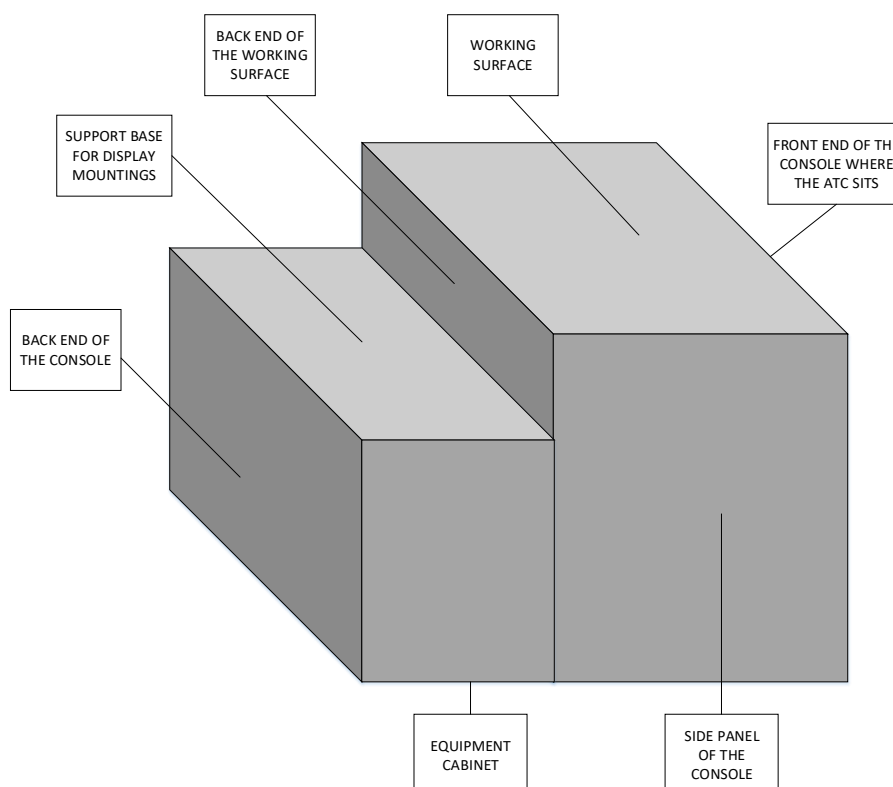
- A. The specification describes the requirement to design, manufacture, supply, deliver and install technical Air Traffic Control Tower Consoles, equipment cabinets and auxiliary modules at OR Tambo International Airport (FAOR) control tower. This project also includes the delivery and installation of supporting infrastructure (such as cables and cable trays) and performing of minor building refurbishments. Installation, transitioning and commissioning (ITC) plans for this project are critical due to 24-hour operational hours and high traffic volumes at FAOR.
- B. The specifications herein describe the structural and functional characteristics of the required technical consoles, equipment cabinets and auxiliary modules.
- C. Within this document:
- A console is defined as an ergonomically designed technical workstation, that allows Air Traffic Controllers to carry out their duties comfortably and efficiently. ATC consoles support ATC operations through strategic positioning of CNS and display equipment while ensuring that visibility to the runway and manoeuvring areas is not obscured.
  - An auxiliary module is defined as a structure or enclosure that accommodates, protects and provides mounting for equipment.

- Modularity is defined as the ability of a structure (e.g. consoles, console cabinet) to be dismantled or disassembled into smaller unit components or building blocks, i.e. legs, doors, surfaces etc.
- D. All technical drawings or diagrams provided within this document are for illustration or clarification of stated requirements and should not be interpreted otherwise.

## 4 SYSTEM DESCRIPTION

Consoles are used for organising the equipment and display screens used by Air Traffic Controllers. ATC consoles have the benefit of ensuring comfort and ergonomics for the ATCs in the operating position. The consoles replacement project accounts for the replacement of auxiliary items including equipment cabinet and auxiliary consoles modules.

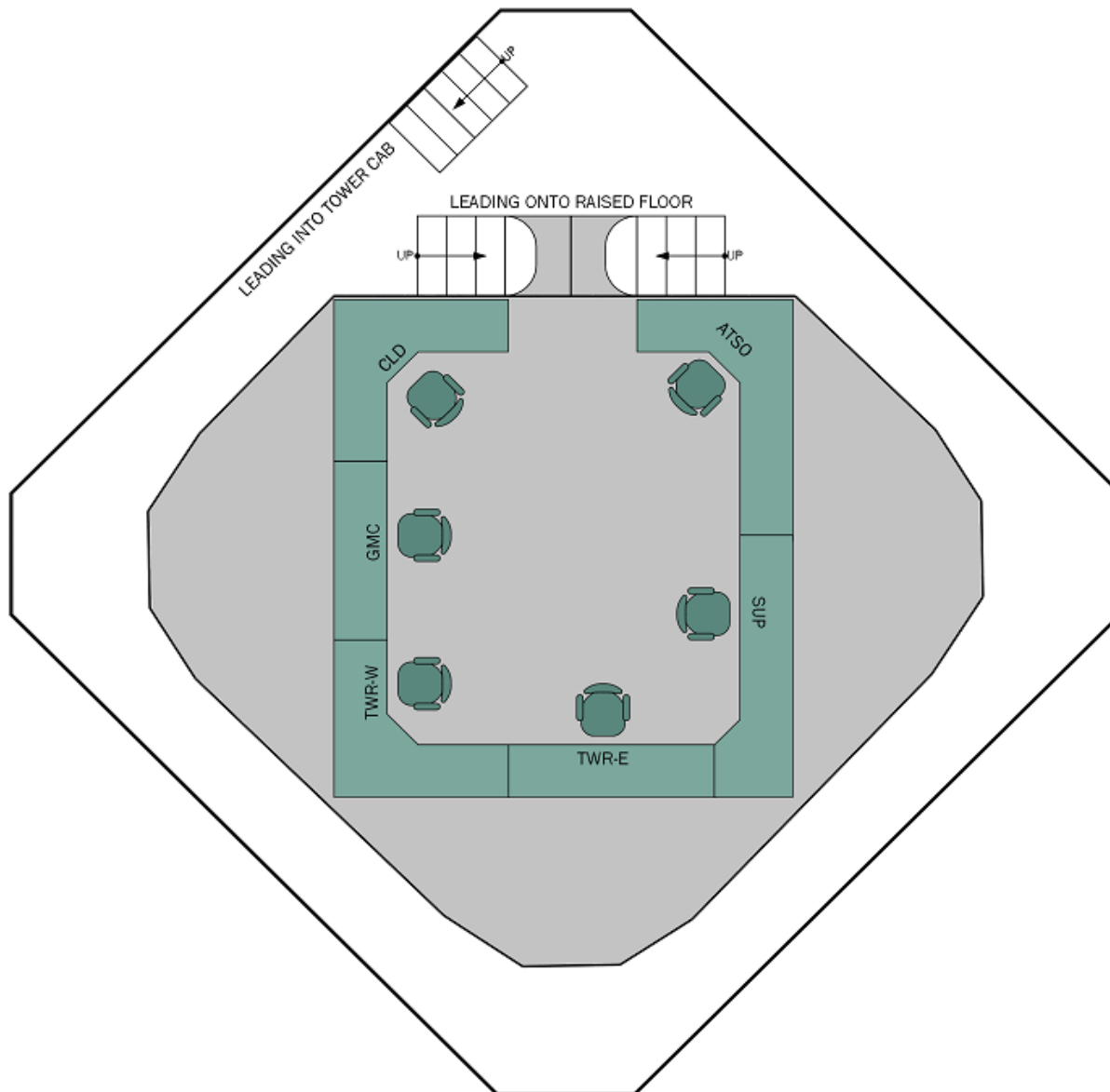
**Figure 1**, illustrates, for clarification purposes, the concept of a technical console. Various sections of the consoles are indicated as well e.g., the “working surface” and “support base” of the console. The Support base supports ATC equipment such as Personal Computers (PCs) and the Voice Communication System (VCS). The Work Surface is used for resting arms, writing, and accommodating reference manuals and other books used in operations. The section between the back end of the console and the back end of the working surface, below the support base forms the “equipment cabinet” section for equipment storage.



**Figure 1: Console terms of reference.**

## 5 EXISTING CONSOLE LAYOUT

The existing console layout is presented in **Figure 2**. The drawing is for illustrative purposes only and is not to scale.



**Figure 2. Existing Console Layout**

## 6 PROPOSED CONSOLES

### 6.1 Tower Equipment

The following equipment must be incorporated on the new consoles. Equipment that is marked with an asterisk (\*) is not currently installed but will be installed by ATNS in the future (not under this project) and must be accommodated by the new consoles.

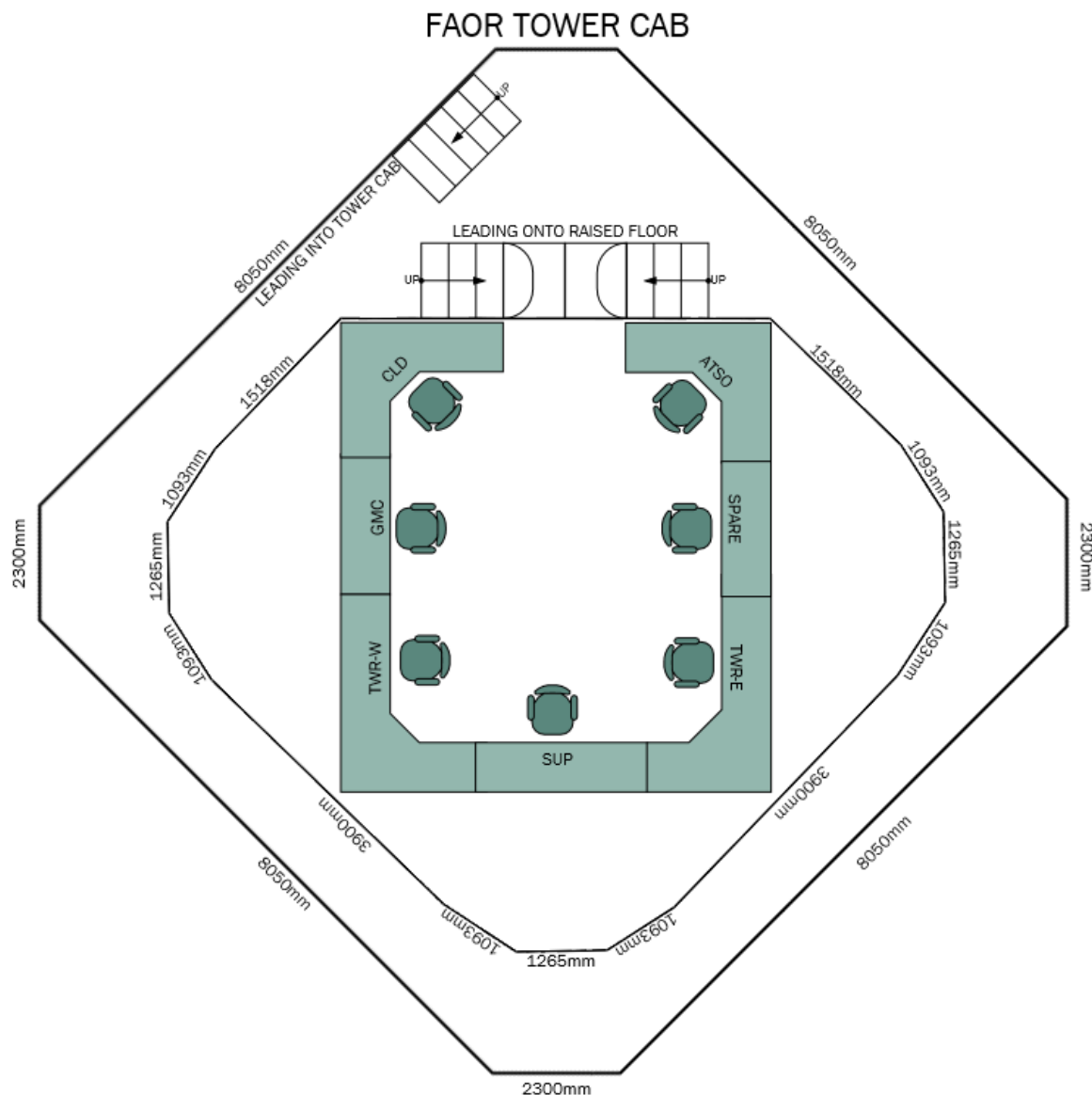
**Table 2. Equipment to be incorporated**

