# PHILIPPINE NORMAL UNIVERSITY
## The National Center for Teacher Education

## FACILITIES MANAGEMENT & SUSTAINABILITY OFFICE

**BAGONG PILIPINAS**

📍 **Taft Ave. cor. Ayala Blvd., Ermita, Manila**  📞 **(+632) 5317-1768 loc. 779**  ✉ **fmso@pnu.edu.ph**

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| Name of Project: | **COMPLETION OF THE NATIONAL CENTER FOR TEACHER EDUCATION (NCTE) BUILDING *(formerly* THE PHILIPPINE NORMAL UNIVERSITY CONVENTION AND TRAINING CENTER), Manila Campus** |
| Location: | **PNU MAIN CAMPUS** |
| Subject: | **SCOPE OF WORKS AND TERMS OF REFERENCE** |

**OBJECTIVE:**

The main purpose of the NCTE Building is to increase the carrying capacity of PNU to admit more qualified students. The plan to move all classrooms from the Geronima T. Pecson Hall (formerly Main Building), which is designated as a National Cultural Treasure, will de-stress the structure and further preserve is as a living museum for teacher education.

**RATIONALE:**

The NCTE Building will provide state-of-the-art facilities conducive for trainings, workshops, and conferences, not only for PNU and its Campuses, but also for other stakeholders in the government and academe, both public and private. The big classrooms with air-conditioning systems and ample lighting and ventilation will provide ideal teaching and learning spaces for both faculty members and students in the undergraduate and graduate levels. This will be an ideal training ground, not only for pre-service teachers of PNU, but also for in-service teachers from public and private schools

The National Center for Teacher Education (NCTE) Building (formerly the PNU Convention and Training Center) is a building that will house 60 classrooms, some of which are convertible to training/lecture rooms and one (1) auditorium/conference hall that can accommodate 500 people. It will have four (4) service passenger elevators.

The ground floor will have an activity center for students. The mezzanine will have the Office of Student Affairs and Services Office (SASO) as well as rooms for student organizations.

**SCOPE OF DIRECT WORKS:**

The Work consists of supervision, supply of materials, labor and equipment and all other items and services necessary to complete the Project. The Contractor shall execute and complete the Work with full responsibility and in self-supporting capacity. He shall comply with all Laws, City Ordinances, and all Government Regulations and with other regulatory requirements. He shall be responsible for all damages to persons or property, which may occur in connection with the execution of the Work.

Unless otherwise specified in the contract documents, the Contractor shall be fully responsible for all the direct work required to complete the project including, but not limited to the following:

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## I.   GENERAL REQUIREMENTS

1. Mobilization of workers, materials, and construction equipment to be supplied by the contractor.

2. **Securing and obtaining all requisite clearances, licenses, certificates, and operational permits** from all applicable national agencies and local regulatory bodies, specifically addressing:

   2.1.   **New Construction Compliance:** All documents necessary for the lawful construction of the proposed additional structure.

   2.2.   **As-built Compliance:** All documents necessary and regulatory approvals required for the whole structure to ensure the entire structure is fully compliant, operational, and ready for occupancy

3. Construction of temporary facilities for temporary offices, warehouse, and workshop or staging area.

4. Acquiring temporary utility services (water, electricity, internet, and communications) to be used during the execution of the project.

5. Furnishing of ID cards and uniforms, PPEs, and other safety equipment necessary for the complete protection of workers and others around the project area against the dangers of injury, sickness, or death. Also, installation of temporary protection and cover of school facilities.

