Section VIII. Terms of Reference for the Design and Build of the New Eighteen-Storey Clark Air Traffic Control Tower Building Facility at Clark International Airport

1.0 PROJECT INFORMATION

1.1 **The Project.** Clark International Airport Corporation [hereinafter also called "CIAC"], through General Appropriations Act (GAA) of 2020 intends to apply the sum of **Two Hundred Ninety One Million Nine Thousand Nine Hundred Fifty Four Pesos and 49/100 (PHP291,009,954.49)** being the Approved Budget for the Contract (ABC) to payments under the contract for the **Design and Build of the New Eighteen-Storey Clark Air Traffic Control Tower Building Facility at Clark International Airport** and hereinafter referred to as "the Project", by way of Design and Build Scheme.

Bids received in excess of the ABC shall be rejected in accordance with Annex "G" of the Revised Implementing Rules and Regulations of R.A. 9184, otherwise known as the "Government Procurement Reform Act" [Annex "G" IRR/R.A. No. 9184]

1.2 **Adoption Annex "G" IRR/R.A. No. 9184.** The Procurement of Design-Build and Contract Implementation of the Project shall be governed by Annex "G" Guidelines For The Procurement And Implementation Of Contracts For Design And Build Infrastructure Projects, Revised Implementing Rules and Regulations of R.A. No. 9184 otherwise known as the Government Procurement Reform Act [hereinafter referred to as "IRR/RA No. 9184"] and all applicable building codes, regulations, and Department Orders which may be issued by DPWH.

1.3 **Qualifications of Bidders.** Bidders should possess the necessary qualifications in accordance with the Bidding Documents, including Annex "G" IRR/R.A. No. 9184. Interested bidders must have at least a license category "A" and a license classification "Medium B" from the Philippine Contractors Accreditation Board (PCAB) for General Engineering. The PCAB license must be valid and effective at the time of submission of the bid. Prospective bidders shall provide the necessary architectural, engineering, and supervision capability for multi-storey building structure.

1.4 **Contractual Framework.** Annex "G" IRR/R.A. No. 9184 provides the guidelines for design and build procurement. Briefly, the contractual arrangement for the project is the Design and Build scheme. Under this scheme, CIAC awards a single contract for the architectural and engineering [A&E] designs and construction to a single firm, partnership, corporation, joint venture or consortium.

2.0 PROJECT DESCRIPTION

2.1 The Government of the Republic of the Philippines has identified the Clark International Airport Expansion project as one of the priority infrastructure projects of the government.

2.2 The Bidding and Awards Committee (BAC) of the Clark International Airport Corporation (CIAC) seeks shortlisted Contractors to submit bids for the Design and Build of the New Eighteen-Storey Clark Air Traffic Control Tower Building Facility at Clark International Airport.

2.3 This project shall adhere to the minimum standard set by the following:

2.3.1 Civil Aviation Authority of the Philippines (CAAP) Manual of Standards latest edition
2.3.2 ICAO Annex 14 for Visual Navigational Aids latest edition
2.3.3 National Building Code of the Philippines (PD 1096) and its latest amended IRR;
2.3.4 National Structural Code of the Philippines (NSCP);
2.3.5 Fire Code of the Philippines (RA 9514) and its latest amended IRR;
2.3.6 Government ordinances enforced in the locality.

2.4 There are number of project drivers that contribute to the proposal for a new Air Traffic Control Tower at Clark International Airport. These drivers outline the purpose of the project, as well as guide design decision-making throughout the design and construction process.

These drivers can be described as follows:

2.4.1 Existing Tower.

The proposal for a new tower on a new site is partly driven by the design and condition of the existing control tower. The existing tower at Clark International Airport is over 50 years old and is nearing the end of its useful life. This means that there are a number of inherent building and compliance issues associated with the existing tower. These include:

a) Due to its age, the existing tower may not comply with current Building Code of the Philippines standards. This includes seismic and fire engineering design standards;
b) The existing tower requires significant on-going maintenance and seismic strengthening in order to remain operational; and
c) The LOS (Line of Sight) is broken.

2.4.2 Operational Drivers

The primary purpose of the new control tower is to create an optimal operational environment for Airways to undertake its air traffic control operations. While the tower primarily monitors traffic

approaching and departing Clark International Airport, it should also be noted that the tower forms a node of a wider network of integrated air traffic control facilities, and therefore also has regional and national significance. Key operational drivers include:

a) Providing maximum visibility for controllers through orientation of the tower with the runway and raising the cab as high as possible without penetrating the runway OLS;
b) Provision of sufficient space within the tower to allow for communications equipment and cable work required to operate the tower;
c) Provision of space within the tower to allow for future integration of new air traffic control systems and technologies; and
d) Provision of safe and secure entry for night-time air traffic controller shift changes.

2.4.3 Compliance Drivers

Compliance with the Building Code of the Philippines, as well as other relevant safety standards, is a significant driver of the project. This includes:

a) Compliance with current seismic engineering;
b) Compliance with current fire engineering design and compliance standards, including fire egress, fire detection and fire suppression systems;
c) Compliance with the accessibility of disabled persons to the building facility. (BP 344 compliant)
d) Improved accessibility measures, including accessible car parking provision, a lift within the tower, and provision of accessible sanitary facilities within the tower; and
e) Ensuring that the LOS (Line of Sight) at the tower is not blocked or obstructed considering the development of commercial areas adjacent to the terminal buildings.

2.4.4 Resilience Drivers

The design of the control tower needs to have a level of resilience to ensure the on-going operation of the tower, particularly in post-disaster situations. Key aspects of this include:

a) Base isolation, ground improvements and seismic engineering design commensurate with a building capable to withstand seismic activity as per the Building Code of the Philippines;
b) A 500mm raised building platform for flood resilience;
c) On site generator and UPS facilities for security of power supply following a disaster; and
d) An external observation deck to enable manual monitoring of the skies following a disaster.

2.4.5 Architectural Drivers

Due to the significance of the project both in form and function, a high quality, site-specific design response is required to envelope the project drivers noted above. Such a response includes:

a) Creating a tower with a first class degree of architectural and visual interest, that relates both to the local site context and the tower's role in the aviation industry;
b) Creating a tower that is robust and resilient to the local environmental conditions, including the intense wind and weather conditions found at the site.
c) Provision of views for occupiers of the tower, particularly of the north/south runway approaches as well as views across the runway and aprons to the east.

2.5 Basic Components of an Air Traffic Control Tower

Air Traffic Control Tower building facilities have the following basic components: control cab or cab, equipment room, tower shaft or shaft, and base building.

2.5.1 **CONTROL CAB**. The cab is the primary control tower operating space. The cab shall be situated at the desired elevation above ground level (AGL) and physically oriented relative to the primary runways to provide the best unobstructed view of the airport aircraft primary movement areas (taxiways and runways). There is usually an attic-type access door and ladder that goes from the Cab to the Roof. The ladder is use for maintenance personnel to access the roof. The cab roofs' shall be able to carry the communications radio antennas, obstruction light, lightning arresters, beacon light and Ground Radar.

2.5.2 **EQUIPMENT ROOM**. Strategically located inside the tower shaft that houses all the necessary communications equipment integrated with the airfield operations systems.

2.5.3 **TOWER SHAFT**. The primary tower shaft function is to support the raised cab at the desired elevation. Tower cab access can be provided with a stairway and/or elevator. Tower shafts can be structurally independent (free standing) or an integral part of another related structure such as a terminal building or base building.

2.5.4 **BASE BUILDING**. The base building is a two-storey building adjacent to the tower shaft. Its primary function is to provide facility functional space. When the base building is structurally independent, it is usually attached to the tower shaft with an access corridor or link. The base building is normally used to house the

equipment necessary to support the operational needs of the Air Traffic Control Tower, including space for administrative and training functions

2.6 Project Area

The Project is located in the Clark International Airport, Civil Aviation Complex, Clark Freeport Zone, Pampanga. Its proposed location is near the existing Passenger Terminal Building and south of the New Passenger Terminal Building. The total area is 10,000 sqm.

2.7 **Project Components.**

Component	Particulars
Architectural and Engineering Designs	Complete plans, drawings, specifications, BOQ and cost estimation, construction management, progress reports and claims for payments and completion reports.
Site Civil Works	Site drainage/ flood control, site stabilization, sanitary works forming part of the site civil works, and pavement and road right-of-way [RROW] improvements as applicable/ needed, including pavement markings, etc., with pertinent plans and designs prepared by a duly-Registered and Licensed Civil Engineer.

Architectural Works	All masonry, finishing, acoustics, lighting, moisture protection/ thermal, glazing, wood/ plastics, fenestrations [doors & windows], with pertinent plans and designs prepared by a duly- Registered and Licensed Architect.
Structural Works	Foundation, earthquake-proof superstructure, roof and communications tower support systems, etc.], with the pertinent plans and designs prepared by a duly-Registered and Licensed Civil Engineer, who must specialize in structural design practice.
Electrical Works	All electrical systems, including back-up power generator set and provision for the Air Traffic Communication System, with pertinent plans and designs prepared by a duly Registered and Licensed Professional Electrical Engineer [PEE]
Mechanical Works	Fire Protection, automatic fire suppression system and elevator with the pertinent plans and designs prepared by a duly- Registered and Licensed Professional Mechanical Engineer [PME]
Sanitary Works	Water tanks, supply systems, water sewage, sanitary and disposal systems with pertinent plans and designs prepared by a duly-Registered and Licensed Sanitary Engineer
Electronics and Communication (Including ICT) Works	Conceptualize, design, test and oversee the installation of communications and electronic systems that includes, vertical and horizontal LAN cabling, CCTV-ready and provision of connections for the Air Traffic Management Communication equipments prepared by a duly- Registered and Licensed Professional Electronics and Communication Engineer [PECE]

2.8 **Concept Plans and Images. Section VII** shows indicative concept plans and images. The concept drawings are only for illustration purposes. The Bidder/Contractor may propose alternative schemes in its Bid Proposal subject to final verification and confirmation by CIAC during the actual conduct of Architectural and Engineering Design Services by Design and Build Contractor.