<b>GMC</b>	<b>TWR E</b>	<b>TWR W</b>	<b>CLD</b>	<b>ATSO</b>	<b>SUP</b>	<b>SP</b>
Topsky (24" Monitor, keyboard, mouse)	Topsky (24" Monitor, keyboard, mouse)	Topsky (24" Monitor, keyboard, mouse)	Topsky (24" Monitor, keyboard, mouse)	Topsky (24" Monitor, keyboard, mouse)	*Topsky (24" Monitor, keyboard, mouse)	*Topsky (24" Monitor, keyboard, mouse)
GPS clock	GPS clock	GPS clock	GPS clock	GPS clock	*GPS clock	*GPS clock
VCCS (14" Operator unit, handset, 2 x headset plugs+ 1 headset plug, speaker)	VCCS (14" Operator unit, handset, 3x headset plugs, speakers)	VCCS (14" Operator unit, handset, 3x headset plugs, speakers)	VCCS (14" Operator unit, handset, 3x headset plugs, speakers)	VCCS (14" Operator unit, handset, 3x headset plugs, speakers)	*VCCS (14" Operator unit, handset, 3x headset plugs, speakers)	
ASMGC-S (21" Monitor, rack mount PC, keyboard, mouse)	ASMGC-S (21" Monitor, rack mount PC, keyboard, mouse)	ASMGC-S (21" Monitor, rack mount PC, keyboard, mouse)			*ASMGC-S (21" Monitor, rack mount PC, keyboard, mouse)	*ASMGC-S (21" Monitor, rack mount PC, keyboard, mouse)
	DAID (AWOS) (19" monitor, keyboard, mouse)	DAID (AWOS) (19" monitor, keyboard, mouse)	DAID (AWOS) (19" monitor, keyboard, mouse)		*DAID (AWOS) (19" monitor, keyboard, mouse)	*DAID (AWOS) (19" monitor, keyboard, mouse)
RWY lighting (12" monitor)	RWY lighting (19" monitor)	RWY lighting (19" monitor)	RWY lighting (12" monitor)		*RWY lighting (19" monitor)	
Flight strip board	Flight strip board	Flight strip board x2	Flight strip board		*Flight strip board	*Flight strip board
Emergency VHF radio (Dittel)	Emergency VHF radio (Dittel)	Emergency VHF radio (Dittel)	Emergency VHF radio (Dittel)		*Emergency VHF radio (Dittel)	*Emergency VHF radio (Dittel)
Radio Control Unit (T6 Controller)	Radio Control Unit (T6 Controller)	Radio Control Unit (T6 Controller)	Radio Control Unit (T6 Controller)		*Radio Control Unit (T6 Controller)	*Radio Control Unit (T6 Controller)
Crash alarm	Crash alarm	Crash alarm			*Crash alarm	
Flight strip transfer rail	Flight strip transfer rail	Flight strip transfer rail			*Flight strip transfer rail	
Biometric Sign-On	Biometric Sign-On	Biometric Sign-On	Biometric Sign-On	Biometric Sign-On	*Biometric Sign-On	*Biometric Sign-On
		Flight Strip Printer	Flight Strip Printer	Flight Strip Printer		
	Stop Bar (14" monitor)	Stop Bar (14" monitor)			*Stop Bar (14" monitor)	
				DATIS PC (17" monitor, keyboard, mouse)		
				TWR Log PC (23" monitor)		

					*2x ATS Resource Tool PC's (20" monitors, keyboard, mouse)	
			CAMU PC (19" monitor, keyboard, mouse)	CAMU PC (17" monitor, keyboard, mouse)		
				Admin PC (20" monitor, keyboard, mouse)		
				Flight Strip Filer/ Storage box		

## 6.2 Proposed Console Layout

The control tower consoles shall make provision for six working positions (CLD, GMC, TWR W, TWR E, SUP and ATSO) and one spare (SP) position as indicated in **Figure 3**. This drawing is for illustrative purposes and is not to scale. The dimensions and layout of the tower cab must be verified at the first site visit.



**Figure 3. Proposed Consoles Layout**

### 6.3 Transition Principles

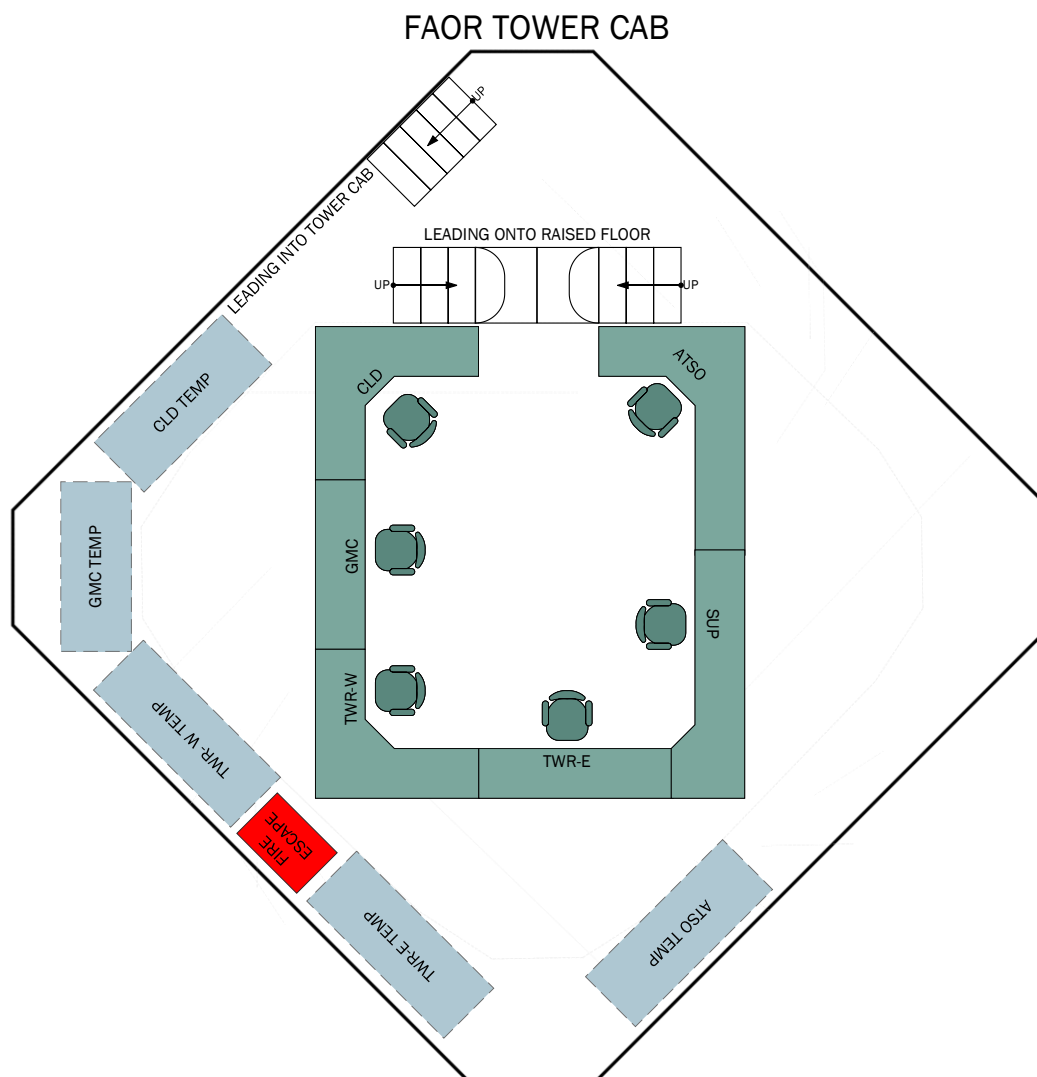
The transition from the old consoles to the new consoles shall be performed in line with the following transition principles:

- 1) New equipment cabinets and KVM extenders are installed in the equipment room on the second floor. Cables required between the equipment room and the tower cab are installed.
- 2) The floor around the existing raised floor is temporarily raised to the same level as the existing raised floor to create a seamless floor surface.
- 3) Temporary work surfaces are erected on the outer edge of the floor closer to the windows.
- 4) Equipment is moved and tested per position on the temporary work surface at night before the ATC/s is moved to their respective temporary position the next morning. Spare equipment

shall be used wherever possible. Once the ATCs are all moved, work may begin on the old consoles.

- 5) The existing consoles are disassembled, and cable management is performed within the permanent raised floor.
- 6) The floor tiles and vents of the original raised floor are replaced.
- 7) The new consoles are installed, and equipment is set up and tested per position at night. The ATC/s moves to the new console the next morning.
- 8) Once all the ATCs have been moved to the new consoles, the temporary work surfaces and temporary raised floor are removed.
- 9) The tiles in the rest of the tower cab are replaced.
- 10) Noise-sensitive tasks are performed only at night.

The preferred layout for the temporary positions is found in Figure 4.



**Figure 4. Preferred Temporary Layout**

# **CHAPTER 1: TECHNICAL SPECIFICATIONS**

## 1 CONSOLE SPECIFICATIONS

### 1.1 Supply, Delivery and Installation

- [A] The Contractor shall supply, deliver, and install the consoles and associated components as defined herein at the FAOR control tower. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.2 Design Life

- [A] The console and all auxiliary modules, components and equipment cabinets shall have a design life of at least 10 years. The Bidder shall provide supporting documentation, on all products or materials used, to support this statement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The console shall not incorporate any cut-outs or slots that will weaken its durability and longevity. The Bidder shall demonstrate on design documents that no cut-outs or slots are used. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The console shall not be drilled onsite to accommodate the installation of any components. The Bidder shall provide full details on how the installation of components will be achieved. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The consoles shall minimize the potential for damage of consoles including the chipping and structural stability of the consoles over the lifespan of the console. The Bidder shall provide full details on how the structural stability of the consoles is achieved by the proposed design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.3 Material

- [A] The consoles and auxiliary components shall be made of a material that is fire retardant, heat resistant, moisture-proof, durable, scratch resistant and hard wearing with the required design life of at least 10 years. The Bidder shall provide full details on the material/s; and supporting information to show that the material/s adheres to these requirements. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The consoles shall be water-resistant to withstand damage from spilt liquids. The Bidder shall provide full details on the material/s; and supporting information to show that the material/s adheres to these requirements. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] This material shall, as far as possible, be environmentally responsible and sustainable. The proposed material shall adhere to the following requirements:

- [a] Should the proposed consoles or auxiliary components be produced from wood, the Bidder shall provide a certificate from the Forest Stewardship Council (FSC) to show that the wood has been sourced from sustainable forest plantations. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	