6. Use of various pieces of equipment, including heavy equipment and scaffoldings.

7. Disposal of debris, site cleanup and demobilization.

8. Value Engineering. For major projects as specified by the agency, value engineering  shall  be conducted according to accepted standards and practices. Value engineering shall analyze alternative schemes of achieving the projects objectives in order to delete or reduce non-essential features and lessen the life cycle costs of the projects without sacrificing the quality and integrity of the structure, while maintaining its essential function, performance, and safety.
The bidder may conduct value engineering as identified by the Facilities Management and Sustainability Office (Electrical Works, Mechanical Works, Plumbing etc.). The bidder shall submit an amount for their proposed value engineering that shall not exceed the cost of the item/work being subjected to value engineering. The identified value engineering works are subject to the approval of the Head of the Procuring Entity

9. Bidder must have a minimum PCAB License General Building Category "AA", size range in Building "Large A" with specialty on the following: Electrical Works-Small

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B, Elevator-Small B, Water Proofing-Small B, Elevator-Small B, Fire Protection Work-Small B

10. Bidder must be ISO certified 9001:2015 Quality Management System. Bidder shall submit valid/latest ISO certification during bid opening.

11. The Contractor shall employ the following Key Personnel:

    11.1. Structural Engineer must be member of ASEP with 5 years' experience

    11.2. Project Engineer (Civil Engineer or License Architect) with 5 years' experience

    11.3. Professional Electrical Engineer with 5 years' experience

    11.4. Sanitary Engineer with 5 years' experience

    11.5. Professional Mechanical Engineer (PME) with 5 years' experience

    11.6. Professional Electronic Engineer with 5 years' experience

    11.7. Materials Engineer II Accredited by the DPWH with 5 years' experience

    11.8. Safety Officer II (COSH) with 5 years' experience

    11.9. Foreman with 5 years' experience

During bid opening, the bidder shall submit the photocopy of the latest PRC ID, valid license, professional tax receipt number, certification, resume, and affidavit of employment of the personnel stated mentioned-above

12. Bidder must have a following equipment:

    12.1. 25 Ton Crane

    12.2. 4200 kg. Mini Dumb Truck or higher

    12.3. Scaffolding

    12.4. Rebar bender

    12.5. Laser self-levelling measurement

13. The contractor shall submit all the following documents during bid opening:

    13.1. Bid prices in the Bill of Quantities;

    13.2. Detailed estimates, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipment rentals used in coming up with the Bid;

    13.3. Detailed Unit Price Analysis (DUPA); and

    13.4. Cash flow by quarter or payment schedule

14. Similar contracts refer to those that involve the same major categories of work. The bidder must have completed a similar contract with the valued at least fifty percent (50%) of the Approved Budget for the Contract (ABC) for the constructed building. Prospective bidders are required to submit evidence of this contract, which shall be included as part of the Technical Specifications.

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15. During bid opening, the bidder shall submit a technical data sheet and evidences (in the form of manufacturer sales literature/catalogs/brochures). The technical data sheet and evidences shall be part of the criteria for evaluation.

16. The bidder/s must conduct an onsite inspection on the project mentioned above and submit a site inspection certificate issued by the PNU Facilities Management and Sustainability Office (FMSO) during bid opening. A certificate of site inspection will be given to the bidder/s who procured the bid documents.

17. After the completion of the project, the contractor shall submit the soft copy of the as-built-plans in CAD format stored in NVME External 1 TB and five (5) copies of 20" x 30" signed and sealed as-built-plans of the following: a) Structural plan; b) Architectural plan; c) Electrical Plan; d) Mechanical plan; e) Plumbing plan; and f) Electronics and Communication plans.

18. The contractor shall secure all the necessary permits such as municipal fees, licenses, fire permit, zoning fees, electrical fees, elevator permit to operate, sanitary permit, permit to operate of the elevator and building occupancy permits. The FMSO will assist the contractor in all documentation for the application of the necessary permits.

19. Procuring entity shall provide utility services such as water and electricity to be used during the execution of the project.

20. The bidder shall submit a notarized certificate of no record/s pending case to any government agencies.

21. The Approved Period for the contract is three hundred sixty-five (365) calendar days for the completion of the abovementioned project.