3.0 SCOPE OF DESIGN AND BUILD CONTRACT AGREEMENT

3.1 **General Activities.** The Design-Build Contractor [DBC] shall conduct the following:

3.1.1 **Conduct of Architectural and Engineering [A&E] Surveys.** Annex "G" IRR/RA No. 9184 specifies that the DBC shall conduct

the surveys in its Bid Proposal and present to CIAC their results and findings which would impact on the detailed A&E designs of the Project. The DBC shall include the findings and recommendations and effects, if any, on the Technical and Financial Components of its Bid Proposal in its report on Conceptual Engineering Designs of the Project. The DBC shall be responsible for the accuracy and verification of data and compliance with policies in Annex "G":

a) "Section 13.2. The contractor shall be responsible for obtaining all necessary information as to risks, contingencies and other circumstances which may affect the works and shall prepare and submit all necessary documents specified by CIAC to meet all regulatory approvals as specified in the contract documents."

b) "Section 13.5. As a rule, changes in design and construction requirements shall be limited only to those that have not been anticipated in the contract documents prior to contract signing and approval."

   "Change Orders resulting from design errors, omissions or non-conformance with the performance specifications and parameters and the contract documents by the contractor shall be implemented by the contractor at no additional cost to CIAC."

c) "Section 13.9. The contractor shall provide all necessary equipment, personnel, instruments, documents and others to carry out specified tests."

d) "Section 13.11. The contractor shall be held liable for design and structural defects and/or failure of the completed project within the warranty periods specified in Section 62.2.2 of the IRR-A."

e) DPWH Engineering Survey Guidelines

   e.1) All surveys shall follow Chapter II, Part I, Volume I, Survey and Investigation, DPWH Design Guidelines, Criteria and Standard and Manual on Technical Requirements for Surveying and Investigation of Public Works and Highways Projects and applicable provisions of existing laws, codes or Department Orders.

   e.2) Topographic Survey shall be undertaken by the use of an electronic total station or RTK GPS survey equipment or combination of both in order to gather the precise position of existing, waterways, drainage, structures, utilities, and

other features as needed.

f) Current Seismic Engineering

The New Air Traffic Control Tower shall be compliant with the updated requirement as per the latest National Structural Code of the Philippines.

3.1.2 **Preparation of the Conceptual and Pre-Detailed Engineering Designs [CED] For the Project Components.** The DBC shall prepare and submit to the CIAC the draft Conceptual Engineering Designs [CEDs] for each of the Components. The CEDs shall conform to Section VI MPSP. The DBC shall submit a report on the CED to the CIAC.

Building design shall conform to the provisions of the ICAO Annex 14, National Building Code of the Philippines (PD 1096), Civil Aviation Authority of the Philippines (CAAP) Manual of Standard, National Structural Code of the Philippines, Electrical Engineering Law (RA 7920), Mechanical Engineering Law (RA 5336), Plumbing Code (RA 1378, 1993-1994 Revisions), Philippine Electronics Code (RA9292), Fire Code (RA 9514) and other laws and regulations covering environmental concerns and local ordinances and regulations.

3.1.3 **Preparation of the Revised Conceptual Engineering Design [RCEDs].**The DBC shall prepare and submit the Revised CEDs for each Project Component following the Minutes of Discussion with CIAC. The DBC shall submit a report on the Revised CEDs for the issuance of a "Notice of No Objection" from the CIAC following the Minutes of Discussion.

3.1.4 **Preparation of the Detailed Engineering Design [DED] for Approval of the CIAC**

a) After CIAC and DBC have agreed on the CEDs, the DBC shall prepare and submit the final DED to CIAC for approval. The DBC shall adopt a format acceptable to CIAC for itsreport.

b) Guidelines under Annex G IRR/RA 9184. Annex "G" defines the following;

b.1) "Section 8. Detailed Engineering Requirements provides –

"8.1. Upon award of the design and build contract, the winning bidder shall be responsible for the preparation and submission of all necessary detailed engineering investigations, surveys and

designs in accordance with the provisions of Annex "A" of this IRR, [with the exception of the bid documents and the ABC].

"8.2 CIAC shall ensure that all the necessary schedules with regard to the submission, confirmation and approval of the detailed engineering design and the details of the construction methods and procedures shall be included in the contract documents.

"8.3. CIAC shall review, order rectification, and approve or disapprove – for implementation only - the submitted plans within these schedules. All instructions for rectification shall be in writing stating the reasons for such rectification. The design and build Contractor shall be solely responsible for the integrity of the detailed engineering design and the performance of the structure irrespective of the approval/confirmation by CIAC."

b.2) Changes in Design and Construction Requirements. Section 13.5 provides - "As a rule, changes in design and construction requirements shall be limited only to those that have not been anticipated in the contract documents prior to contract signing and approval."

c) Contractor's Responsibility. The data and information in the Bidding Documents are for reference only. CIAC does not guarantee that these data are fully correct, up to date, and applicable to the project at hand. The Contractor is responsible for the accuracy and applicability of all data that it will use in its design and build proposal and services as stated in Section 7, Annex "G" IRR RA 9184].

3.2 **Design Criteria.** The Minimum Design Criteria for the Air Traffic Control Tower with the following component which shall be considered in the Design, but not limited to:;

3.2.1 Line of sight

The minimum height for the line of sight should not be lower than 54 meters from the AMSL and ensure Line-of-sight on all runway systems of the airport based on commercial development at the area adjacent to terminal buildings as per ADPI Master Plan in accordance with Obstacle Limitation Surfaces (OLS) requirements.

3.2.2 Interior and Exterior Finishes And Colors

Control cab ceiling and other paintable surfaces above the windows in the cab shall have a non-reflective finish. Window sills shall be covered with a non-reflective, sound-absorbing material. Ceiling tiles should be a dark color to lessen interior light reflections. Interior colors should be a mix of warm and cool colors relating to the functional areas. Exterior colors should be compatible with base decor. When tone down is required, consideration should be given to use of pigmented concrete, stucco, exterior insulation and finish systems (EIFS), and concrete masonry units (CMU). EIFS should be limited to upper floors only and shall not be used on the first floor.

3.2.3 Window Mullions

Design window mullions in the control tower cab to comply with wind load requirements while at the same time reducing visual obstructions to the maximum extent possible. In addition, the structural mullions should be used for antenna cable access.

3.2.4 Shaft Windows

As a minimum, a single window shall be provided on the runway side of the tower shaft in the Lounge/Break Room and in the Chief Controller's office. If structurally feasible, more windows may be installed on the runway side of the Lounge/Briefing Room to facilitate training. Conventional steel structures with diagonal bracing may prevent the installation of additional windows. The number of windows in the rest of the tower shall be kept to a practical minimum for the sake of construction cost savings and maintenance/energy cost savings for the life of the facility. Consider specifying Energy Star labeled windows for energy conservation.

3.2.5 Acoustical Requirements

Acoustical materials with high sound absorbent coefficients shall be used as necessary in the construction of the walls, floors, and ceilings to reduce the noise level in the cab and the lounge/briefing room. A sound study may be required if the tower is close to taxiways, engine start up ramps, or other noise-generating functions. In general, if the facility is constructed in accordance with the recommendations contained in this document the above noise criteria will be met. The carpeting of walls for acoustical attenuation is not allowed. However, if local conditions are such that it is impractical to obtain the desired db level using conventional construction practices and materials, the contractor shall notify CIAC and proposed alternate method for approval by CIAC. [Note: Smoke and flame spread properties for carpet installed in the vertical

position differs from normal tests in the horizontal position and may not meet building code requirements.].

Carpet all occupied areas and other designated areas with anti-static carpet. Carpet edge molding shall be provided at all carpet edges.

The walls below the windows and the top of the air plenum in the cab shall be covered with acoustical material.

Acoustical ceiling tiles tend to get damaged from the frequent removal and replacement during equipment cable installations. The DBC needs to consider this fact when designing ceilings in the occupied areas. In addition, the DBC should consider the use of spray-on foam designed to control sound attenuation in equipment rooms and mechanical rooms. The DBC shall design the project to control sound attenuation in the electrical and mechanical equipment rooms since they generate a large volume of noise pollution.

Provide vibration isolation for all noise generating equipment.

3.2.6 Roof

The cab roof deck shall be sloped to drain away from center. Do not include gutters and downspouts. Shingle roofs are not allowed. The roof design should take into consideration the need to minimize rainwater from the roof dripping down the cab windows.

Provide a permanent means of roof access via a ladder from either the cab or the catwalk area—preferably the cab. The ladder shall be retractable from ceiling space to the cab or catwalk floor. The installation of exterior stairs for access to the tower cab roof is not desirable.

The metal stairway and safety climb obstruct visibility to view aircraft in the pattern.

Coordinate the location of the roof safety railing, beacon light, antenna mast mounting, and the lightning protection system.

The roof surface must be designed to allow for pedestrian maintenance traffic.

The roof shall be designed to withstand the load of all antennas and a ground radar system.

3.2.7 Control Cab Windows

a. Materials.