<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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- [b] For any non-renewable material used, Bidders shall provide details of the suppliers' practices showing how their resource extraction and manufacturing processes have reduction measures in place to address environmental impacts. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [c] At least 50% of the consoles and auxiliary components shall be made from recycled content. Bidders shall provide supporting information indicating what percentage of the proposed consoles and auxiliary components will be manufactured from recycled materials i.e. wood, fabrics, metal and plastic, as well as organic wool and cotton that has been recycled. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [d] At least 50% of the consoles and auxiliary components shall be recyclable. Bidders shall provide supporting information indicating what percentage of the proposed consoles and auxiliary components will be recyclable. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [e] There shall be no toxic substances in the materials used (i.e. adhesives, paints with high volatile organic compound content, PVC, lead, etc.). The Bidder shall indicate compliance to this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>

[f] Flame retardant and solvent free materials shall be used. The Bidder shall indicate compliance to this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[g] Products that may result in indoor air pollution through chemicals that are emitted by processed materials and finishes shall not be used. The Bidder shall indicate compliance to this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[D] The console and all its supporting equipment and auxiliaries shall withstand and operate within specifications under the environmental conditions as stated below. The Bidder shall indicate any deviations from the conditions in Table 3. (D)

**Table 3: Environmental Conditions.**

METEOROLOGICAL VARIABLE	SPECIFICATIONS
Ambient Temperature	+5 °C to +35 °C (indoor) -10 °C to +50 °C (outdoor)
Relative humidity	≤ 95% for temperatures ≤ +35 °C (indoor) ≤ 60% for temperatures > + 35 °C (indoor) 1% to 100% (outdoor)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[E] The Bidder shall provide supporting information indicating how the console design shall minimise natural light and room light reflections taking into consideration the following: (D)

- [a] The tower cab experiences 10 to 15 hours of sunlight through large glass windowpanes.
- [b] The tower cab is well illuminated by electrical lighting.
- [c] The light emitted from multiple monitors which are used simultaneously.

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[F] The Bidder shall provide supporting information indicating how the working surface material shall support the operation of an optical mouse. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.4 Modularity

[A] A complete consoles design shall be modular to support installation and maintenance activities, and for ease of moving the console through passages and around corners. The Bidder shall (with their Bid) provide modular technical designs for the consoles and indicate how the following limitations of the access routes in the respective areas, are considered in their designs: The smallest access point is 800mm in width, 1800mm in height and 90-degree corners shall be assumed. The control tower can be accessed via a 2321mm x 2340mm elevator, then using stairs where 90-degree corners will need to be navigated. (D)

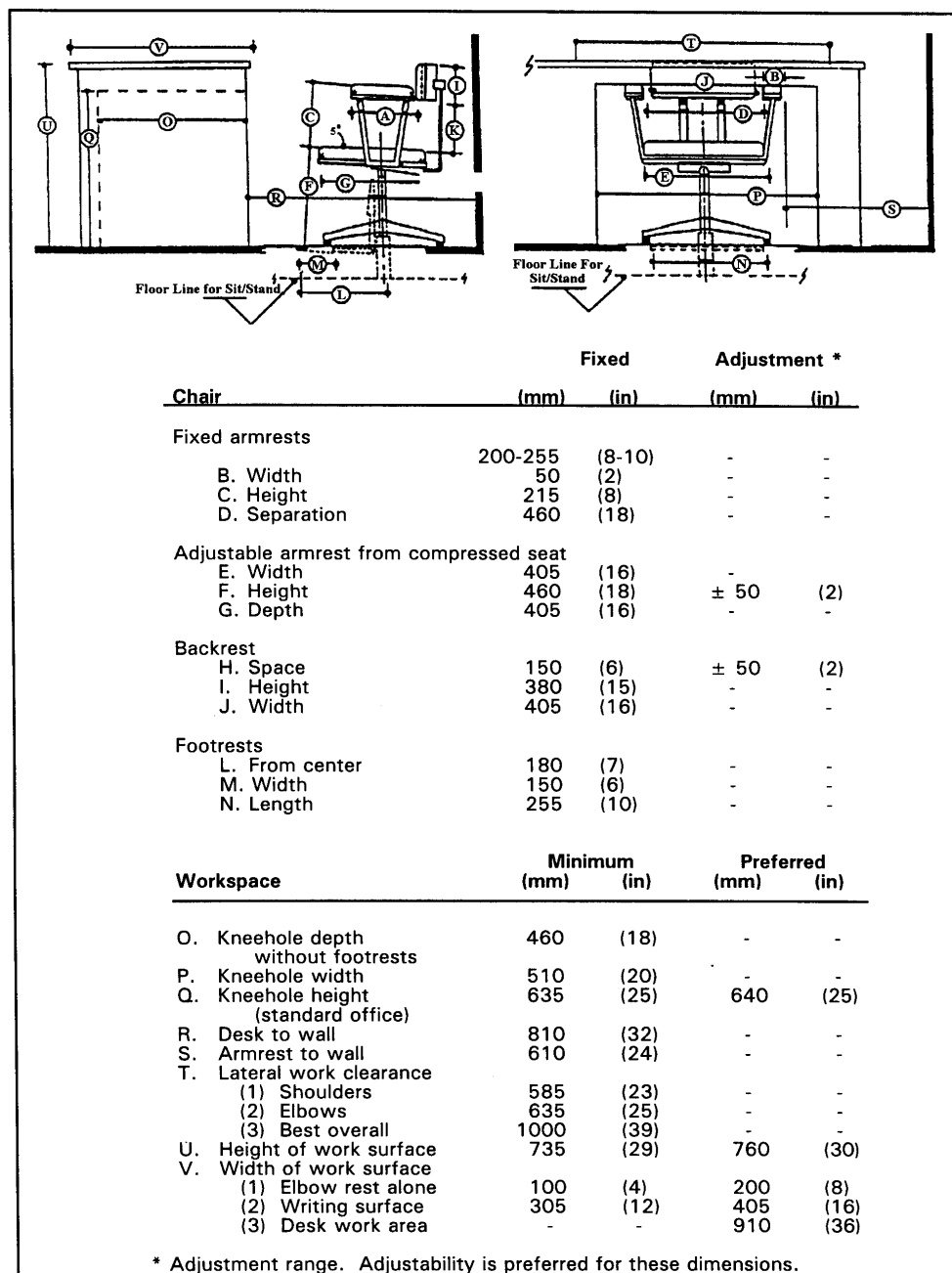
<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] The Bidder shall indicate the separate parts that make up the console in the technical drawings submitted with their Bid. The drawings shall highlight how the modular parts combine to form the complete console structure. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

## 1.5 Ergonomics

The following illustration is taken from the ATNS Ergonomic Specifications Manual.



- [A] Prior to the console being manufactured, the Contractor shall submit the final console design to ATNS for approval from the ATNS Human Factors department. The ATNS Ergonomic Specification Manual will be provided for console design reference. (I)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The Contractor shall ensure that the surfaces and edges of the consoles are smooth. The Bidder shall provide information indicating how this will be achieved. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The console shall have sufficient space available for leg room and essential equipment beneath the working surface on the console design. The minimum leg room dimensions are 460 x 510 x 740 mm (depth x width x height). The Bidder shall indicate the space available for leg room and essential equipment beneath the working surface on the console design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The Contractor shall ensure that the final design review includes a line-of-sight review to ensure that seated TWR Controllers and ATSO have unobstructed visibility of the manoeuvring area and apron as well as the circuit and final approach/take off sectors. Therefore, consoles should be designed such that equipment will be placed on the working surface in a manner which will promote unobstructed visibility. Equipment in the tower is to be housed inside the consoles or placed on lowered desktops that enable greater visibility of the manoeuvring area. (I)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
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<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
--

[E] The recommended equipment layout for the consoles is as follows:

- a. Primary equipment within 35-degree angle of controller position centreline
  - i. Flight Strip Board
  - ii. Weather Display
  - iii. Crash Alarm
  - iv. Telephones, VCS, Emergency Radios, Intercom (Fire)
  - v. Clock
  - vi. Binoculars
- b. Secondary equipment that are applied less frequently and placed within a 45-degree centreline of the seated controller position:
  - i. Storage bay for flight plan strips.
  - ii. Speakers
  - iii. Entrance control

The Bidder shall provide the proposed equipment layout for their Tower console designs. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.6 Electrical

[A] The Contractor shall issue a Certificate of Compliance (CoC) for FAOR Control Tower cab on completion of all electrical work associated with the project. The Bidder shall indicate compliance with the requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The console shall incorporate materials that are good insulators to minimize the occurrence of electrical shock. The Bidder shall provide details on materials that are not good insulators which are used in their design and indicate where in the design they are applied. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.7 Disposal

- [A] The existing consoles shall be uninstalled, disassembled, and disposed of in an environmentally friendly manner and in line with current environmental laws. Waste must be managed according to the ATNS waste management policies and there shall be adherence to the requirements of the National Waste Management Act (No.59 of 2008). The Bidder shall make provision for these activities in the project costing. A disposal certificate shall be issued to ATNS by the Contractor. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.8 Console Design

- [A] The Bidder shall provide project specific technical design/s of the consoles in the form of technical drawings with dimensions to demonstrate understanding of the requirements. The drawings shall highlight the shape/form of the console and include the dimensions of the console and must be submitted with the Bid. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The console shall allow for displays/monitors to be mounted such that the bottom of the display/monitor can be adjusted to be below the working surface. A seated controller, of average height (1,67m for men, 1,58m for women), shall be able to comfortably view the full display/monitor and the runway and manoeuvring areas. The Bidder shall provide drawings which demonstrate the minimum height at which the displays/monitors can be placed. The

drawings must be accompanied by calculations to support the measurements on the drawings.

(D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The space between the back end of the working surface and the back end of the console (refer to **Figure 1**) shall form an equipment cabinet as defined in Chapter 1, Section 1.12 and shall house the equipment and computers. The Bidder shall provide a detailed design for the equipment cabinet section including dimensions, cable routes and power distribution; and indicate the equipment cabinet section in the technical drawings for the proposed consoles submitted with their Bid. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The back end of the console (refer to **Figure 1**) shall be closed with panels that can be removed and placed back into position quickly and easily to allow for maintenance personnel to access the equipment and cables. The Bidder shall indicate in their proposal how this will be achieved.