22. The approved budget contract for the abovementioned project is Php230,800,000.00.

23. Request of extension will be on the following conditions:

   23.1. Due to weather conditions with supporting documents from Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

   23.2. Due to unavailability of materials and equipment subject to attached justification from the manufacturer.

   23.3. Due to the noise produced by construction, which is affecting university events, conferences, classes and meetings.

   23.4. Due to unforeseen site conditions, client-initiated changes and non-acquisition of permits.

   23.5. Due to sudden declaration and suspension of works by the government.

   23.6. No extension will be granted due to regular holidays. All regular holidays have been included in the contract duration.

## II.   STRUCTURAL WORKS

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A. Concreting Works

1. Concreting of columns, beams, suspended slabs, stairs, machine rooms, and tank skid base.

B. Rebar Works

1. Supply and installation of rebars for columns, beams, suspended slabs, stairs, machine rooms, and tank skid base.

C. Formworks and Falseworks

1. Supply and installation of formworks and scaffoldings for columns, beams, suspended slabs, stairs, machine rooms, and tank skid base.

D. Metal Works

1. Supply and installation of steel deck for portion of roof deck.

2. Supply and installation of structural steel for construction of steel beams and trusses, complete with necessary steel plate connectors and various bolts

## III. ARCHITECTURAL WORKS

A. Masonry Works

1. Supply and installation of precast concrete wall, complete with reinforcements, compressible fillers, and concrete stiffeners as shown on drawings, described in the specifications and as otherwise required.

2. Supply and installation of concrete hollow blocks, including reinforcements, compressible fillers, and concrete stiffeners as shown on drawings, described in the specifications and as otherwise required.

3. Plastering of exterior and interior walls and other masonry and concrete surfaces.

4. Floor levelling/cement topping

B. Doors

1. Supply and installation of metal doors.

2. Supply and installation tempered glass doors in aluminum frames.

3. Supply and installation of solid tanguile panel doors and jambs with clear glass.

C. Windows

1. Supply of Low-E clear glass awning windows on powder coated aluminum frame.

2. Supply of Low-E clear glass fixed windows on powder coated aluminum frame.

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D.  Curtain Wall

    1.  Supply of Low-E clear glass curtain walls on powder coated aluminum frame.

E.  Floor and Wall Finishes

    1.  Supply and installation of floor tiles.

    2.  Supply and installation of heavy- duty wall-to-wall carpet.

    3.  Supply and installation of unglazed ceramic tiles on stair tread, risers and landings.

    4.  Supply and installation of operable partitions in classrooms and convention center.

F.  Ceiling Finishes

    1.  Supply and installation of fiber cement ceiling board on light gauge metal framing system.

    2.  Supply and installation of aluminum linear ceiling on light gauge metal framing.

    3.  Supply and installation of fiber cement board ceiling tile on heavy-duty tee-runner framing system.

G.   Painting Works

    1.  Removal of loose and flaking skim coats and other imperfections and complete surface preparation works prior to application of paints.

    2.  Painting of exterior walls, interior walls, and ceiling using acrylic latex paints.

H.  Waterproofing Works

    1.  Supply and application of flexible cementitious waterproofing in toilets.

    2.  Supply and installation of torch-applied waterproofing membrane.

I.  Miscellaneous Architectural Works

    1.  Supply and installation of ceiling fans, beveled face mirrors, and stainless-steel grab bars.

    2.  Supply and installation of granite countertops.

    3.  Supply and installation of magnetic glass boards, including frames and mounting boards, with adjustable marker trays and holders.

J.  Toilet Partitions

    1.  Supply and installation of phenolic compact board partitions, complete with stainless-steel fittings and accessories.

K.  Plumbing Fixtures

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1. Supply and installation of flush valve type water closets.

2. Supply and installation of under-the counter type lavatories, complete with self-closing tap line.

3. Supply and installation of stainless-steel toilet paper holders and robe hooks.

4. Supply and installation of electric hand dryers.

5. Supply and installation of wall-mounted soap dispensers, in stainless-steel housing with mirror finish and removable plastic globe.