Windows shall be double glazed units. Glass shall conform to ASTM C1036-85 or equivalent. Window units shall consist of two panes of float glass separated by a 13 mm (1/2 in) air space. The outer pane shall be Type I, Class II, Quality q3, slightly tinted blue/green, unless glass thickness over 6 mm (1/4 in) is required, in which case, clear glass may be used. The inner pane shall be Type I, Class I, Quality q3, clear. The use of "Starphire®" glass is highly encouraged. In areas of high sun or solar gain, use of a "low-E" glass is encouraged. Tempered glass may be used in upper glass panels in towers that have "sloped back" or "diamond cut" tower windows as long as it does not obstruct viewing aircraft flying overhead patterns.

b. Glass Thickness.

Each of the two panes shall be at least 6 mm (1/4 in) thick, but shall not exceed 13 mm (1/2 in). The total window thickness shall not exceed 1 1/2 inches [13 mm (1/2 in) interior pane with 13 mm (1/2 in) air space and 13 mm (1/2 in) exterior pane]. The glass thickness should be sized to meet wind load design requirements of ANSI A58-1. Panes of unequal thickness can be used together, e.g., 6 mm (1/4 in) tinted inside pane with a 13 mm (1/2 in) clear exterior pane. Tempered glass and laminated glass are not authorized for use in control tower cabs.

c. Air Space

The inner and outer panes shall be separated by a 13 mm (1/2 in) hermetically sealed space. The entrapped air shall be dehydrated by a drying agent. Dehydration shall be guaranteed for a period of at least five years. Window units shall be fabricated for use at the installation's elevation above mean sea level (AMSL). Units shall be free of any optical distortion at the time of installation.

d. Glazing Retainage

The ATCT shall be designed to meet seismic requirements, to include retainage of glazing in the control cab. The DBC shall design the glazing to meet seismic requirements. In environments with high wind, the addition of an intermediate mullion strip may be considered only as a last resort. Only one intermediate mullion strip per cab side is preferred.

e. Wind Loading

For design purposes, the tower cab glass shall be designed to withstand sustained wind speeds of 125 mph or more. The tower will most likely be evacuated when winds exceed 75 mph.

3.2.8 Control Cab Transparent Window Shades

Shades shall be at least .125 mm thick. Color shall be smoke gray and body dyed. Shades shall be provided with rollers with constant tension to prevent shade contact with windows.

Shades shall follow the slope of windows and shall match size and shapeof cab windows when in fully drawn position. Where towers are designed with "diamond cut" sloped back glass, separate shades shall be installed for the upper windows. Provide shade pockets for storing the shades when not in use.

Shades shall be "See-Thru Window Shades"

Electric rollers are not encouraged because manual cords allow for faster up and down action and access for light gun operation.

Use of "mini-blinds," opaque, semi-opaque material, or "mesh type fabric" in the tower cab is prohibited.

3.2.9 Control Cab Console

The DBC shall coordinate and validate the control cab console design to CAAP through CIAC to ensure the design accommodates the required equipment. The contractor shall provide and install the airfield lighting panel, power outage indicator lights, door ajar indicator light, dimmer switch for overhead lights and the master control for the intercom system in the cab console. Boxes for wind indicators should be constructed by the contractor, and laminated with the same finish as the console. Place single "strip bays" at the Local Control Flight Data and Ground Control positions, in addition to the dual "strip bay" provided for the Flight Data position. No communications equipments shall be provided by the contractor. All communications systems shall be designed by contractor and shall only be provided by provisions of connections both by electrical and fiber optics. Contractor installers will accomplish console cut-outs for required communication equipment. Console colors, equipment location and surface configuration design will be coordinated with CAAP

through CIAC.

The DBC shall provide a conceptual tower cab layout to CAAP through CIAC at the coordination meeting in order to finalize the operational requirements, positions, and equipment layouts.

3.2.10 Equipment Access

Provide physical access to all mechanical and electrical rooms large enough to remove the largest piece of equipment from the room. Provide a hoist or elevator to lift equipment to all floors above ground level. Pay careful consideration to maintenance access when designing mechanical/electrical spaces.

In light of life-cycle design considerations (e.g. replacement or upgrading HVAC equipment in the future), it is recommended that a hatchway be installed in the floor between the tower cab floor and the mechanical room and also between the mechanical room floor and the Lounge/Briefing Room floor (last floor with elevator access) if deemed necessary. The size and shape of the HVAC equipment and components should be able to fit through these openings. It is anticipated that the suspended ceiling in the Crew Rest/Ready Room will have to be removed during an upgrade.

3.2.11 Equipment Room

The equipment room shall be provided a provision of electrical and fiber optic connection for the Air Traffic Management Communication System equipments.

3.2.12 Equipment Room Doors

The doors to the equipment rooms must be a minimum of 2.18 m (7 ft 2 in) high and 91 cm (36 in) wide to allow for the movement of electronic equipment racks through them. Equipment room doors shall have closers and be lockable.

3.2.13 Support Items

The project shall include connection to all required existing utilities such as water, sanitary sewer, electrical power, communication ducts, etc. In seismic zones, all utilities shall be passed through the building envelope using flexible connectors and/or utility ducts which allow for the differential building movement anticipated as a result of a seismic event. All-weather access roads and parking areas shall be provided as required.

The minimum recommended criteria should include an access road and parking lot with a chip seal surface. Parking spaces should accommodate the overhead staff, normal day shift crews and a few spaces for visitors. The width of the access road should be 6.1 m (20 ft) minimum.

Communication ducts and spares for future expansion will be installed only where the use of direct bury cabling is not feasible, e.g., under roads, taxiways, runways, buildings, parking and other paved areas such as sidewalks. Include in the design 8 each 4 inch diameter ducts (2 of which shall have fiber cable and interduct).

3.2.14 Raised Access Flooring

The use of raised access flooring in the cab area is highly recommended to facilitate the periodic rearranging and upgrading of equipment and cables. Incorporate ventilation, air conditioning, electrical, communications, and other systems in the raised flooring system to the greatest extent possible. The raised access flooring shall berated to handle a minimum uniform live load of 150 psf. The DBC shall determine the required capacity of the raised access flooring system after calculating the anticipated uniform live loads, concentrated live loads, and dead loads. The raised access flooring shall be installed a minimum of 12 inches above finished floor.

3.2.15 Catwalk

The catwalk provides the controller with an unobstructed view of aircraft, the airfield, and the airspace environment. Interior cab areas that are visually obstructed by the tower roof, window mullions, and the area at the base of the tower can be seen from the catwalk. Another purpose of the catwalk is to provide access to wash the control cab windows.

3.2.16 Energy Management And Control System (EMCS)

The new air traffic control tower shall be designed so that it can be monitored by EMCS. The EMCS shall have the capability to monitor lighting systems, security systems, and other systems. The DBC shall consult the base EMCS office for the design requirements since each base is different. Due to mission essential staffing requirements and flight safety considerations, the ATCT occupants, not the base EMCS office, shall have direct control of the thermostat to regulate appropriate heating and cooling levels. The DBC shall zone the HVAC system so that ATCT cab occupants can control the temperature in the cab. Electronic equipment rooms shall be treated as separate zones

and with their own thermostats. Other floors shall be controlled by thermostats zoned to these floors.

3.2.17 Air Conditioning System

a. Control Cab

Provide Variable Refrigerant Flow (VRF) system. Provide redundancy for the control cab. Install units as per manufacturer's recommendation.

b. Equipment Rooms

Electronic equipment rooms shall be provided unitary split type AC system with redundancy so that if one unit goes down another unit will be capable of handling the entire load. Also, electronic equipment rooms typically need cooling, even when other rooms need heat; consider having electronic equipment rooms on a dedicated, redundant unit. Install units as per manufacturer's recommendation.

c. All Other Floors

Unitary split type AC system shall serve all other areas to include lobbies and bathrooms. Install units as per manufacturer's recommendation.

3.2.18 Powerhouse

Provide an appropriate architectural enclosure for exterior equipment such as generators and fuel oil tanks to maintain the aesthetics of the facility.

3.2.19 Location of Air Intake

Ensure that outside air intakes are not located in the vicinity of generators, loading docks, or other areas where exhaust may be present or where air quality is compromised.

3.2.20 Fuel Oil Storage Tanks

Provide an above ground tank conforming to Fire Code of the Philippines requirements, and NFPA 30. The standby power generator should also be able to run on diesel fuel. Above-ground self-diking tanks may be used, provided that they are placed on a concrete pad, have spill and overfill protection, have interstitial monitoring, and the primary tank has a water drain and is epoxycoated inside and outside. Tanks without these features may be used, but must be contained with a dike.

3.2.21 Metering

Metering equipment is to be installed on all main energy and water supplies to the building. Landscaped areas or areas that

are irrigated should be metered separately, if water usage is considerable, in order to reduce sewer costs. Meters shall determine consumption, not rate of consumption. Demand or maximum flow meters are not required.

3.2.22 Building Water Supply

a. Source Of Supply

The water source for this facility shall be from the base water supply system.

Note:

Remote locations may require a separate well as a practical alternative to costly utility connections to the base water supply system.

b. Hot Water

Domestic hot water shall be provided for restroom areas. Consider an instantaneous hot water heating faucet or a small hot water heater in the restroom.

c. Water Pressure

The tower will likely need a water pressure booster system to get water to the cab.

d. Sink

Provide a sink with hot and cold running water in the control tower cab. The area below the sink should contain storage.

e. Hose Bibcock

Provide an external non-freeze hose bibcock on the catwalk and at ground level. Each hose bibcock will have a backflow preventor.

f. Backflow Prevention

The supply connection to each fixture or appliance that is subject to back-siphonage of non-potable liquids, solids or gases will be protected in accordance with the National Plumbing Code of the Philippines (NPCP).