(D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The back end of the working surface (refer to **Figure 1**) shall be closed and shall allow for cable entry points through brush panels or similar. The Bidder shall indicate in their proposal how this will be achieved. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	

<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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- [F] The Contractor shall participate in a Technical Design Review process with ATNS. On conclusion of this process, the Contractor shall provide to the Company the final technical drawings for the consoles, all auxiliary modules and cabinets, including all dimensions prior to commencement of the manufacturing process. Bidders shall indicate compliance with this requirement. (I)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [G] The Contractor shall provide manufacturing drawings as part of the deliverables. Bidders shall indicate compliance with this requirement and ensure that provision for this is made in the costing. (I)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [H] The console shall be stable after it has been assembled and all equipment has been installed. The console shall also provide stability for the displays and all other equipment such that it shall not shake if force is applied to the console. The Bidder shall provide details of how stability of the consoles and equipment is achieved by their proposed design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [I] The Bidder shall indicate the point loads for the console that will be in contact with the control tower cab floor on the technical drawings. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [J] Any reflections of the consoles onto the windows shall be mitigated through the console design. The Bidder shall indicate how the design of the proposed console mitigates reflections onto the tower cab windows. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [K] The consoles shall not incorporate devices that generate noise during operation. The Bidder shall provide supporting information indicating how the console and auxiliary equipment shall contribute minimal noise in the control tower cab to support clear communication and support acceptable noise levels for operations given that the threshold of unimpaired human hearing is 0dBA and typical sound level of normal conversation is 60dBA. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [L] The design and configuration of the console shall make provision for equipment cooling through venting to facilitate natural heat dissipation while minimising the ingress of dust. The Bidder shall indicate this on the technical design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [M] The Bidder shall provide supporting information indicating how the console and equipment cabinets (refer to Chapter 1, Section 1.12) shall have measures to minimise dust collection within equipment cabinets. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.9 Adjacent Consoles

[A] There shall be no gaps between the working surface of adjacent consoles. The Bidder's technical designs shall include "gap filler surfaces" which close any gaps between adjacent consoles such that the working surface between consoles is continuous. The gap filler surfaces shall connect only the working surface portions of the adjacent consoles. The Bidder shall indicate the gap filler surface in the technical drawings for the proposed consoles. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] The gap filler surface between adjacent consoles shall be designed such that the space beneath it is completely unobstructed for the seated controller. The Bidder shall indicate the gap filler surface in the technical drawings for the proposed consoles. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.10 Flight Strip Board

A flight strip board serves as a placement for flight strip holders. The strip board comprises of 3 columns. Each column consists of two 9mm cylindrical rods placed 83 mm apart. The flight strip board columns are carefully separated to allow a perfect fit of flight strip holders. The height of the flight strip board is approximately 25 mm. A side view and a bottom view of a flight strip holder is presented in **Figure 5**. **Figure 6** provides a picture of a typical operations flight strip board/s.

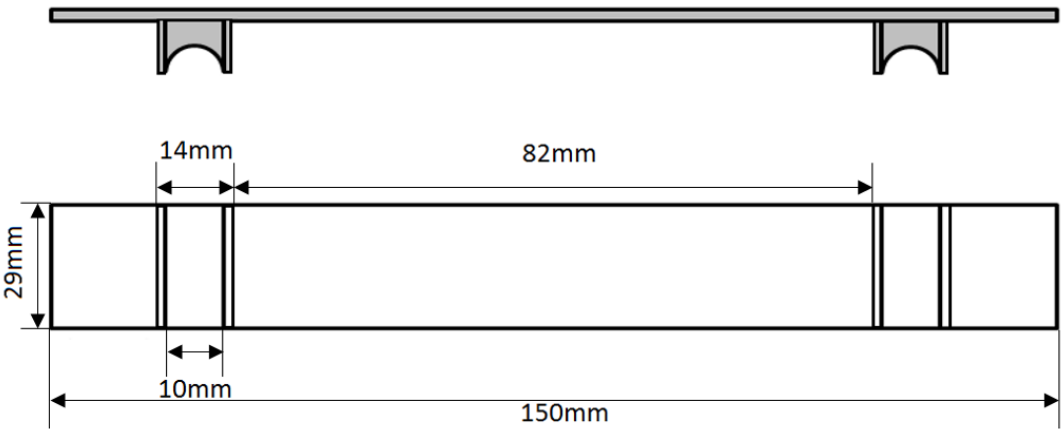


Figure 5: Flight strip dimensions for flight strip board

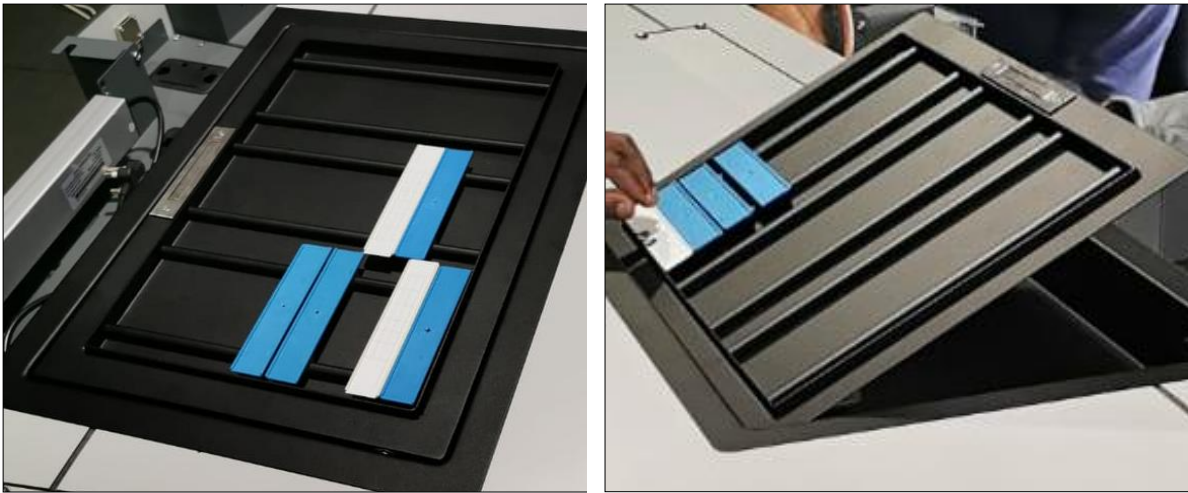


Figure 6: Typical operations flight strip board/s

[A] The flight strip board shall have a length to fit at least 10 flight strips in a column and a width that allows three flight strips to fit side by side with a 10mm gap between each adjacent strip holder. The minimum length and width of the recess in the flight strip board shall be 300mm and 470 mm respectively. The Bidder shall provide a technical design of a flight strip board indicating these dimensions with their Bid. The Contractor will be provided with a sample flight strip holder to confirm the correct dimensions when finalizing the design of their flight strip board. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

- [B] The angle of the top surface of the flight strip board shall be adjustable within a range of 0 to 45 degrees. The flight strip board shall have a locking mechanism to keep the flight strip board at the desired angle. The Bidder shall explain how this will be achieved and provide technical designs which indicate how the proposed solution complies with the requirements. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The flight strip board shall be recessed into the console such that it is flush with the surface directly in front of the controller. The flight strip board shall be fixed such that there is sufficient space behind it to fit a keyboard. The flight strip boards may only be used for a portion of the entire life span of the console due to pending system upgrades which may require them to be removed. The console shall be restored once the flight strip board is removed i.e. watertight sealing of any holes or cut-outs made for the flight strip board such that the working surface is smooth and continuous without gaps. Any hardware that is required to achieve this (rubber seals, gap filler, etc.) shall be provided under this project. Drilling into the console on-site will not be acceptable. The exact position of the flight strip board on the console will be determined during the final design as it needs to be ergonomically placed. The Bidder shall explain in detail how this requirement is met by their proposed design, including any hardware proposed to restore the console should the flight strip board be removed. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The Contractor shall supply flight strip boards as follows:

- i. 1 (one) for CLD
- ii. 1 (one) for GMC
- iii. 1 (one) for TWR-E
- iv. 2 (two) for TWR-W
- v. 1 (one) for SUP
- vi. 1 (one) for SP

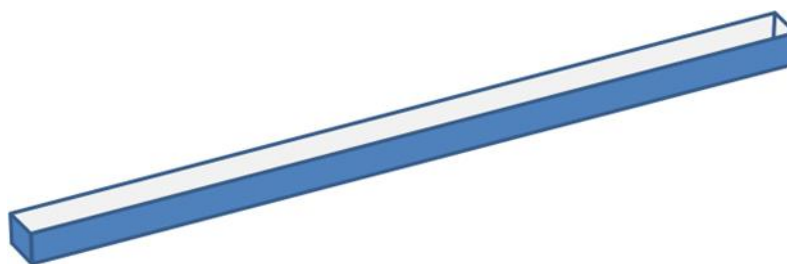
The Bidder shall indicate compliance to this requirement and make provision for the flight strip boards in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

### 1.11 Flight Strip Slider Track

The controllers are required to exchange information in the form of flight strips attached to a flight strip holder. A flight strip slider track is a narrow rectangular track that allows a flight strip holder to slide/run within it after a mere push, in the direction of the pushing force. **Figure 7** below gives an example of a flight strip slider track as described above.



**Figure 7: An example of a flight strip slider track**

- [A] The console design for two adjacent consoles shall incorporate a flight strip slider track that will allow for exchange of flight strip holders between two adjacent positions. The design of the flight strip slider track should take into consideration the gap-filler surface between two adjacent consoles, the relative physical distance between the two consoles and its reachability by a sitting controller on either position. The depth of the flight strip slider track shall be able to accommodate a flight strip holder. Details of the flight strip holder can be found under Chapter 1, Section 1.10. The Bidder shall provide a technical design of the flight strip slider track as a demonstration of their understanding of the requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

- [B] The flight strip slider track shall be attachable and detachable from the consoles or gap filler surface it attaches to. Drilling into the console on-site will not be acceptable. The Bidder shall explain how this requirement is met by the proposed solution. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
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<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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- [C] Consoles must be protected against wear and tear when installing and removing the flight strip slider track. The Bidder shall explain how this requirement is met by the proposed solution. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
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<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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- [D] The flight strip slider track depth shall be such that the flight strip holders can run or slide freely through it without falling out of the track. However, it shall also allow for ease of placement and removal of flight strip holders from it. The Bidder shall explain how this requirement is met by the proposed solution and indicate the depth of the track in the technical drawings. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
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<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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- [E] Five flight strip slider tracks will be required as follows:

- i. One between the CLD and GMC positions.
- ii. One between the GMC and the TWR-W positions.
- iii. One between the TWR-W and TWR-E positions across the SUP position.
- iv. One between the SUP position and the Spare position.
- v. One between the temporary TWR-W and TWR-E positions during the transition period.

The Bidder shall indicate compliance to this requirement and make provision for the tracks in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
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<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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## 1.12 Equipment Cabinets

### 1.12.1 General

- [A] The equipment cabinet shall cater for 19-inch based rack mountable equipment by complying with the Electronic Industries Association (EIA) standard EIA-310 for a standard rack. The Bidder shall provide technical designs with dimensions for all proposed equipment cabinets (including all components such as panels, doors, cable management, static switches, rotary isolators, PDU's, earth bars, sliding mechanism and equipment racks/ trays, etc.) with their Bid.
- (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The equipment within the cabinets shall be easily accessible from the front and back of the cabinet for maintenance activities. The front and back of the cabinets shall be closed with panels that can be removed and placed back into position quickly and easily to allow for maintenance personnel to access the equipment and cables. The Bidder shall indicate the panels in the technical designs and explain how the design of the proposed equipment cabinets meets this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The equipment cabinets' doors shall be perforated to permit sufficient air flow in and out of the equipment cabinets. The Bidder shall indicate compliance to the requirement and indicate the perforated doors on the technical designs. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The equipment cabinets' front and back doors shall be lockable. The lock shall cater for a master key. Padlock locking mechanisms are not acceptable. The Bidder shall include details of the proposed locking mechanism and indicate the lock on the technical designs. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The Bidder shall provide supporting documentation/information detailing how the equipment cabinet design shall cater for natural heat dissipation to prevent heat build-up within the cabinet. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [F] The equipment cabinet shall have a cable management system. The cable management system shall take into consideration the cable route as defined herein and the sliding in and out of equipment from the equipment cabinets. The Bidder shall indicate the cable management system in the technical designs and shall explain how this requirement is met by the proposed design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [G] The Bidder shall explain how the equipment cabinet design caters for noise suppression. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [H] The Contractor shall supply each equipment cabinet/ controller position with a static switch to connect the main and standby power supply, and a rotary isolator to isolate power during maintenance activities. The Bidder shall indicate the static switches and rotary isolators in the technical designs and provide full details on the proposed static switches and rotary isolators in the form of technical datasheets. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [I] The Contractor shall ensure that each equipment cabinet is connected to an earth bar that is connected to the site earth. All equipment shall be appropriately earthed. The Bidder shall provide full details on the earth bar and earthing methods for the proposed cabinets. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [J] The consoles shall be fitted with surge protected Power Distribution Units (PDU) as follows. Each PDU shall have at least ten (10) International Electrotechnical Commission (IEC) C13 sockets and at least two (2) IEC Type C (Europlug/Two pin plug) sockets. There shall be four (4) PDU's supplied per position. Three (3) PDU's shall be mounted inside the console equipment cabinet and one PDU shall be delivered as a spare. There shall be two (2) PDU's installed inside each freestanding equipment cabinet defined in Chapter 1, Section 1.12.3. An example of the PDU with C13 sockets is shown in **Figure 8**. Bidders shall provide details of the PDU to be used and indicate the PDU's in the technical designs. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [K] The PDU's shall not obstruct access to equipment. The Bidder shall indicate the PDU's in the technical drawings for the equipment cabinets. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>