## IV.   ELECTRICAL WORKS

1. Supply and installation of electrical roughing-ins.

2. Supply and installation of electrical wiring devices: switches and outlets.

3. Supply and installation of electrical wires and cables.

4. Supply and installation of panel boards and boxes

5. Supply and installation of lighting fixtures

6. Complete Testing of the Electrical System and submit the following test result.

   a. Insulation Test Result
   b. No-Load, and Full Load Test Result
   c. Continuity Test Result
   d. Live test Result

7. As-built electrical drawings showing the updated electrical system.

## V.    PLUMBING AND SANITARY WORKS

A. PVC Pipes and Fittings

1. Supply and installation of PVC series 1000 sanitary pipes and fittings.

2. Supply and installation of floor drains, cleanouts and p-traps.

B. Waterline Works

1. Supply and installation of PPR pipes and fittings.

2. Supply and installation of valves, flexible connectors, and hose bibbs.

C. Pumps and Equipment

1. Supply and installation of submersible type transfer pumps.

## VI.   MECHANICAL WORKS

A. Air conditioning and Ventilation

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1. Supply and installation of window type ACUs, wall mounted ACUs multi-point ACUs, and floor-mounted ACUs, including all standard accessories, brackets, pedestals, communication cables, NEMA 3R, electrical wires, refrigerants, piping insulation, drain materials, Testing and Commissioning, and all necessary materials to make the units functional.

B. Elevators

1. Supply and installation of elevators, complete with all standard accessories, and others to make the elevator functionable.

## VII.    FIRE PROTECTION WORKS

A. Black Iron Pipes and Fittings

1. Supply and installation of BI straight pipes, fittings, and supports.

2. Painting of pipes.

B. Valves and Accessories

1. Supply and installation of valves and accessories.

2. Supply and installation of supervisory and water flow switches.

3. Supply and installation of pressures gauges.

4. Supply and installation of roof manifolds.

5. Supply and installation of testing line header.

6. Supply and installation of fire department connections.

7. Supply and installation of auxiliary drains and air vent.

8. Supply and installation of manhole cover with s/s ladder rung.

9. Supply and installation of alarm motor gong.

10. Supply and installation of suction strainer.

C. Sprinkler Heads

1. Supply and installation of sprinkler heads; pendent type, sidewall, and upright.

D. Fire Hose Cabinet and Fire Extinguishers

1. Supply and installation of fire hose cabinet, complete with valves, hoses, and accessories.

2. Supply and installation of dry chemical fire extinguishers and $CO_2$ fire extinguishers.

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E.  Pumps and Equipment

   1.  Supply and installation of fire pump including pump controller.

   2.  Supply and installation of jockey pump including pump controller.

   3.  Supply and installation of GRP panel type elevated water tanks.

VIII.  **ELECTRONICS**

   A.  Electronics and Communication Engineering Works

   1.  Supply and installation of building management system, complete with the necessary devices, workstations, software, and other accessories.

   B.  Structured Cabling System and Information Technology System
   1.  Supply and installation of Information Technology System and structured cabling system components.

   C.  IP CCTV System
   1.  Supply and installation of day & night vandal proof dome IR IP camera for outdoor and indoors.
   2.  Supply and installation of network video recorder and other IP CCTV system accessories.

   D.  Fire Detection and Alarm System
   1.  Supply and installation of smoke detectors (addressable) and smoke detector bases.
   2.  Supply and installation of heat detectors (addressable) and heat detector bases.
   3.  Supply and installation of fire detection and alarm system accessories.