3.2.23 Piping System

a. Materials

The exterior underground service piping to the facility shall be polyvinyl chloride (PVC) or type L copper. Do not use galvanized steel piping for the underground water service because of corrosion problems. For interior piping, consider PVC or CPVC and polyethylene to reduce project cost.

b. Features

Domestic water lines should have water hammer arresters. Self-closing fixture valves should be used at all fixtures with combination hot/cold water faucets on all sinks and lavatories.

c. Restroom

Provide a minimum of one unisex (GAD compliant) restroom. The primary restroom location shall be adjacent to the mechanical room directly below the control cab. Recommend providing one shower and locker area in towers with more than one restroom where the program requirements reflect a 24-hour work shift. Restroom fixtures and interior finishes shall be in accordance with NPCP design standards. Lacking NPCP or other standards, use the following guidance: Restroom doors shall be provided with a bathroom door lockset. Restrooms shall have one tank type water closet and one lavatory with mirror. Plumbing fixtures should be wall hung to facilitate cleaning and maintenance. Fully or partially recessed (depending on wall depth) towel dispensers with integral waste receptacles should be used. Dispenser/receptacle should have standard stainless steel architectural finish with a removable stainless steel waste container in the bottom receptacle portion. No sanitary napkin dispenser shall be installed in unisex restrooms. A sign depicting "In Use" should be included and installed to aid in occupancy notification.

3.2.24 Power Requirements

Non-technical, critical-technical, and technical power requirements must be determined by the total loads as calculated by the DBC. Use Philippine Electrical Code;

3.2.25 Power Sources

Power sources shall consist of a primary source with a back-up Class C diesel generator.

a. Back-Up Generator

The control tower shall be provided by a back-up generator with redundancy so that if one unit goes down another unit will be capable of handling the entire load and shall be Class C equipped with auto-start and auto-transfer capability. The generator shall be designed to come on line within 10 seconds after the primary source is lost. The generator run control system shall include a 0 – 2 hour

adjustable timer. The timer shall operate on primary power and shall reset to the preset delay of 0 – 2 hours upon each power failure. A manual/automatic switch shall be provided to permit manual or automatic operation. The power system shall be equipped with a remote status power outage warning box. The power outage warning box shall be equipped with green, yellow and red lights, low db annunciator horn and silencer switch. The red light shall flash and the horn shall activate upon loss of primary power source. The yellow light shall remain on when running on standby power. The green light shall remain on when primary power is in use and/or available for use. Warning lights shall be located in the control cab console.

b. Generator Fuel Supply
Fuel storage shall be sized accordingly. Design fuel storage and supply for emergency generators to ensure continuous operation during seismic events. This, for example, may require piping and flexible connections at the tank ,building envelope, and generators that remain fuel tight throughout the seismic event and after. Consider the following when locating the tank: protection against damage (intentional or unintentional), protection against fuel spills, and containment of spills.

c. Generator Capacity
The generator shall be sized to meet critical-technical power loads in addition to technical power loads, described above. These critical-technical power loads shall include power for control cab lighting and HVAC systems serving the control cab, electronic equipment rooms and the elevator.

d. Power Surge Suppressor
The elevator motor should have a soft start system. The elevator power bus shall be isolated from technical power and critical-technical loads to protect such loads from transient voltage variations. Surge protection shall reduce lightning and switching surges to within acceptable quality power limits.

e. Uninterruptible Power Supply (UPS)
The control tower communication equipments will be provided with an UPS. The Enhanced Terminal Voice Switch (ETVS) and digital voice recorder system (DVRS) are equipped with battery backup and shall not be fed from the UPS system. The facility is designed with generator backup

to provide 100%power required in case of a power failure. If an UPS is required, as determined, it shall be installed in conjunction with the building power system(s) and have a minimum backup capability of 15 minutes to provide a buffer when manually starting the generator. Only technical power panels need to be served by the UPS.

3.2.26 Communication Ducting And Cabling Systems

Administrative telephone wiring/cabling must be installed under the project. Specialized communication wiring/cabling, Navigational Aids (NAVAIDs), remote transmitters and receivers, etc. shall be installed by Contractor. Raceways, conduits, pullboxes, duct banks, etc., necessary for the installation of these specialized communication cables shall be included in the contract and are as follows:

a. Provide ducts within the tower. Two 100 mm (4 in) ducts shall be provided for antenna cables between the equipment room and the roof. Ducts shall be installed adjacent to each of two roof support columns and terminate in the weather heads on the roof. The two 100 mm (4 in) ducts for antenna cabling should not be a continuous run from the equipment room to the roof. The two conduits should run from the radio equipment room to the floor just below the cab. There should then be a cable ladder, trough or duct over to another set of 100 mm (4 in) conduits that continue the run up to the weather heads on the roof. Provide four 150 mm (6 in) ducts from the equipment room to the floor trench in the cab. Ducts shall be provided with pull boxes on each floor that they pass through, sized per the Philippine Electric Code (PEC). Pull boxes must be large enough to allow meeting minimum bending radius specifications of any transmission lines running to the roof.

b. Where cables are required to be buried beneath paved areas, provide cable ducts to support future installation of specialized communication wiring/cabling. Generally, a bank containing six 100 mm (4 in) ducts is adequate for this purpose. Duct banks should be used for critical communications wiring; direct bury for other cabling will be at the discretion of CIAC. Duct banks may be installed but are not required where the use of direct bury cabling is feasible.

c. Provide manholes and conduit stub-outs as necessary to accommodate future communications cable installation by others. Provide a 0.56 m2 (6 sq ft) minimum

communications space under the first floor, immediately beneath the communications duct riser. The manhole shall have a manhole access port from the first floor. Run six 100 mm (4 in) ducts from manhole below floor to a point at least 1.5 m (5 ft) beyond the building line. Direction of the duct lines will be provided at the pre-design conference.

d. Provide three 100 mm (4 in) conduits from the cable trays in the equipment rooms into the vertical communications chase.

3.2.27 Cable Separation

Power and communication cables shall be physically separated by distance or by barrier to preclude power cables from coming into contact with communication cables in accordance with the Philippines Electric Code. Cable ladders shall be provided. Vertical shafts shall be provided with fire separation assemblies in accordance with the other paragraphs in this section.

3.2.28 Communication Penetrations

Provide eight each 100 mm (4 in) cable penetrations in the concrete floor between each level of the communications riser. Install a full-height (floor to ceiling) cable ladder in the vertical communications riser. The ladder shall be installed on stand-offs to facilitate the ability to install cable ties to secure the cables to the ladder. Doors shall be installed at each level to facilitate cable installation and maintenance. Also provide communication penetrations for island areas where raised access flooring is not installed. The DBC shall specify that firestop material be installed at all penetrations.

3.2.29 Power Penetrations

Provide 6 each 100 mm (4 in) cable penetrations in the power chase. If desired, the 6 each 100 mm (4 in) cable penetrations in the power chase may be deleted in lieu of 300 mm x 400 mm (12 in x 16 in) rectangular opening for the building contractor to install power conduits, versus plenum-rated power cables. Doors shall be installed at each level to facilitate cable installation and maintenance. The DBC shall specify that fire stop material be installed at all penetrations.

3.2.30 Emergency Lighting

Ensure the stairway lighting and at least one light in each continuously occupied room is supplied by circuits powered by the emergency generator. Provide emergency fixtures (conventional with battery-backup) in the stairway and also one in each room. Battery powered emergency lights (wall packs)

are prohibited. Use LED.

3.2.31 Telephone Cabinets

Provide a minimum 1070 mm wide by 1240 mm high by 150 mm deep (42 in x 49in x 6 in) telephone cabinet in the upper electronic equipment room. The cabinet shall be interconnected by a 150 mm (6 in) square duct to the vertical communication riser. The cabinet shall be provided with "lift out" door. The main cable head shall be at ground level into the telephone room.

3.2.32 Lightning Protection

Lightning protection shall be provided as per Philippine Electrical Code (PEC).

3.2.33 Exterior Lighting

Building entrances should be lit to 21.5 lx (2 foot-candles) by LED Lights. Specify the use solar powered luminaires when they meet lighting requirements and are cost effective.

3.2.34 Obstruction Lights

Provide ICAO approved LED obstruction lights.

3.2.35 Parking Lot Lighting

Lighting should be provided per PEC standards. Where no guidance is given: a lighting level of 5.4 lx (0.5 foot-candles) at ground level is required in the parking lots. The lighting should use LED for low energy consumption. Lighting should be mounted on aluminum/steel standards which are mounted on concrete piers.

3.2.36 Control Cab Area Lights

Provide LED lighting in the Control Cab. Area lights shall be recessed floodlights with non-reflective grooved baffles. Lighting should be compatible with night vision goggle requirements. Specify lighting that meets Energy Star program standards.

3.2.37 Control Cab Spotlights

Spotlights shall be recessed pinhole lights, dimmer controlled, with approximately 64mm (2.5 in) opening, LED bulb. Caution: Do not use fluorescent "energy efficient" bulbs in the recessed pinhole lights in the tower cab since they do not allow for a full range of dimming (0 – 100%) and can cause undesirable reflections off of the glass. Specify lighting that meets Energy Star program standards.

3.2.38 Gooseneck Lamps

Overhead spotlights cannot provide direct lighting to operator positions in ATCT layouts that include glass that slopes toward the interior of the cab. The DBC shall consider the use of desk-mounted gooseneck lamps with LED bulb to illuminate each position. The gooseneck lamp must be fully dimmable and controlled from each position. Specify lighting that meets Energy Star program standards.