[L] The PDU’s shall be connected to the mains supply at the tower cab and the mains supply in the equipment room respectively. The Contractor shall be responsible for supplying the cabling and connecting the PDUs to the mains supply. The Bidder shall indicate compliance with this requirement. (D)



**Figure 8: Example of an IEC power distribution unit with C13 sockets.**

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

1.12.2 Console Equipment Cabinet

[A] The console equipment cabinet shall be the same length as the console working surface and the depth shall be at least 650mm. The height of the equipment cabinet will be determined by the requirements for the display/ monitor mounting arm requirements defined in Chapter 1, Section 1.18. The Bidder shall provide technical design for the proposed cabinet including dimensions. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] Each rack shall have two (2) heavy-duty trays and sliding mechanisms that accommodate equipment with a height of 4U, and one (1) fixed tray to accommodate equipment with a height of 2U. The remaining space in the cabinet shall be rack mountable. The heavy-duty sliding trays and mechanisms shall allow technicians to slide/draw out equipment from the equipment

cabinets beyond the edge of the equipment cabinets for maintenance activities. The Bidder shall provide full details on the heavy-duty sliding trays and mechanisms, and rack mounting capability. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.12.3 Freestanding Equipment Cabinet

Equipment (computers and servers) will be moved from the tower cab to the equipment room on the second floor of the FAOR control tower.

- [A] The Contractor shall provide two (2) equipment cabinets to house the equipment in the equipment room on the second floor of the control tower. The Bidder shall provide full details on the proposed freestanding equipment cabinet including technical designs and make provision for them in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The equipment cabinet shall have a minimum height of 1800mm and a maximum height of 2260mm including the feet, and a depth of 830mm. The Bidder shall provide full details on the dimensions of the cabinet in the technical design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The equipment cabinet shall have double doors that meet in the centre of the cabinet to comply with space constraints. The Bidder shall indicate the cabinet doors in the technical design to demonstrate how the cabinet doors meet this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
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<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>

- [D] Each equipment cabinet shall incorporate eight (8) heavy duty sliding trays and mechanisms spaced 4U apart (to accommodate server computers) that will allow technicians to slide/draw out equipment from the equipment cabinets beyond the edge of the equipment cabinets for maintenance activities. The remaining space in the equipment cabinet shall be rack mountable. The Bidder shall provide full details on the heavy-duty sliding trays and mechanisms and rack mounting capability. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.13 Freestanding General Use Cabinets

- [A] The Contractor shall provide three (3) freestanding general use cabinets that fit under the working surface of the console. One will be place on the right side of the ATSO position and one will be places on the right side of the SP position; these will be used to store stationery headsets and other office items. One cabinet will be placed on the right side of the CLD position and will be used to store training log files. The cabinets shall be of the same quality and aesthetics as the consoles. The Bidder shall provide a technical design for the freestanding general use cabinets including dimensions. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The dimensions of the cabinets shall be 400mm (width) x 500mm (height) x 500mm (depth). The Bidder shall provide full details on the dimensions of the freestanding general use cabinets in the technical design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	

<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
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[C] The cabinets shall comprise of three (3) equal sized pull-out drawers with handles, that are on sliders. The Bidder shall indicate the pull-out drawers in the technical design for the cabinet and provide full details on the proposed handles and sliders. (D)

COMPLIANCE (C/PC/NC/Noted)	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[D] Each cabinet shall have one locking mechanism that locks all the drawers with a key. Padlock locking mechanisms are not acceptable. The Bidder shall provide full details on the proposed locking mechanisms. (D)

COMPLIANCE (C/PC/NC/Noted)	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[E] The cabinets shall rest on 4 (four) 360-degree swivel wheels that are lockable. The Bidder shall provide full details on the proposed swivel wheels and indicate the wheels on the technical design. (D)

COMPLIANCE (C/PC/NC/Noted)	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

1.14 KVM Extenders

[A] High resolution optical fibre KVM extenders shall be supplied and used to relocate eight (8) pieces of equipment as listed in **Table 4** from the tower cab to the equipment room on the second floor of the FAOR control tower. The distance that the extenders shall cover is at least 100m. The Bidder shall provide full details including technical datasheets/ specifications on the proposed optical fibre KVM extenders. (D)

Table 4. Equipment to be relocated

	EQUIPMENT TYPE	POSITION
--	----------------	----------

1	ASMGCS	SUP
2	ASMGCS	SP
3	ASMGCS	TWR E
4	DAID	TWR E
5	DAID	TWR W
6	DAID	ATSO
7	DAID	SUP
8	DAID	SP

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] Sixteen (16) KVM extenders shall be supplied by the Contractor to accomplish the relocation. The Bidder shall indicate compliance with this requirement and make provision for the KVM extenders in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The KVM extenders input and output ports shall include VGA, HDMI, Ethernet and at least two (2) USB. The Bidder shall provide full details on the input and output capabilities of the proposed KVM extenders. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] Eight (8) of the KVM extenders shall be installed in the freestanding equipment cabinet in the equipment room, and the remaining eight will be installed in the tower consoles at the respective positions. The Bidder shall provide a layout diagram that shows how the KVM extenders will be connected to the equipment. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The KVM extenders shall not introduce any noise/ interference or latencies on the systems which they are connected to. The Bidder shall provide supporting documentation/ information detailing how the proposed KVM extenders meet this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [F] Four (4) 24-port fibre patch panels and four (4) 24-port brush panels shall be provided by the Contractor for the optical fibre connections to the KVM switches. Two (2) patch panels and two (2) brush panels shall be installed in the equipment room; and two (2) patch panels and two (2) brush panels shall be installed in the tower cab. The fibre patch panels shall support multi-mode fibre. The Bidder shall make provision for the proposed fibre patch panels and brush panels in the pricing schedule and provide full details on the proposed fibre patch panels and brush panels. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.15 LED Desk Lamps

- [A] The Contractor shall supply an LED Desk lamp shall be provided for each position. The desk lamp shall have adjustable brightness and height. The Bidder shall provide a technical datasheet for the proposed desk lamps which shows adjustable brightness and height. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The light wattage shall be at least 5W. The Bidder shall provide a technical datasheet for the proposed desk lamps which shows the light wattage. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The cable for the desk lamp shall run through flexible gooseneck tubing. The Bidder shall provide supporting information to prove compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.16 Auxiliary or Special Modules

Table 5 below tabulates all the modules to be supplied along with the consoles and their features.

**Table 5: Consoles associated modules and their features.**

MODULE	FEATURE
1U Blank Panel module (1.16.1)	Accommodates a 1U blank panel
Emergency VHF Radio module (1.16.2)	Accommodates the Dittell radio used for operations support and/or emergency cases.
T6 Controller Module (1.16.3)	Accommodates the T6 controller used for operations support and/or emergency cases.
Headset connecting ports module (1.16.4)	Accommodates the headset connecting ports or plug-ins.
Crash Alarm Module (1.16.5)	Accommodates the crash alarm button.
Filing Storage Module (1.16.6)	Accommodates files.
Fire Crash Alarm System (1.16.7)	Accommodates the fire crash alarm system.

### 1.16.1 1U Blank Panel Module

- [A] The Bidder shall provide each position with a module fitted with a 1U blank panel. This module may be used to mount any buttons or equipment which may be added to the tower in the future. The dimensions of the module shall be at least 400mm x 350mm x 44.45mm (width x depth x height). The Bidder shall provide a technical design for the 1U blank panel module. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

1.16.2 Emergency Very High Frequency (VHF) Radio (Dittel) module

[A] The Contractor shall provide Emergency VHF Radio module to accommodate a mobile Dittel radio with dimensions 270mm x 80mm x 280mm (width x depth x height). The VHF radio is shown in **Figure 9**. The Bidder shall provide a technical design of the Emergency VHF radio module to show compliance with this requirement. (D)



Figure 9: VHF Radio.

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[B] The preferred location for the Emergency VHF radio module is behind the working surface area (the portion of area separating the support base and the working surface) on the right-hand side of the console relative to the controller position or on the side (left end or right end) of the console. However, if the Emergency VHF module is placed at the former location, the distance of a mounted display/monitor relative to the module’s position should be considered. The Emergency VHF radio module must be within an arm’s reach of the controller and located in such a way that the controller can switch it on, use the microphone and adjust the frequency without removing the radio from the module/ bracket. The Emergency VHF radio module shall allow for the ease of removal and placement of the mobile Dittel within the module for evacuation purposes. The areas of contact for the Emergency VHF radio module shall be protected from wear and tear. The Bidder shall explain how the proposed module complies with the requirement. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[C] The Contractor shall provide Emergency VHF radio modules per position in accordance with **Table 2**. The Bidder shall indicate compliance with this requirement and make provision for the modules in the pricing schedule. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

1.16.3 T6 Controller Modules

[A] The Contractor shall provide T6 controller modules to accommodate a T6 controller with dimensions width 225mm, height 120mm, depth 165mm. The T6 controller is shown in Figure 10. The Bidder shall provide a technical design of the module to show compliance with this requirement. (D)



Figure 10 T6 controller

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

- [B] The T6 controller modules must be within an arm's reach of the controller and located in such a way that the controller can switch it on, use the microphone and adjust the frequency without removing the radio from the module/ bracket. The Bidder shall explain how the proposed module complies with the requirement. (D)

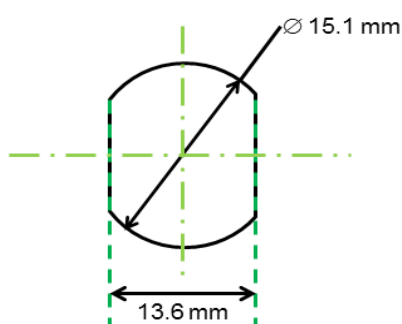
<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The Contractor shall provide T6 controller modules per position in accordance with **Table 2**. The Bidder shall indicate compliance with this requirement and make provision for the modules in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.16.4 Headset connecting ports module

- [A] The headset connecting ports module shall cater for three headset connecting ports. The three ports are for the ATC on position, a supervisor and an observer or student. The cut-out for a single headset/ audio connecting port is illustrated in **Figure 11**. The Bidder shall provide the technical design including dimensions of the headset connecting ports module. (D)



**Figure 11: Headset/ audio connecting port dimensions.**

- [B] The Contractor shall provide and install two headset connecting ports modules for each console. The headset connecting ports modules will be positioned beneath the console's working surface, one on the left side and the other on the right side in relation to the centre.