## SCOPE OF INDIRECT WORKS:

The following services shall be included in the indirect work/expenses as deemed necessary:

1.  Overhead expenses which include but not limited to the following: Engineering and Administrative Supervision, transportation allowances, office expenses; and premiums on bonds and insurances.
2.  Contingency works, which include meetings, coordination, design and construction of temporary works, if necessary, and other unforeseen events.
3.  Miscellaneous works to include material testing whenever necessary for quality control, preparation and submission of shop drawing or working drawings, documents and/or materials samples as required, and preparation of as-built plans.
4.  Contractor's profit and value-added tax.

## IX. DESIGN DOCUMENTATION SUBMITTAL, DOCUMENTS AND REVIEW PROCESS
The Bidder shall submit the following documents, at a minimum, during the bid opening.

1.  Health and Safety Plan
2.  Bidder shall submit during bid opening valid/latest certification ISO certified 9001:2015 Quality Management System.
3.  Architectural landscape design including hardscapes and softscapes specification.

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4. Submit Certificate of Site Inspection issued by the PNU Facilities Management and Sustainability Office (FMSO).

5. The contractor shall submit all the following documents during bid opening:
   - Bid prices in the Bill of Quantities;
   - Detailed estimates, including a summary sheet indicating the unit prices of construction materials, labor rates, and equipment rentals used in coming up with the Bid;
   - Detailed Unit Price Analysis (DUPA); and
   - Cash flow by quarter or payment schedule

2. Bidder shall submit technical data sheet and these technical data sheet shall be part of the criteria for evaluation (see BOQ – submit technical data sheet).

3. All technical documents shall be reviewed by PNU authorized representative

4. The Bidder shall submit a detailed unit price analysis for each of the pay item

5. **SPECIFICATOIN OF WIRELESS ACCESS POINT 7<sup>TH</sup> GEN. – 60 UNITS (submit technical data sheet)**
   - 1*10/100/1000M/2500Mbps Base-T Ethernet Port (802.3at PoE+)
   - 1*10/100/1000Mbps Base-T Ethernet Port
   - 1*1G/2.5Gbps Fiber Port (SFP)
   - Support 802.3af/802.3at compatible PoE power supply
   - Forwarding capacity of the whole machine ≥ 3.5Gbps
   - 1*Reset Button
   - 1*RJ45 Console port for Management
   - Support frequency band
   - Radio1: 2.400-2.4835GHz
   - Radio2: 5.150–5.350GHz, 5.47–5.725GHz, 5.725–5.850GHz
   - Built-in Intelligent Antennas
   - Max STA Capacity up to 1024
   - Support 32 SSIDs
   - AP working mode: Fit Mode, can be centrally managed by the Wireless Controller (AC)
   - Support IEEE 802.11a/b/g/n/ac/ax/be
   - Support 20, 40, 80, 160 MHz Channelization
   - Support Multi-User Multiple Input Multiple Output (MU-MIMO)
   - Support Maximum Ratio Combining (MRC), Space-Time Block Coding (STBC), Cyclic Delay/Cyclic Shift Diversity (CDD/CSD), Dynamic MIMO power saving
   - Support U-APSD, SM Power Save, Green AP mode
   - Support Open, WPA-PSK, WPA-802.1X, WPA2-PSK, WPA2-802.1X, WPA3-PSK, WPA3-802.1X, Portal, Radius

- **OR**
  - Complies with the 802.11be standard, enterprise grade AP
  - Interface:1 x 100/1000M/2.5G/5G/10G Multigigabit Ethernet, RJ-45, PoE input + 1 x 1000M/10G optical port, PSFP, PoE input + 1 x 10/100/1000M Ethernet, RJ-45, PoE output
  - Weight: at most 0.79g - 0.90g
  - Must support dual-radio 4-5 streams and built-in antennas, with one radio supporting switching between 6GHz and 5GHz, and the other radio supporting switching between 5GHz and 2.4GHz, with a speed of up to 8.647Gbps – 9.647Gbps