3.2.39 Grounding

The tower shall have a multi-point (earth electrode sub-system) facility grounding system. A Signal Reference subsystem wire (minimum 2/0 copper, yellow insulated) shall be installed in the vertical communication riser. Do not ground to the structure. The Signal Reference subsystem wire shall connect directly to the multi-point facility grounding electrode system. Grounding requirements will need to be enhanced for towers over 50 feet tall.

3.2.40 Equipment Reference Grid

The control tower cab and the electronic equipment rooms shall be provided with an equipment reference grid with embedded grounding plates as described in IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment. In addition, provide a single point ground lug on the plywood backboards in both equipment rooms and the telephone room on the first floor connected to the equipotential ground plane.

3.2.41 Light Gun Outlets

Light gun outlets shall be provided in the control cab. Eye bolts for hanging the light guns shall be installed by contractor.

3.2.42 Telephone Outlets

Telephone outlets are required in the offices of the facility. It is recommended that a minimum of four each (one per wall) "quad" jacks (two each CAT 5 data and two each CAT 5 telephone) be installed at each floor. Conduit for telephones can be stubbed, with bushings provided, above the ceiling where suspended ceilings are used. A cable tray should run from the Telephone Terminal Backboard (TTB) to and along the centerline of the facility when this method of installation is used. Conduit is only necessary for areas where there is no ceiling or there is no access above the ceiling. When conduit is used, it shall be prewired. Telephone service to the building will be provided by implementation of a communications scheme.

3.2.43 Service Outage Duration Limitations

The DBC shall specify that power outages for contractor connection will be arranged by coordination through CIAC. The contractor must request all outages in advance so that tower operations will not be inadvertently interrupted. Special provisions in the contract must clearly delineate these requirements.

3.2.44 Airfield Lighting Control

The Airfield Lighting Panel, with connections and interface to the existing airfield lighting vault, shall be provided and installed by the construction contractor, to include installation of the conduit and wiring for the lighting control panel. The size and number of conduit and conductors must be determined on a case-by-case basis. The contractor shall provide and install the airfield lighting control panel in the control cab console. The contractor should make the physical connection (including underground ducting) from the airfield lighting vault to the airfield lighting control panel at the ATCT. Provide one 10 cm (4 in) empty square duct between power panel and floor trench in control cab. The airfield lighting control panel shall conform to minimum requirements of CAAP, Panels for Remote Control of Airport Lighting. Updated, improved controls are encouraged but must be approved by CIAC.

3.2.45 Elevator

Towers with a cab floor level of 50 ft (15 m) or more above the ground level shall be equipped with an elevator. New elevators shall conform to the requirements of Mechanical Engineering Code of the Philippines (ME Code), Safety Code for Elevators and Escalators, and shall include a ventilated shaft. The elevator speed shall be a minimum of 0.76 m/s (150 ft/min). The elevator capacity shall be sufficient to transport the equipment installed above the ground floor.

3.2.46 Elevator Type

As a general practice, electric elevators with a soft start system should be specified. However, consideration may be given to the use of a hydraulic elevator when the ATCT is less than 18 m (60 ft) in height.

3.2.47 Elevator Operation

The elevator shall operate from ground floor to Lounge/Briefing room (or upper equipment room) whichever is higher, stopping at each intermediate floor. Elevators shall be interconnected

with the fire alarm/detection telephone and emergency power systems to recall the elevator to the ground floor and hold it there until the alarm is reset and/or the facility is returned to commercial power with the following exception: A three-position (on, off, and bypass) key-operated switch shall be installed in the first floor lobby to allow the elevator to operate on emergency power. When the switch is in the "on" position, normal elevator service shall be provided. When the switch is in the "bypass" position, the elevator shall operate independently of the fire alarm/detection system and the commercial power source. The key shall be removable only from the "on" or "off" positions. The elevator will be used to transport personnel and equipment. Provide RFID Access Control System.

3.2.48 Elevator Door

All elevator doors are to be the sliding type and shall provide at least a 0.9 m wide by 2.2 m high (3 ft wide by 7 ft 2 in high) clear opening. Elevator doors shall not open to the stair enclosure.

3.2.49 Elevator Electronic Equipment

Provide a containment vessel in the absence of an industrial waste line. Some types of elevator systems require location of elevator supporting electronic equipment in a conditioned space.

3.2.50 Elevator Pit

The elevator pit shall have pit light, ground fault indicator (GFI) electrical outlet, pit ladder extending 1017 mm (42 in) above the sill line and 113 mm (41/2 in) from the wall, and a sump pump connected to industrial waste line. Provide a containment vessel in the absence of an industrial waste line. Smoke detectors shall be installed in the elevator machine room and hallway in front of the elevator doors.

3.2.51 Fire Protection and Life Safety

This section provides the designer with fire protection and life safety information necessary to plan and design ATCTs and complies with applicable sections of Fire Code of the Philippines, the National Fire Protection Association's (NFPA) Life Safety Code, NFPA 101, and the National Building Code of the Philippines.

a. Occupancy

Since ATCT facilities have well defined work areas, workstations and operational positions, occupancy loads are determined by actual count of people planned to occupy the

facility. Included in the count should be current and future controllers, staff personnel, maintenance technicians and supervisors plus an allowance for visitors. The total occupancy of an ATCT is normally less than 25 people. Occupancy of the cab is generally 10 persons or less.

b. Protection For Persons With Disabilities
Persons who are unable to use the stairway for emergency egress and who are permitted access to the tower shall be restricted to the level of exit discharge only. The ATCT is intended to be manned by able-bodied personnel. Air Force policy requires all air traffic controllers to pass and maintain a current flight physical examination. Provisions for the physically handicapped are not applicable.

c. Number Of Exits and Means of Egress
Towers shall be provided with a single exit when the following conditions are met:
1. The tower is subject to occupancy by fewer than 25 persons all of which are part of the air traffic control tower operation.
2. The tower is not used for living or sleeping purposes.
3. The tower is of Type I or Type II construction,
4. The tower interior wall and ceiling finish is Class A or Class B.
5. The tower has no combustible materials in the structure, under the structure, or in the immediate vicinity of the structure, except necessary furniture.
6. There are no high hazard occupancies in the tower or in its immediate vicinity - emergency power for the ATCT is permitted.
7. Where the tower is located above a building, the single exit from the tower shall be provided by one of the following:
   7.1 An exit enclosure separated from the building with no door openings to or from the building, or
   7.2 An exit enclosure leading directly to an exit serving the building. A secondary egress is not required.

The means of egress shall not be shared with an attached adjacent facility or other occupancy. The DBC shall consider specifying a backup egress to provide a secondary means of escape from the cab, except when stairway and doors meet fire rated enclosure requirements and a secondary egress system is not required. Secondary egress from the tower is not required.

d. Construction

All towers must be (fire resistive) construction according to the National Building Code of the Philippines.

1. Fire rated partitions shall be installed to separate areas of hazardous occupancies such as mechanical, generator, storage, electrical and technical equipment rooms from areas of ordinary occupancy such as the stairway, offices, training rooms and control cab. Fire partitions shall be constructed to have a fire resistance rating of one hour with the exception of the mechanical and generator rooms greater than 9.3 sqm (100 sqf) which shall have a fire resistance rating of two hours and fire rated doors of one and one-half hours. Doors from areas of hazardous occupancies shall not open directly into the stairway, which shall be designed as a smoke proof enclosure.
2. All ducts and chases must be fire/smoke stopped by an approved/listed method at every floor. The construction contractor shall install firestops in the vertical cable ducts (NFPA standards) after installation of the cables. Stopping methods used must permit repeated removal and replacement, without special tools, to support changing requirements.
3. Flame spread and smokes development ratings as per Fire Code of the Philippines. A Class B interior finish may be substituted for Class A interior finish in areas of ordinary occupancy such as the offices, training rooms, and control cabs of towers that are completely protected with automatic sprinklers. All stairway finish material shall be Class A and floor finish shall be Class I rated.

e. Doors

Doors that connect with the stairwell must be equipped with automatic door closers. If the door has a lite to allow visibility from the floor into the stairwell, it shall be a fire-rated 5" x 20" vertical lite. Doors shall swing in the direction of egress travel when serving any hazardous area or serving an occupant load of 10 people or more. Doors shall have the capability of opening at least 90 degrees and have a clear width at the exit way of at least 910 mm (36 in).

All doors shall have a master keying system including coded entry doors. Key control should be compatible with the key control of the rest of the installation.

f. Stairways

1. ATCTs must have the stairway designed as a smoke proof enclosure. The purpose of the smoke proof enclosure is to prevent heat and smoke from entering the stairwell. The smoke proof enclosure shall consist of the vestibule and stairwell continuously enclosed from the ground floor to the bottom of the cab floor with a two-hour fire rated wall. The enclosure shall be a positively pressurized, firerated enclosure.
2. The width of a new stairway shall be 1120 mm (44 in) minimum. There shall be not more than 3.7 m (12 ft) vertically between landings. The handrail may extend from each side of the stairway a distance of 88 mm (3 1/2 in) into the required width. The stair rise shall not exceed 175 mm (7 in), and the tread shall be at least 275 mm (11 in), and the total height of two risers plus the width of one tread shall not be less than 610 mm (24 in).
3. Non-complying stairs may continue to be used, subject to the approval of the user and the authority having jurisdiction.
4. Circular stairways are prohibited except in existing cabs where the circular stairway serves an occupant load of 10 persons or less and the minimum width of run is not less than 125 mm (5 in) and the rise is not more than 225 mm (9 in).
5. Floor levels must be clearly marked at each landing level so that in the event of an emergency, fire and rescue personnel can identify where they are.

g. Fire Suppression and Detection

1. Fire Sprinkler System
   Towers shall be provided with complete automatic sprinkler protection. Wet-type systems shall be provided in all areas, unless subject to freezing. Protection for electronic rooms shall be provided.
2. Fire Standpipe System
   Towers more than 15.2 m (50 ft) to the cab floor (the minimum tower height must be provided with a Class I wet standpipe and an exterior fire department connection if the base water system has sufficient pressure to supply the standpipe. If the water system has insufficient pressure or is subject to freezing, then a dry Class I standpipe may be installed. Pressure and flow tests shall be conducted on the water mains near

the project site showing static pressure and flow capacity. A copy of a recent flow test should be submitted to CIAC. A machine room shall be provided with securable shut off valve installed outside elevator machine room.