These stated positions shall be optimized in consideration of the mobility of controller knees and/or legs. The Bidder shall indicate the proposed positions of the headset connecting ports modules on the console technical design. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[C] The Bidder shall provide a proposal for the installation of the headset connecting port modules onto the console while taking the following factors into consideration: (D)

- a. The cable management system of the console;
- b. The modules shall remain fixed in position until the end of life of the console; and
- c. Drilling into the console on-site will not be acceptable.

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.16.5 Crash Alarm Module

[A] The Contractor shall supply and install crash alarm modules that shall accommodate the crash alarm buttons as indicated in **Table 2**. The Bidder shall provide a technical design including dimensions for the crash alarm module. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] The crash alarm module shall be mounted on the console within an arm's length from the controllers seated position. The Bidder shall provide full details on how the crash alarm modules will be mounted on the consoles. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[C] The crash alarm module shall cater for the wiring of the crash alarm button. The Bidder shall indicate how this requirement is met in the technical design for the crash alarm module. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

1.16.6 File Storage Module

[A] The Contractor shall supply and install two (2) desktop filing storage modules for the left and right side of the SUP position. The dimensions for the file storage module are 420mm (height) x 450mm (width) x 300mm (depth). A proposed conceptual design for the module can be found in **Figure 12**. This drawing is for illustration purposes and is not to scale. The Bidder shall provide a technical design including dimensions for the proposed file storage module and shall make provision for the modules in the pricing schedule. (D)

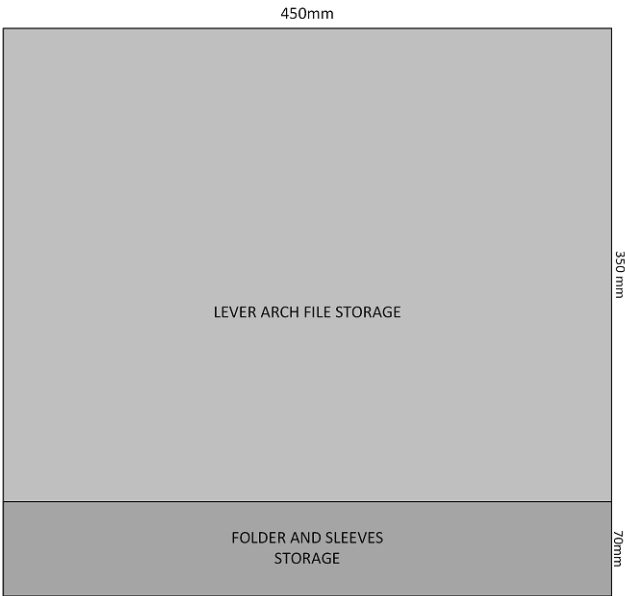


Figure 12. File storage module

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[B] The modules shall each provide side-by-side vertical storage for five (5) A4 lever arch files with a space for project folders and plastic sleeves below. The standard dimensions of a level arch

file are 320mm (length) x 285mm (depth) x 85mm (width at the spine). The Bidder shall indicate compliance with this requirement and include all dimensions on the technical design for the proposed file storage module. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

1.16.7 Fire Crash Alarm System Module

[A] The crash alarm module shall accommodate the fire crash alarm system depicted in **Figure 13** and shall be placed between the ATSO and SP position. The Bidder shall provide a technical design including dimensions for the Fire Crash Alarm System Module. (D)

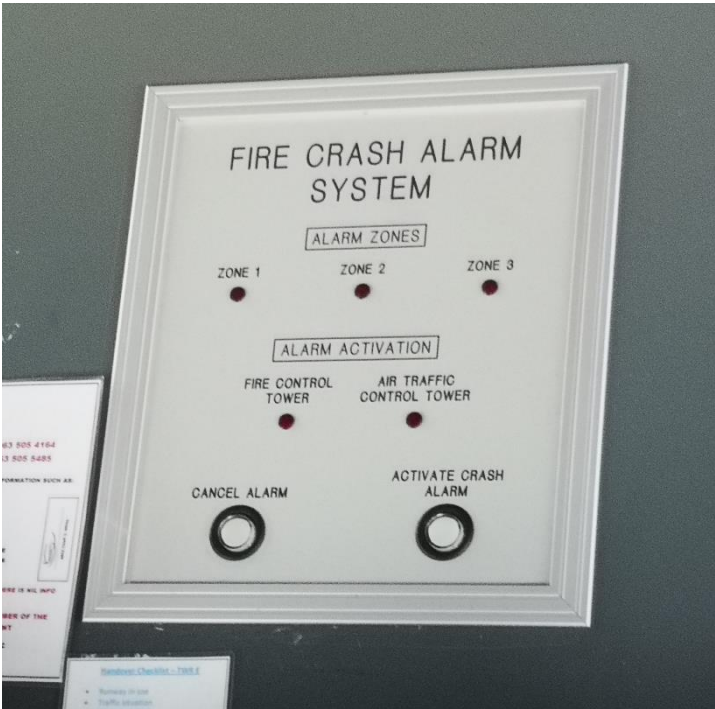


Figure 13. Fire crash alarm system

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[B] The dimensions of the fire crash alarm system module shall be 250mm x 220mm x 120mm (length x width x depth). The Bidder shall indicate all dimensions on the technical design for the module. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 1.17 Cable Management

### 1.17.1 Cable Routes

Cabling for equipment will be routed through the raised floor. There are feeder holes running through the floor at various positions for connections to the equipment room on the second floor of the control tower. The cabling will then be routed to the console's working surface (to modules, mouse and keyboards) or the console's support base (to display/monitor mounting arms and monitors/displays) or the equipment cabinets (to desktop computer towers). In principle cables shall be routed to any of the following termination points, through any of the following passage/midway points and from any of the following entry points:

- Console working surface,
- Console support base,
- Monitor/display mounting arm/s,
- Equipment cabinets,
- Auxiliary modules, and
- The raised floor.

[A] The cable management system of the consoles, equipment cabinets and auxiliary modules shall account for the cable route defined above. The Bidder shall define and provide the design of the cable management system for the consoles and associated modules as required. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] The heavy-duty sliding trays and mechanism in the equipment cabinets; and the sliding movement of equipment shall be accommodated by the cable management system. The Bidder shall explain how the requirement is met by the proposed solution. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
-----------------------------------	--

<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>

- [C] The cable management system shall ensure that cables are directed through the necessary channels or routing mechanisms, in an organised manner, without congesting the route. The cable routes of the cable management system should allow for flexible routing. The Bidder shall explain how the requirement is met by the proposed solution. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] ATNS preference is for brush panels or similar instead of open cable entry/exit points. The Bidder shall provide a design for cable entry/exit points and indicate how it will decrease the ingress of dust within the console. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.17.2 Cable Separation

- [A] The incorporated cable management system shall separate power cables and communication cables. The Bidder shall highlight how the cable management system will ensure separation of power cables from communication cables. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.17.3 Cable Routing Mechanism/s

- [A] There shall be a cable routing mechanism/s for the cable management system that allows for easy access to routed cables and for installation of new cables. The Bidder shall provide full technical details of the proposed cable routing mechanism/s. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The capacity of the cable routing mechanism/s shall take into consideration the quantity of equipment (current and anticipated) per controller position. It can be assumed that each equipment will have at minimum two cables (one for power and one for communication) connecting to it. The Bidder shall provide the maximum number of cables a particular cable routing mechanism can handle. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.17.4 Cable Supply

- [A] The current cable layout of the equipment on the console may change with the design of the new consoles. Subsequently, some of the existing cables may be too short for the new cable layout and will need to be replaced. The Contractor shall supply the cables and interfaces listed below. Bidders shall make provision for these cables and interfaces in the pricing schedule. Labelling of the cables shall also be catered for. (D)

- [a] 1500m of UTP CAT 6 cable
- [b] Fifty (50) x RJ45 plugs
- [c] 100m of surfix 2 core and earth power cable (This does not include the power cables needed to connect the PDUs to the mains DB)
- [d] Forty (40) x 10m long C13 to C14 power cables
- [e] Forty (40) x 10m long C5 to C14 power cables.
- [f] Forty (40) x 10m long USB to USB cables
- [g] Forty (40) x 10m long VGA to VGA cables

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] The fibre optic KVM extenders shall be connected to the fibre patch panels in the respective rooms. The fibre patch panels shall be connected via the fibre optic cables that shall be supplied and installed by the Contractor, between the tower cab and the equipment room on the second floor of the control tower, under this project. The Bidder shall provide full details on the fibre optic cables and the splicing that is required; and make provision for them in the pricing schedule. (D)

[a] Two (2) x 150m long 48 core multimode fibre optic cable.

[b] The fibre optic cable shall be protected by cladding.

[c] Splicing of the fibre optic cables for the patch panels is required.

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

#### 1.17.5 Raised Floor

[A] The transition from the old consoles to the new consoles involves the movement of equipment and old cables, and installation of new cables which requires management of the cabling within the raised floor. Cable management shall be performed by the Contractor under the instruction and supervision of ATNS technical services during this project. The Bidder shall indicate compliance with this requirement and ensure that cable management activities within the raised floor is accommodated in the project schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[B] Old cabling that is present underneath the raised floor but is not connected to any equipment shall be removed by the Contractor under the instruction and supervision of ATNS technical services during this project. The Bidder shall indicate compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.18 Display/Monitor Mounting Arm

- [A] The Contractor shall supply and install display/monitor mounting arms that shall support a weight of at least 16 kilograms and be able to carry two 24-inch display/monitors side-by-side for the full life span of the console. The Bidder shall provide a technical design and full technical specifications of the display/mounting arm. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The display/monitor mounting arm shall consist of three major parts, namely; a horizontal arm, a vertical arm and a mounting adapter. The horizontal arm shall allow for backward and forward adjustment. The vertical arm shall allow for upward and downward adjustment. The mounting adapter shall allow for a 30 degrees tilt in all directions with regards to its central point. The tilting adjustment shall be designed in such a manner that the displays/monitors do not tilt unless intentional force is applied. The Bidder shall provide supporting information/documentation to demonstrate how compliance with this requirement is met. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The vertical and horizontal adjustments of the display/monitor mounting arm parts as defined above shall be lockable. This means that the display/monitor mounting arm shall allow for locking of its positions after an adjustment (horizontal or vertical) is completed. The Bidder shall provide the description and technical design of the locking mechanism for the horizontal and vertical adjustments. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] There shall be sufficient clearance between the vertical arm and the back end of the working surface such that the bottom edge of the displays/monitors do not rest on or collide with the working

surface of the console. This will allow for the bottom bezel of the displays/monitors to be hidden from the ATC's view. The Bidder shall provide a demonstration of compliance to stated requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The vertical arm, of the display/monitor mounting arm, should have a maximum height of 300mm (including its upward adjustability) above the working surface to minimise the obstruction on the ATC's view of the aerodrome. The Bidder shall provide the maximum height and the adjustability range of the vertical arm of the display/monitor mounting arm. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [F] The display/monitor mounting arm's technical design shall incorporate a cable management system that will allow for routing of cables. This cable management system shall take into account the accessibility and manageability of different cables (e.g. power and communications cables) and the sliding movement of equipment in and out of the equipment cabinet. The Bidder shall provide details of the cable management system that will be deployed with the display/monitor mounting arm. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [G] The mounting adapter for the display/monitor mounting arm shall be the same as the mounting adapter for the current display/monitor mounting arm. The existing mounting adapter used are a Video Electronics Standards Association (VESA) mount plate as shown in **Figure 14**. The mounting adapter for the display/monitor mounting arm shall be replaceable. The Bidder shall demonstrate compliance to this requirement. (D)

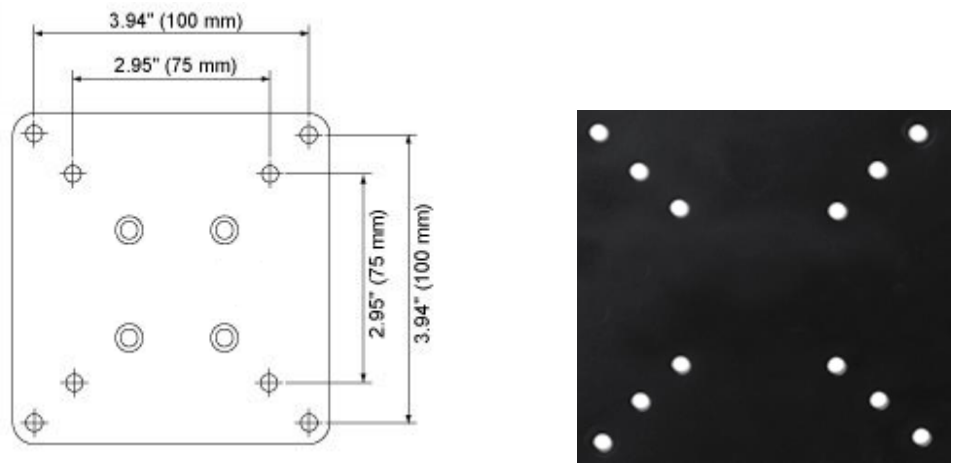


Figure 14: Two types of the current display/monitor mounting adapter or plate (VESA mounts).

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[H] The display/monitor mounting arm shall be installed on the console in a manner that allows for additional display/mounting arms to be installed in the future. The Bidder shall demonstrate compliance to this requirement. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[I] The number of display/monitor arms that must be provided by the Contractor for each position shall be based on the number of displays/monitors as defined in **Table 2**. The Bidder shall provide two additional display/monitor arms per position for displays that may be installed in the future. Bidder shall indicate compliance to this requirement and make provision for it in the pricing schedule. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

1.19 VCCS Mounting Solution

[A] The Contractor shall provide a mounting solution to mount each VCCS (Sitti system) listed in **Table 2**. The setup that is required is shown in **Figure 15**. In addition to the VCCS display/touchscreen, the mounting solution shall also accommodate the handset described in **Appendix A**. The mounting solution shall be fixed to the console so that it cannot be easily pushed out of position. A laptop stand will not be acceptable as a solution. The Bidder shall provide a conceptual design for the proposed VCCS mounting solution. (D)



Figure 15 VCCS Mounting bracket and plate

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

- [B] The VCCS mounting solution shall perform the following adjustments to allow for flexible positioning of the VCCS display:
- [a] Upward and downward adjustment.
  - [b] Forward and backward adjustment; and
  - [c] A 45 degrees tight tilt in all directions.

The Bidder shall explain how this is achieved by the proposed VCCS mounting solution. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

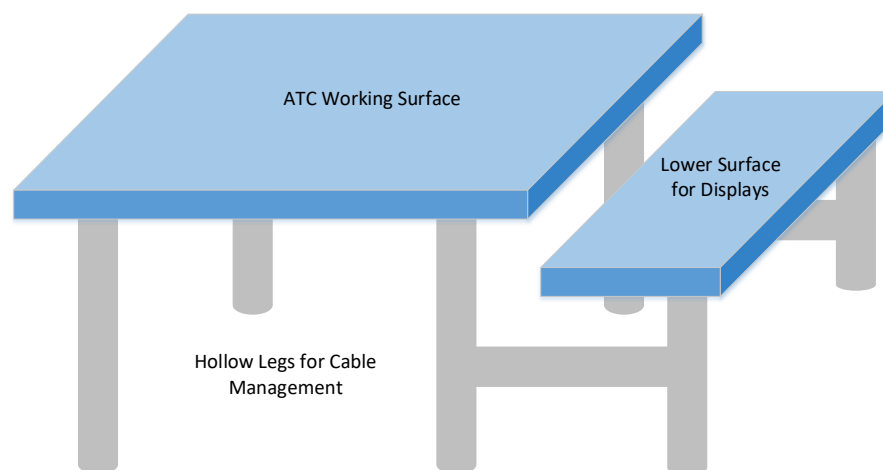
## 1.20 Temporary Desks

[A] The Contractor shall provide temporary desks for the CLD, GMC, TWR-E, TWR-W and ATSO positions for transition purposes.

- [a] The desks for the CLD and ATSO positions shall be at least 1200mm x 800mm x 710mm (length x depth x height). The Bidder shall provide a technical design for the CLD and ATSO desks (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [b] The desks for the GMC, TWR-E and TWR-W positions shall have a step-down design similar to **Figure 16** such that the displays can be vertically adjusted behind the working surface of the desk to reveal only the screen and not the bezel. This drawing is given to provide the concept and is not drawn to scale. The desks shall be at least 1200mm x 800mm x 710mm (length x depth x height). The desk-standing displays that are currently in the Tower shall be placed on the lower surface at the rear of the desk such that line-of-sight vision through the windows is not obscured. The Bidder shall provide a technical design for the GMC, TWR-E and TWR-W desks. (D)



**Figure 16. Temporary Step-Down Desk**

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	

<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
--

- [B] The Bidder shall provide supporting information showing that the desks shall withstand and operate within specifications under the environmental conditions stated in Chapter 1 Section 1.3 [D] . (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The Bidder shall provide supporting information showing that the desks shall comply with the Modularity and Ergonomics requirements provided in Chapter 1 Section 1.4 and 1.5 respectively. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The desks shall be made from a material that is fire retardant, heat resistant, moisture proof, durable and scratch resistant. This material shall, as far as possible, be environmentally responsible and sustainable. The Bidder shall provide details information on the proposed material for the desks to show that the material adheres to these requirements. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The Bidder shall explain how the desk designs shall minimise natural light and room light reflections taking into consideration the following: (D)

- [a] The tower cabs experience 10 to 15 hours sunlight.
- [b] The tower cabs are well illuminated by electrical lighting.
- [c] The light emitted from monitors.

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
-----------------------------------	--

<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>

- [F] The Bidder shall provide supporting information indicating how the working surface material shall support the operation of an optical mouse. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [G] The desks shall have a cable management system. The desk legs shall be hollow such that they form part of the cable management system. The Bidder shall indicate the cable management system in the technical designs for the desks. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 1.21 Equipment required for Transition

- [A] The Contractor shall ensure that the following items that are detailed in Chapter 1 are delivered for use at the temporary positions during the transition period:

- [a] Temporary desks described in Chapter 1 Section 1.20.
- [b] LED Desk lamps described in Chapter 1 Section 1.15.
- [c] Flight strip slider track between TWR-E and TWR-W described in Chapter 1 Section 1.11.
- [d] Flight strip boards described in Chapter 1 Section 1.10.

The Bidder shall indicate the delivery of these items in the project schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 2 TOWER CAB SPECIFICATIONS

### 2.1 Tower Cab Consoles and Equipment Fitting Requirements

- [A] The Contractor shall be responsible for uninstalling, disassembling, removal and disposal of the existing consoles in an environmentally friendly manner and in line with current environmental laws. Waste must be managed according to the ATNS waste management policies and there shall be adherence to the requirements of the National Waste Management Act (No.59 of 2008). Bidders shall make provision for these activities in the pricing schedule and project schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The Contractor shall be responsible for the removal and re-installation of all CNS equipment and all associated wiring and cabling work. This will be under the supervision of the ATNS technical team. The Bidder shall indicate compliance with this requirement. (I)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The fire alarm system panel in **Figure 17**, with dimensions 535mm x 420mm x 135mm (length x width x depth) shall be removed from the existing console and mounted on the side of the CLD console by the Contractor. The Bidder shall indicate compliance with this requirement. (D)

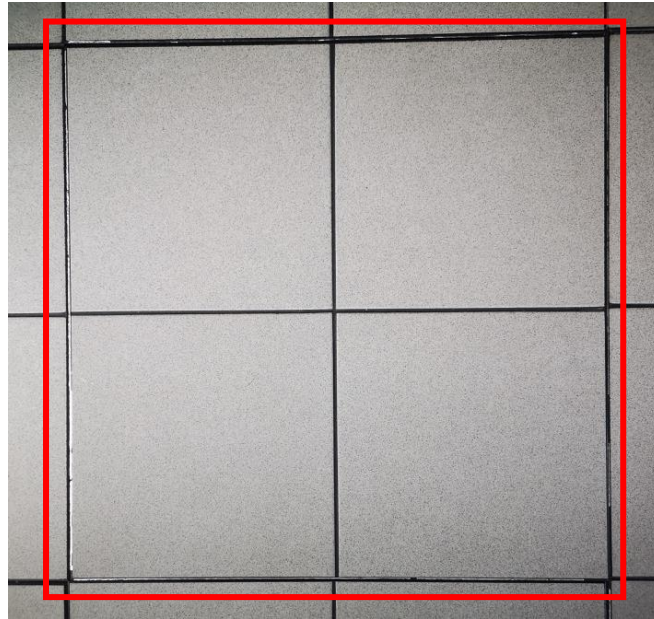


Figure 17. Fire alarm system panel

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

2.2 Flooring

[A] The access floor panels of the entire tower cab shall be replaced by the Contractor. The removal of old panels, and the supply and installation of new access floor panels for the total tower cab shall be indicated by the Bidder in the Pricing Schedule. An example of the floor panel can be found in **Figure 18** within the red square, where one square panel appears as four smaller squares.



**Figure 18. Example of access floor panel**

The panels and raised floor shall meet the following requirements as a minimum:

- a. The dimension of each panel is 600mm x 600mm, with the smaller squares within being 300mm x 300mm. The panels shall be removable with a tile lifter. The panels at the edges of the raise floor will need to be cut to fit the shape of the raised floor.
- b. The panels/ floor structure shall be constructed from material that shall support the weight and point loads of the consoles; the force of the emission of gas from the fire suppression system beneath the floor; heavy computer equipment that is housed in and on the consoles; and at least 10 people seated and standing. The panels shall be reinforced with a steel frame.
- c. The panels and resulting floor structure shall have a smooth finish; flat, rigid and continuous structure; provide lateral stability and absorb structural movements.
- d. The panels/ floor structure shall support heat dissipation and provide sound insulation.
- e. The panels/ floor structure shall comply with SABS Class 1 fire rating.
- f. The panels/ floor structure shall be waterproof.
- g. The panels shall be easy to wipe clean.

The Bidder shall provide a detailed technical design of the raised floor with dimensions, and full technical specifications of the proposed access floor panels. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] Six (6) steel air vents are spaced throughout the permanent raised floor and require replacement. An example of the vent can be found in **Figure 19**. The Bidder shall provide full technical specifications for the proposed steel air vents. (D)



**Figure 19. Example of air vent**

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] The Contractor shall replace the floor tiles on the stairs in the tower cab and along a vertical portion of the wall. This covers an area of 52 square meters. The old tiles shall be removed and replaced with tiles as follows:

- [a] Similar colour to the access floor panels.
- [b] Constructed from heavy duty/ industrial material that is durable and will support a lifespan of at least 10 years with moderate to heavy foot traffic.
- [c] High grade that is resistant to chipping and cracking.
- [d] Slip-resistant surface that is easy to clean.