3. Portable Fire Extinguishers and Cabinets
   Fire extinguisher cabinets shall be semi-recessed or surface mounted, 213 mm deep by 300 mm wide by 675 mm high (8-1/2 in by 12 in by 27 in). Fire extinguishers will be furnished and installed by the contractor. The fire suppression agent for handheld extinguishers shall be dry chemical powder suitable for Class A, B, C, and D fires. Halon extinguishers shall not be used.
4. Fire Detection and Notification System
   4.1 Automatic smoke detection and alarm systems shall be installed in all ATCT facilities. Smoke detectors shall be located near all probable sources of fire or smoke, including mechanical equipment rooms, return air plenums, electrical/electronic rooms, facility operational areas, etc. Protection for electronic rooms shall be provided. The system must transmit both alarm and trouble signals to the fire department. Transmitter equipment must be compatible with receiving equipment at the fire department's alarm communications center.
   4.2 Facility equipment generally includes manual pull stations, audible notification devices, visual notification devices, standby power supply, zoned control and transmission equipment.
   4.3 All audible and visual notification devices shall be "private mode" devices.
   4.4 A single fire detection and notification system may serve an ATCT.
5. Fire Hydrants
   Fire hydrants shall be provided as per Fire Code of the Philippines. Fire hydrants will be required as part of this facility. If added, fire hydrants are to conform to American Water Works Association (AWWA) Standard C502 or equivalent. Hydrants shall have two 64 mm(2 1/2 in) hose connections and one 113 mm (4 1/2 in) pumper connection and shall have a 150 mm (6 in) connection to the portable main. Outlets shall have American National Standard or equivalent fire hose coupling threads; working parts shall be bronze. Hydrants shall be dry or wet barrel type conforming to

the base standard and AWWA C502 with valve opening at least 125 mm (5 in) in diameter. At each fire hydrant installation, an isolation valve shall be installed between the hydrant and the main. The isolation valves must be contained in a valve box.

3.2.52 Security

a. Telephones
Provide and install an intercom station at the main entrance to the tower and at the entrance to the control cab. The intercom station located on the exterior of the tower must be installed in a weatherproof box.

b. Door Locks
Provide and install cipher locks, door closers, and electric strikes on the main entrance door and the door into the control cab. The wiring for the electric strikes shall be remote to the lower equipment room where the proposed ETVS will activate the relay. Also provide a light in the control cab console which indicates when either of these doors is not closed. The lock on the main entry and cab doors shall have a remote control override switch, controllable from the tower cab.

c. Entrances
Recommend a covered or recessed entrance or inner vestibule with outer and inner doors as possible options to allow for security requirements and provide protection from the elements. Provide a one-way reinforced window and a slot in the main entry door and the entry door to the control cab for the passage of identification cards.

d. Security Camera
The tower shall be prewired for a security camera system. The security camera shall allow the tower cab supervisor to view the main entrance door. A second camera shall be mounted to view the entrance door to the tower cab. The system may be designed so that the monitor cycles between each door, or by utilizing a split screen mode where one half of the monitor displays the first floor entry and the other half of the monitor displays the tower cab entry door.

e. Intercom System
An intercom system shall be provided and installed to allow audible communication between all floors and stations

specified above. The intercom system shall be simple and allow the cab to do an "All Call" to every floor. Master control shall be located in the control cab. The intercom system is purchased and installed by the contractor in the pre-wiring contract.

3.2.53 Control tower building aesthetic

Use rectangular tubular steel for the aesthetic skin. Provide support for the aesthetic skin to withstand wind speed of 125 mph or more.

3.2.54 Air Traffic Management Communication Equipment

a. Provision of electrical and fiber optic connections for the equipments.

3.3 **Scope of Construction.** The DBC shall fully undertake the Construction Works for all Project components.

3.3.1 The DBC shall implement the construction of the Project in accordance with its Bid Proposal and any modifications which may be agreed upon during the discussion on Conceptual Engineering Designs [CEDs] as officially recorded in the Minutes of Discussion with CIAC and final Detailed Engineering Designs approved by CIAC.

3.3.2 The DBC shall undertake the construction of the Project in accordance with Section VI. Minimum Performance Standards and Parameters [MPSP] and the DPWH Blue Book, Volume II.

4.0 PRELIMINARY STUDIES AND DESIGN ACTIVITIES

The DBC shall conduct and/or undertake the following:

4.1 Site Inspection and Survey

4.1.1 Reconnaissance shall include ocular inspection of the project site and its surrounding area.

4.1.2 Lot area shall be subject to preliminary detailed engineering survey.

4.1.3 The survey shall determine the area, topography, contours, elevation and surveys of existing trees at the project site.

4.1.4 Soil investigation shall include the testing and analyses of soil samples, soil boring tests five boreholes at 25 m. maximum depth or until hard strata is reached, geotechnical reports to determine

load-bearing capacity and other relevant physical properties needed prior to production of construction drawings.

4.2 Conceptual Design

4.2.1 The conceptual design of the New Eighteen-Storey Clark Air Traffic Control Tower Building Facility at Clark International Airport shown on Section VII Conceptual Designs, Drawings And Studies is only for ideation purpose of the Bidders. Bidders are required to present their respective images of the Project in its Approach and Work Plan as part of the Bid Proposal based on Section VIII Terms of Reference and Section VI MPSP.

4.2.2 The minimum height for the line of sight should not be lower than 54 meters from the (Above Mean Sea Level) AMSL and ensure Line-of-sight on all current and planned runway systems of the airport, as well as the proposed commercial development at the area adjacent to the terminal buildings as per ADPI Master Plan, in accordance with Obstacle Limitation Surfaces (OLS) requirements.

4.2.3 Cost estimates following Section X Bid Forms in Envelope No. 2.

4.2.4 Space Requirements

The eighteen-storey building facility shall contain the following space requirements/facilities subject to revisions during the negotiation stage of the procurement process.

a) Base Operation Building

- Ground Floor
    - Genset Room
    - Lobby
    - Mechanical Room
    - Electrical Room
    - Storage Room
    - Maintenance Room
    - CAAP Office 1
    - CAAP Office 2
    - CAAP Office 3
    - CAAP Office 4
    - Pantry
    - Lactation Room
    - Male Locker Room
    - Female Locker Room
    - Restrooms

- Second Floor
    - Training Room
    - Conference Room

- Administration Office
- CAAP Office 1
- CAAP Office 2
- Restrooms

b) Powerhouse
c) Tower Ground Lobby
d) Mechanical Room
e) Electrical Room
f) Elevator Room
g) Stairs
h) Lower Equipment Room
i) Upper Equipment Room
j) Ready/Briefing Room/Lounge
k) Lactating Room
l) Toilet/Rest Room- GAD approved
m) ATC Chief Controller's Office
n) Control Cabin
   - Catwalk
o) Roof

4.2.5 GAD (Gender and Development) Requirement

All infrastructure projects involve the construction of facilities, including schools, hospitals, dams, irrigation structures, and transportation systems shall adhere to the GAD Guidelines of the DOTR Department Order No. 2012-09. Some result in the involuntary resettlement of communities or households. Regardless of the type of infrastructure project, users and resettled groups are erroneously viewed as an undifferentiated population, having the same needs, vulnerabilities, access, and opportunities to participate in deciding what facilities are needed where, how they will be maintained, how much they should cost each user, and the like.

a) GENDER ISSUES AND GENDER EQUALITY RESULTS

Projects in the infrastructure sector have to contend with a number of gender issues, including the following:

- Different groups of users may have divergent requirements based on the seasonality and location of their activities. Projects that are designed without considering the variations may have a great impact on women's workload and access to resources.
- Women are rarely considered for employment in construction sites, although there are areas in which women have traditionally been involved in groundbreaking tasks. Most projects do not view women as potential workers. Where women workers need to move close to the worksite, they require secure and safe areas in construction camps.
- Gender gaps are often found in women's and men's

participation in users' groups that are organized to operate and maintain facilities (health centers, domestic water systems, and irrigation systems).

- Involuntary resettlement can and do affect women and men differently.

b) GENDER ANALYSIS QUESTIONS
Refer to [item 18.0 GAD checklist for designing and evaluating infrastructure projects] for the guidelines.