The Bidder shall provide full details on the proposed tiles. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	

<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>
--

- [D] The tile removal and surface preparation will result in extremely dusty conditions. To limit this, the Contractor shall ensure that proper dust expulsion is achieved using extractor fans. The Bidder shall provide full details on how dust expulsion will be achieved. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] ATCs shall be supplied with the appropriate PPE by the Contractor during the tiling phase when they will be entering and exiting through the construction area. The Bidder shall provide full details on the PPE that will be supplied. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 2.3 Air Conditioning Ducting

- [A] The Contractor shall remove; and supply and replace drywalling around the air conditioning ducting along the walls of the tower cab. This covers an area of 70 square meters. The Bidder shall indicate costing for the removal, supply and installation of the drywalling in the pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The Contractor is required to supply paint; and prepare and paint the drywalling once it has been installed.

- [a] The paint shall be dark grey with a smooth matte finish.
- [b] The paint shall have a lifespan of at least 10 years.
- [c] The paint shall be stain- resistant with a finish that can be easily wiped with a wet cloth.
- [d] The paint shall not create reflections on the glass windows in the tower cab.

The Bidder shall provide full details on the paint that shall be supplied. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## 2.4 Temporary Raised Floor

- [A] The Contractor is required to comply with the transition principles outlined in Section 6.3 of the Introductory Chapter and must temporarily raise the entire tower cab floor to the same level as the existing raised floor. The Bidder shall provide a detailed design for the construction of the temporary raised floor. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The Contractor shall ensure that the temporary raised floor is level and constructed with no gaps. The Bidder shall indicate in their design how this requirement is met. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

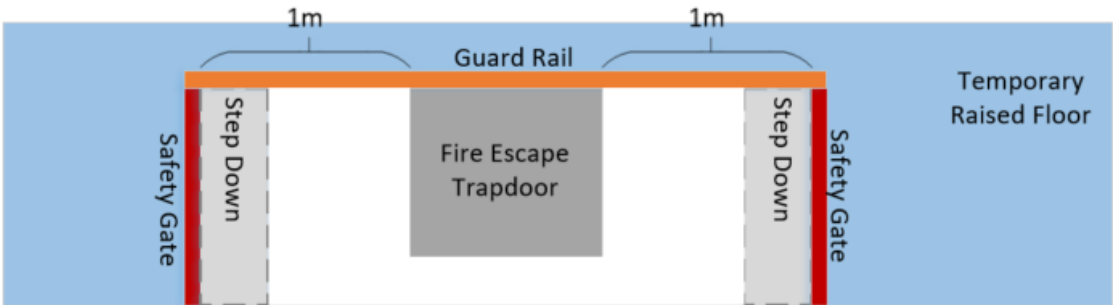
- [C] The Contractor shall ensure that the temporary raised floor is stable and rigid before the ATCs are moved to their respective temporary positions. The Bidder shall indicate in their design how this requirement is met. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The Contractor shall ensure that the temporary floor and the individual parts from which it is constructed shall at no time present any OHAS risks to the occupants of the tower cab for the duration of the project. The Bidder shall provide details on the OHAS measures that will be taken during the project. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[E] The temporary raised floor shall terminate on either side of the fire escape trap door such that the trapdoor remains unobstructed. **Figure 20** provides an illustration of how this shall be achieved. This drawing is given only to provide the concept and is not drawn to scale.



**Figure 20. Temporary Raised Floor design around the Fire Escape**

[a] A 1m space shall be left on both sides of the trapdoor to allow people to access the trapdoor and climb down the fire escape ladder. The Bidder shall indicate the 1m spaces in their design for the temporary raised floor. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[b] A temporary step down shall be installed on both sides of the temporary raised floor where it terminates at the fire escape trapdoor to allow people to climb down to the same level as the trapdoor. The Bidder shall indicate the step down in their design for the temporary raised floor. (D)

COMPLIANCE (C/PC/NC/Noted)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

[F] The Contractor shall supply and install safety gates on the temporary raised floor where it terminates on both sides of the trapdoor.

- [a] The gates shall be two-way opening.
- [b] The gates shall be at least 800mm high.
- [c] The gates shall firmly lock into the closed position and shall be easily opened by means of a lifting action with one hand.
- [d] The gates shall auto close.

The Bidder shall provide full details on the proposed safety gates. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[G] The Contractor shall supply and install a guard rail along the side of the fire escape trapdoor that is parallel to the existing consoles such that when the existing consoles are removed and disassembled, there is no falling hazard around the trapdoor. The Bidder shall provide full details on the proposed guard rail. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

[H] The Contractor shall supply and install temporary stairs for access to the temporary raised floor from the lower levels of the tower via the existing staircase. The Bidder shall indicate the stairs in their design for the temporary raised floor. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

## **CHAPTER 2: GENERAL SPECIFICATIONS**

### 3 GENERAL SPECIFICATIONS

#### 3.1 Project Execution and Compliance

- [A] The Contractor shall repair to its original condition or replace, at their own cost, any component damaged during the execution of this project. The Bidder shall indicate compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [B] The Contractor shall not sub-contract any portion of the scope of work detailed herein or support contract without prior approval by ATNS. The Bidder shall indicate compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [C] ATNS may request a demonstration of compliance on any of the components of the consoles and associated components provided. The Bidder shall indicate compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [D] The Bidder shall provide a list of all standards and/or regulations that the consoles and/or its components or associated components as specified herein adhere to or comply with. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [E] The Contractor shall ensure that the consoles, equipment cabinets, auxiliary modules and associated components are designed to the same look (colour) and feel (texture). The Bidder shall indicate compliance with this requirement. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

- [F] The Contractor shall be responsible for the application and costs thereof, for all ACSA vehicle and personnel permits required to gain access to the FAOR control tower and shall abide by the ATNS and ACSA rules and regulations at all times whilst on the property. The Bidder shall indicate compliance with this requirement and make provision for the application of permits in the project schedule and pricing schedule. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

### 3.2 Console Mock Setup

- [A] A suitable mock setup of the consoles shall be set up for the consoles to allow the users to test the ergonomics of the console before the final design is approved for production. Changes to the design to enhance ergonomics may occur after the mock-up. The mock set-up shall be made of cheaper materials and will serve as a proof of concept. Bidders shall ensure that provision is made for the mock setup in their offer. (D)

<b>COMPLIANCE (C/PC/NC/Noted)</b>	
<i>[INSERT FULL RESPONSE FOR EVALUATION HERE]</i>	
<i>[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]</i>	

---END OF VOLUME 2---

## APPENDIX A

### VCS Components

**CARD 144**
The voice that guides you... Always.

## Touch Screen K/ETS



### Technical Data:

Specifications	
CPU:	Freescall i.MX53@800MHz
RAM:	512MB DDR3
FLASH:	32MB (NOR), 512MB (NAND)
OS:	Linux Kernel 2.6.35
SPEAKERS POWER:	2x1W
LCD:	12.1" , backlight LED
RESOLUTION:	800x600
COLOR:	16.7M (8bit/color)
LUMINANCE:	600cd/m2
CONTRAST:	1000:1
VIEW ANGLE:	+/-85° (H/V)
TOUCH PANEL:	PCAP
SURFACE TYPE:	Clear
SURFACE HARDNESS:	Mohs 5
POWER CONSUMPTION:	15W
TEMPERATURE:	-25°C ~ 55°C Operative
DEPTH:	41.6 mm
WIDTH:	301.6 mm
HEIGHT:	248.1mm

### Product:

Characteristics

- Advanced Multimedia Arm Cortex A8-core
- PCAP Touch Screen
- ABS-V0 Plastic Shell (Proprietary Design)
- Vesa Connection

Option:

- Resistive Touch Panel

Application Range:

- ATC Systems - mobile and fixed applications

Rules:

Directive R&TTE 1999/5/CE

EMC EN55022:2010 Emissions  
EN55024:2010 Immunity  
EN62311:2008 Radiated EM Fields

SAFETY EN60950-1 2006 and amendments



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CARD 146

The voice that guides you... Always



Position Loudspeaker

Article Number:  
K/MLS.1427



L'organo elettroacustico K/MLS.1427 è un singolo altoparlante equipaggiato con un dispositivo da 3 W e 4 Ω (Ohm) di impedenza. Alimentato da 24 V in continua, espone frontalmente un LED rosso legato alla funzionalità VOX.

La potenza di uscita è regolabile attraverso un potenziometro ad un giro.

Del design semplice ed elegante, può essere montato verticalmente o orizzontalmente a muro utilizzando una staffa speciale.

*The K/MLS.1427 device is one way speaker unit equipped with one 3 W - 4 Ω (Ohm) impedance device.*

*Powered by 24 Vdc, it has onboard a red VOX LED.*

*The output power is adjustable by one round potentiometer.*

*Featuring a simple and tasteful design, it can be wall mounted either vertically or horizontally, by using the special bracket.*

Technical Data:

Specifications

Power Supply	24 Vdc
Rated Power	3 W
Impedance	600 Ω (Ohm)
Loudspeaker Impedance	4 Ω (Ohm)
Amplification Circuit	3 W D Class
Signal to Noise Ratio	≥ 70 dB
2 W Distortion	≤ 1 %
Frequency Response	200 Hz ÷ 15 kHz
Colour	Black
Optional Mounting	Bracket for wall mounting

Dimensions

Depth	97 mm + Connector
Height	105 mm
Length	96 mm
Weight	649 g

Standard:  
EN 60065 satisfying 2006/95/CE  
CEI EN 55013 (2001), VAR. A1 (2003), VAR. A2 (2008)  
CEI EN 55020 (2003), VAR. A2 (2005)  
CEI EN 61000 -6 -3 (2002)

07.06.2013 Rev.01

Integrated communication systems  
for public and private buildings

SITTI S.p.A. Via Dandolo, 59 - 20090 Vimercate (MI) - ITALY  
Tel. +39 0362 707111 Fax +39 0362 707120 E-mail: commerciale@sitto.it, www.sitto.it

CARD 140
The voice that guides you. Always


Handset

Handset with one button,  
wire clamp and cradle.

Article Number:  
BM/1410  
MT/1410



BM/1410
MT/1410

### Product:

**Characteristics**

- Dynamic ear and microphone electret capsules
- Large and high reliability push-to-talk button
- S.I.T.T.I.<sup>®</sup> spiral cable
- Automatic hook mechanism in the cradle for sloping mounting
- Wire clamp for spiral cable

**Options**

- Handset cradle
- Flame resistant plastic housing
- Magnetic hook sensor

**Application Range**

- Radio and PA systems in mobile and fixed applications

### Technical Data:

General	
Housing	Plastic ABS, black
Dimension with cradle	Height 58 mm, Width 65 mm, Depth 230 mm
Weight	300 g (10.6 oz)
Connection	6 Wires polyurethane S.I.T.T.I. <sup>®</sup> spiral cable, draw length max 900 mm
Operating elements	1 Black button
Storage temperature	-30 °C to +70 °C / (-22 °F to +158 °F)
Operation temperature	-20 °C to +60 °C / (-4 °F to +140 °F)

Microphone	
Frequency range	20 Hz to 16 kHz at -10 dB
Sensitivity (in UAGF)	63 mV/Pa (-46 dBV/Pa ± 5 dB)
Impedance	2.2 kΩ (Ohm) ± 20 % at 1 kHz
Directivity	Omnidirectional
SNR	60dB

Earpiece	
Frequency range	300 Hz to 4 kHz at -10 dB
Sensitivity	26 dB/Pa/W ± 3 dB (IEC 3.2 Low-Leak coupler)
Impedance	300 Ω (Ohm) ± 20 % at 1 kHz
Maximum output	10 mW

Amplifier	
Power supply	Line power supply 5V
Gain	40 dB max
Distortion	0.7 % max 2 <sup>nd</sup> and 3 <sup>rd</sup> harmonics

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