4.3 Detailed Architectural and Engineering Design Services

4.3.1 Prepare from the approved conceptual design, schematic or design development drawings and design parameters including any revisions and refinements as approved and required by CIAC; including but not limited to:

a) Detailed Engineering and Geodetic Survey;
b) Detailed Soil Foundation Investigation;
c) A&E Design Development Plans, Elevations and Sections;
d) Detailed Architectural Design and Plans including exterior glass curtain wall details for energy savings, thermal and moisture protection;
e) Detailed Architectural Interior Design and Plans;
f) Detailed Furnishing Plans as allowed by the budget which indicate casework and base building equipment that shall be Contractor Furnished/Contractor Installed (CFCI);
g) Detailed Site/Civil Landscape Architectural Designs and Plans;
h) Detailed Site and Building Engineering Designs and Plans
    - Site Development (includes provision for additional future CAAP satellite building, approx. floor area of 500 sqm) of the 10,000 sq.m area
    - Land Access (Road networks connected to the landside area) aligned with the ADPI Maser Plan
    - Structural
    - Sanitary/Plumbing
    - Electrical
    - Electrical Auxiliaries
    - Air Traffic Management Communication Systems
    - Communication Ducting And Cabling Systems (Fiber Optics)
    - Fire Alarm
    - Mechanical Room
    - Fire Suppression
    - Security and surveillance
    - Architectural
i) Detailed Plans for the removal/relocation of existing utilities and or structures;

j) Design Analysis which includes basis of designs and design calculations;
k) Detailed Technical Specifications which shall include descriptions of work items, material requirements, construction requirements and methods, methods of measurements, and basis of payments. Quality control program, sampling, testing and inspection requirements, material requirements and delivery schedules, shall be included in the specifications on applicable work items;
l) Detailed Bill of Quantities, Cost Estimates including Detailed Unit Price Analyses;
m) Cover Sheet, Project Location and Vicinity Map, Drawing Index, Summary of Quantities, General Notes, Legends, Symbols, Definitions and Abbreviations; and
n) Consultation and coordination with the Civil Aviation Authority of the Philippines (CAAP) regarding layout requirements of communication equipment (console – ATS, communications – ANS, visibility – ADMS)
o) Safety Program and Methodology
p) Construction Schedules, PERT-CPM, Equipment and Manpower Utilization Schedule
q) Other necessary plans/drawings, details, documents and reports that may be required by CIAC.

4.3.2 Prepare the scope of work for construction

4.3.3 Coordinate with all offices and agencies concerned, within and outside Civil Aviation Complex regarding utility connections, permits and other requirements needed.

4.3.4 Periodically coordinate and present the status of the design phase to CIAC.

4.3.5 All drawings included in the contract documents should be drawn using AutoCAD 2016 software and plotted on a 20" x 30" sheets. All other textual submittals shall be printed and ring-bound on A4-sized sheets.

4.3.6 Where required, design components shall be designed in coordination with the agencies concerned [e.g. Clark Electric, Clark Water, etc…].

4.3.7 Partial and earlier submission of the construction drawings, such as those affecting the preliminary stages of construction [site works, foundation works, etc.] shall be allowed. After CIAC issues a Notice of No Objection to the Detailed Engineering Plans, the DBC may immediately proceed with the Construction Phase provided all necessary Pre-Construction tasks have been accomplished.

4.4 **Construction Services**

4.4.1 Pre-Construction Phase

a) Secure all necessary building permits prior to construction. All incidental fees shall be included in the cost estimate of the building;

b) Preparation of the PERT-CPM, Bar Chart, S-Curve, Cash Flow Schedule, Manpower and Equipment Utilization Schedule of the construction phase;

c) Provide all other necessary documents that shall be required by the Client.

d) Prepare Construction Safety and Health Program.

4.4.2 Construction Phase

a) Implement all works indicated in the approved construction drawings and documents. All revisions and deviation from the approved plans, especially if it shall impact the overall cost of the project, shall be subject for approval;

b) Provide soil filling, grading and other soil protection measures of the building and other elements of the site, in response to the results of soil testing and materials testing;

c) Construct the building and other necessary structures, complete with utilities and finishes, resulting in operable and usable structures;

d) Construct sidewalks and curb cutouts, paving, driveways, parking slots, and, walkways within the project site;

e) Provide protection or relocation of existing trees affected by construction [if any];

f) Preparation of shop-drawings for approval;

g) Coordinate with CIAC regarding scheduling of delivery and installation of all owner-furnished materials and equipment during construction;

h) Conduct all necessary tests and issue reports of results;

i) Rectification of punch-listing works to be inspected and issued by CIAC;

j) Provide all other necessary documents that shall be required by

CIAC;

4.4.3 Post Construction Phase

a) Preparation of as-built plans

b) Turn-over of all manuals, certificates and warrantees of installed items; and

c) Provide all other necessary documents that CIAC shall require;

d) Obtain Occupancy Permit

5.0 APPROVED BUDGET FOR THE CONTRACT [ABC]

The Approved Budget for the Contract [ABC] is Two Hundred Ninety One Million Nine Thousand Nine Hundred Fifty Four Pesos and 49/100 (PHP291,009,954.49). This is the ceiling for eligible, acceptable bids for all Works. The Bidder shall submit only one total cost for all Works. Bids higher than the ABC shall be automatically rejected.

6.0 CONTRACT DURATION AND IMPLEMENTATION SCHEDULE

6.1 **Contract Duration.** Considering that this is a flagship, priority and fast track infrastructure project that needs to be completed on a tight schedule, the design and build services under the contract must be completed in Four Hundred Twenty (420) Calendar Days, reckoned on the date indicated in the Notice to Proceed.

6.2 **Implementation Schedule.** The Contractor is required to follow and complete the Project within the indicative time frame as follows:

Activity	**Month**															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Design Phase																
Permits and Licenses																
Construction Phase																

7.0 CONTRACT IMPLEMENTATION

The implementation of the Design and Build of the New Eighteen-Storey Clark Air Traffic Control Tower Building Facility with Supply, Install, and Commissioning of Communication Equipment at Clark International Airport shall comply with Annex "E" Contract Implementation Guidelines for The Procurement of Infrastructure

Projects and Annex "G" IRR/R.A. No.9184 with reference to the following provisions:

7.1 No works shall commence unless the contractor has submitted the prescribed detailed design drawings as requirements for the Building Permit and CIAC has given written approval. Work execution shall be in accordance with reviewed and approved documents.

7.2 The DBC shall be responsible for obtaining all necessary information as to risks, contingencies and other circumstances which may affect the works and shall prepare and submit all necessary documents specified by the concerned Building Officials to meet all regulatory approvals as specified in the contract documents.

7.3 The DBC shall submit a detailed program of works within five (5) working days after the issuance of the Notice to Proceed for approval by CIAC that shall include, among others:

7.3.1 The order in which it intends to carry out the work including anticipated timing for each stage of design/detailed engineering and construction;
7.3.2 Periods for review of specific outputs and any other submissions and approvals;
7.3.3 Sequence of timing for inspection and tests;
7.3.4 General description of the design and construction methods to be adopted;
7.3.5 Number and names of personnel to be assigned for each stage of the work;
7.3.6 List of equipment required on site for each stage of the work; and
7.3.7 Description of the quality control system to be utilized for the project.

7.4 Any errors, omissions, inconsistencies, inadequacies or failure submitted by the contractor that do not comply with the requirements shall be rectified, resubmitted and reviewed at the contractor's cost. If the contractor wishes to modify and design or document which has been previously submitted, reviewed and approved, the contractor shall notify the CIAC within a reasonable period of time and shall shoulder the cost of such changes.

7.5 As a rule, changes in design and construction requirements shall be limited only to those that have not been anticipated in the contract documents prior to contract signing and approval. The following guidelines shall govern approval for change or variation orders:

7.5.1 Change Orders resulting from design errors, omissions or non-conformance with the performance specifications and parameters and the contract documents by the contractor shall be implemented by the contractor at no additional cost to CIAC.

7.5.2 Provided that the DBC suffers delay and/or incurs costs due to changes or errors in the CIAC performance specifications and parameters, the contractor shall be entitled to either one of the following:

a) An extension of time for any such delays under Section 10 of Annex "E" of IRR (RA 9184); or

b) Payment for such costs as specified in the contract documents, provided, that the cumulative amount of the variation order does not exceed ten percent (10%) of the original project cost.

7.5.3 The contract documents shall include the manner and schedule of payment specifying the estimated contract amount and installments in which the contract will be paid.

7.5.4 Pursuant to the DOTr Department Memorandum, no advance payments or mobilization fees shall be extended or paid to the Contractor.

7.5.5 The contractor shall be responsible for the security and safety of its personnel, equipment, tools, and materials on site.

7.5.6 The contractor shall provide all necessary equipment, personnel, instruments, documents and others to carry out specified tests.

7.5.7 This design and build project shall have a minimum Defects Liability Period of one (1) year after contract completion or as provided for in the contract documents. This is without prejudice to the liabilities imposed upon the engineer/architect who drew up the plans and specification for building sanctioned under Section 1723 of the New Civil Code of the Philippines.

7.5.8 The DBC shall be held liable for design and structural defects and/or failure of the completed project within the warranty period of 15 years for permanent structures/buildings as specified in Section 62.2.3.2 of the IRR (RA 9184)

7.5.9 General Requirements

a) Permit to Construct;
b) Permit (Building Permit, Electrical Permit, Sanitary Permit, Mechanical Permit, Zoning Permit, Fire Safety Permit, etc.);
c) Project Billboard

- Temporary Facilities and Facilities for the Engineer including the operational and maintenance requirements but not limited to;

- 1 lot Furniture/Fixtures, Equipment & Appliances for the Field Office for the Engineer (rental basis)
- 8 units laptop (rental basis)
- 1 lot office supplies
- 1 unit 4x4 Pick Up Type Service Vehicle for the Engineer (rental basis)
- 1 lot communication equipment (rental basis)

- Earth Works
- Structural Works
- Site and Landscape Architectural Works
- Sanity/Plumbing Works
- Electrical Works
- Electrical Auxiliaries Works
- Fire Alarm
- Fire Suppression
- Architectural Interior Design Works
- Engineered Mechanical Building Utilities and Ventilation Systems
- Communication Equipments, Ducting And Cabling Systems (Fiber Optics)
- Supply, Installation, Testing & Commissioning of Air Traffic Management Communication System
- Supply, Installation, Testing & Commissioning of Passenger Elevator and Standby-power Generator
- Way finding and Room Signage Systems
- All other works, reports, documents, components and requirements that may be needed to the completion of the Project and acceptable to CIAC

8.0 OBLIGATIONS OF CIAC

In general, CIAC shall:

8.1 Provide available data to the DBC. CIAC informs that data and information in the Bidding Documents are for reference and does not guarantee that these are fully correct, up to date, and applicable to the project at hand. The DBC is responsible for the accuracy and applicability of all data, including the above, that it would use in its design and build proposal and services, as provided in Annex "G" specifies that the data below are for reference only;

8.2 Acquire road right of way;

8.3 Approve the Contractor's design without diminishing its full sole responsibility for the quality and integrity thereof as DBC;

8.4 Monitor the implementation of the projects in coordination;

8.5 Pay the Contractor's submitted accomplishment accepted in conformity with the payment schedule in the approved build contract; in accordance with the designs approved by CIAC and government accounting and auditing rules and regulations;

8.6 Designate an on-site Representative to the Project; and

8.7 Perform other responsibilities as may be specified in the contract agreement.

9.0 OBLIGATIONS OF THE DESIGN AND BUILD CONTRACTOR [DBC]

The DBC shall:

9.1 Certify that it has inspected and examined the proposed project site, its surroundings and existing infrastructure and facilities related to the execution of the work and has obtained all the pieces of information that are considered necessary for the proper execution of the work covered in the Bidding Documents;

9.2 Ensure that all works at the stages of design, construction, restoration of affected areas, and testing and commissioning shall be carried out efficiently and effectively;

9.3 Provide the CIAC with complete reports such as technical analysis, maps and details regarding the existing conditions and proposed improvements within the site;

9.4 Be accountable for accidents that might occur during the execution of the project and install warning signs and barriers in accordance with Department of Labor and Employment (DOLE) guidelines and construction safety procedures in the Bidding Documents for the safety of the general public and the avoidance of any accidents;

9.5 Be professionally liable for the design and shall submit all its basic designs, plans, and as part of its Technical Proposal using Section X Bid Forms and Qualification Information. The Contractor shall be liable for design and structural defects and/or failure of completed projects within the period specified in IRR/R.A. No. 9184;

9.6 Implement designs, plans, and drawings in accordance with Section VI Minimum Performance Standards and Specifications [MPSP] approved by CIAC; and submit basic architectural plans as required in its Approach and Methodology, Section X, Bid Forms and Qualification Information.

9.7 Implement Flood Mitigating Measures as proposed in the Geo-hazard Certifications issued by the DENR.

9.8 Perform other responsibilities in the contract agreement.

10.0 PROJECT DELIVERABLES OF THE DESIGN AND BUILD CONTRACTOR

The following submittals and accomplished documents shall be duly completed and turned-over by the DESIGN & BUILD CONTRACTOR for the project:

10.1 Pre-Design Phase

10.1.1 Reconnaissance Report

10.1.2 Survey Sketch Plans [with technical description]

10.1.3 Site survey, topographic survey, geotechnical report and all other pertinent data elated to the conditions of the project site

10.1.4 Preliminary Architectural and Engineering designs and layouts

10.1.5 Outline specifications and cost estimates.

10.2 Design Phase

10.2.1 Construction plans [signed and sealed] that include Architectural, Civil, Structural, Electrical, Mechanical, Communications Network Layout, Fire Protection and Plumbing plans [8 sets hardcopy and 1 softcopy]

10.2.2 Technical Specifications [8 sets hardcopy and 1 softcopy]

10.2.3 Detailed Cost Estimate [8 sets hardcopy and 1 softcopy]

10.2.4 Bill of Quantities [8 sets hardcopy and 1 softcopy]

10.2.5 Documents required for securing the Building Permit

10.2.6 Drawings and reports that CIAC may require for the periodic update concerning the status of the design phase.

10.3 Construction Phase

10.3.1 Monthly Progress Reports

10.3.2 As-built plans [4 sets hardcopy and 1 softcopy]

10.3.3 All necessary permits [Fees shall be included in the contract]

10.3.4 Shop drawings

10.3.5 PERT-CPM

10.3.6 Test results

10.3.7 Guarantees, warrantees and other certificates

10.3.8 Fire and Safety Compliance and Commissioning Report [FSCCR] and Fire Safety Maintenance Report [FSMR]

10.3.9 Obtain Certificate of Occupancy

10.3.10 All other documents necessary in line with the construction as may be required by CIAC

11.0 WARRANTY PERIOD

The Contractor shall guarantee the completed Works against structural defects and failure for its satisfactory performance vis-à-vis, the prescribed minimum performance specifications during the lifetime of the structure. For this purpose, the Contractor shall post a warranty security in the form of surety bond, callable on demand issued by a reputable institution, and based on the prescribed percentage of the contract price provided in the Bidding Documents.

12.0 PROCEDURE AND CRITERIA FOR BID EVALUATION

12.1 Two-Step Evaluation Procedure in Annex G IRR RA 9184. For the detailed evaluation of the design and build proposals, the BAC shall adopt a two-step procedure which shall apply in case of any inconsistencies with the contents of the tender documents, to wit:

12.2 Two-Step Evaluation Procedure in Annex G IRR RA 9184. For the detailed evaluation of the design and build proposals, the BAC shall adopt a two-step procedure which shall apply in case of any inconsistencies with the contents of the tender documents, to wit:

12.2.1 First-Step Procedure

a) Eligibility Checklist and Detailed Review of Bidder's Compliance with Qualification Information

a.1) The first activity of the evaluation involves the compliance of a Bidder in the submission of the Checklist of Eligibility Requirements using a non-discretionary "Pass/Fail" criteria. Only those Bidders which pass the checklist shall be eligible for the second activity.

a.2) The second activity involves a detailed Review and

checking of the completeness, sufficiency, and compliance of a Bidder's Class "A" Requirements including Experience in Similar Design and Build Projects with at least 50% of the ABC; and Class "B" Requirements including Bidder's Joint Venture/Consortium with a Contractor or Design Entity with at least one completed Design and Build Project with applicable criteria in cost of project or design.

A Bidder who fails to meet any of the requirements at any stage in the Checklist and Detailed Evaluation shall no longer qualify for the evaluation of the remaining requirements and shall be disqualified.

b) Technical Evaluation of Design and Build Bid Requirements. A Bidder shall be evaluated based on compliance and submission of the technical requirements in Section X Bid Forms and Qualification Information for Design and Build using a non-discretionary "Pass/"Fail" and a Point-System as follows:

Criteria	Points
Approach and Methodology	40
Quality of Proposed Personnel	60
Total	100

Criteria for Conceptual Design

	PASSED	FAILED	REMARKS
1. Architectural/Design Consideration:			
1.1 Drawing Requirements (AutoCAD)			
• 3D Rendered Perspective (Architectural Character)			
1.2 Site Development Plan			
1.3 Conceptual Design			
• Floor Plans a) Distribution b) Circulation c) Light and Ventilation d) Sizes, Areas and Shape			
• Front, Rear, Left and Right Side Elevations a) Light and Ventilation b) Height c) Location of Doors and Windows			
• Sections a) Longitudinal Section b) Cross Section			

• Architectural Interiors and Exterior Finishes			
2. Civil/Structural/Structural Analysis			
2.1 Drawing Requirements (AutoCAD)			
• Structural Design Criteria and Design Notes, Structural Design Concept.			
• Foundation plan;			
• Floor Framing Plans;			
• Stair Details			
• Elevator Structural Framing Plans and Details			
• Control Cab window plans and details			
3. Electrical			
3.1 Drawing Requirements (AutoCAD)			
• Electrical Design Analysis and Computation			
• General notes ,Power Riser Diagram, Single Line Diagram, Legends and symbols, Schedule of Loads			
• Power and Lighting Layout System			
• Fire Alarm System			
• ACU			
• Grounding System			
4. Electronics and Communications Plans			
4.1 Drawing Requirements (AutoCAD)			
• ICT			
• Air Traffic Management Communication System			
• PABX			
5. Sanitary/Plumbing			
5.1 Drawing Requirements (AutoCAD)			
• General Notes, Legend and Symbols			
• Water Supply, Sanitary Line, Vent and Storm drainage layout			
• Isometric Diagram			
6. Mechanical			
6.1 Drawing Requirements (AutoCAD)			
• General Notes			
• Elevators			
• Legends and symbols			
• Fire protection System plans and layout			

• HVAC			

Bidders shall present their building design in 2D and 3D presentation at suitable scale on 20"x30" blue print paper or A3 white print minimum size. Such presentation will be viewed and subject for comment, correction and verification from CIAC.

A Bidder who fails to submit any of the requirements or submits incomplete or insufficient information at any stage in the evaluation shall no longer qualify for the evaluation and shall be disqualified.

12.2.2 Second-Step Procedure

a) Only those bids that passed the above criteria shall be subjected to the second step of evaluation. CIAC shall inform the results and Eligible Bidders shall be notified.

b) The BAC shall open the Financial Proposal of each "Passed", eligible bidder in the presence of the Bidder's Authorized Representatives and shall read out the prices. The "As Read" financial bids shall be ranked, in ascending order, from lowest to highest.

c) The BAC shall automatically disqualify any total calculated bid prices exceeding the ABC.

d) The BAC shall review the bid prices of eligible Bidders and determine the Lowest Calculated Bid [LCB].