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- Must support yellow/green/blue status LEDs for different working states indicate boot loader status, association status, operating status, and fault states of the system
- Must support Cloud-based management option with no additional licenses and subscription
- Must support Built-in BLE5.4 IoT Module
- IPsec: Cloud AP mode supports IPsec
- Overall power consumption: at most 35.6W-38.6W
- Must support 128-1024 number of clients.
- Must support 14-16 number of BSSIDs for each radio
- Must support Service Assurance features: Must support Remote AP, Doctor AP, Spectrum Analysis, only 802.11ax processing, Intelligent bandwidth guarantee, Port Aggregation, Broadcast Suppression, Prohibit weak client signal access, Terminal roaming navigation, Actively triggering client relinking, Adjust channel reuse between APs, Fast forwarding function for client data services, Shorten client sleep time, Software version anomaly repairing.
- Compliant with Wi-Fi Alliance standards, supporting Wi-Fi 7, Wi-Fi 6E, and Wi-Fi 6; certified for WMM, WPA, WPA2, and WPA3 (Enterprise, Personal [SAE], and Enhanced Open [OWE]) security protocols.
- The proposed brand must be included in the latest release (2025) of Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure and included in The Forrester Wave™: IoT-Ready Wireless Solutions, Q2 2024
- The Access Point must support WMM, QoS (TOS/DSCP marking, SSID/VLAN policy mapping, CAR), User Bandwidth Management (per STA, SSID-based, dynamic adjustment), ATF (Airtime Fairness), CAC (Call Admission Control), and Application Identification (SQA, UCC) for enhanced audio, video, and data transmission quality.
- The Access Point must support Green AP mode (dynamic MIMO adjustment), U-APSD (Unscheduled Automatic Power Save Delivery), and SM Power Save (Spatial Multiplexing Power Save) to minimize device power consumption and enhance energy efficiency.
- The Access Point must support Cloud AP Web management via HTTP/HTTPS, SNMP v1/v2c/v3, MIB (RFC 1213 & RFC 3418), SSH v2.0/Telnet/FTP/TFTP for remote debugging, CLI for local access, Syslog for information maintenance, Secure Boot for firmware integrity, and Netconf for programmable network management.
- The Access Point must be compliant with IEEE 802.11a/b/g/n/ac/ac Wave 2/ax/be, IEEE 802.11d/e/h/i/w/u, IEEE 802.11k/v/r, 802.3af/802.3at/802.3bt, 802.3bz, 802.15.1
- The Access Point must be the same brand with the proposed POE Switch, Wi-Fi and Wif Controller.

6. **SPECIFICATIONS OF 24-PORT POE SWITCH – 5 UNITS (submit technical data sheet)**
   - The Switch shall be rack mountable and 1RU high
   - Fixed 24 Nos. 100M/1000M/2.5GE mGig Base-T Ports, Support PoE (802.3af/at/bt)
   - Fixed 6 Nos. 1/10Gbps Base-X optical SFP+ Ports
   - Fixed one RJ45 console port for local management
   - Must have no less than 1520Watts PoE budget
   - Fixed one USB2.0 port
   - Must have two modular power slots
   - Switching capacity no less than 240Gbps
   - Must support 32K MAC table
   - Must support 8K ARP table

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- Must support 4K active VLAN
- Must support 12K Jumbo Frame
- Must support stacking technology
- Support VLANs based on MAC and IP subnets
- Support MAC VLAN, Private VLAN, Guest VLAN, Voice VLAN, Super VLAN, Protocol VLAN, GVRP
- Support Basic QinQ, Selective QinQ, VLAN mapping
- Support Local SPAN, RSPAN, VLAN SPAN
- Support static LACP and dynamic LACP
- Support H-VST, M-VST Stacking, MAD LACP, MAD Fast-Hello, M-LAG
- Support STP/RSTP/MSTP, BPDU Guard, Flap Guard, Loop Guard, Root Guard, TC Guard
- Support VIST/VIST+
- Support DHCP/DHCPv6, Static routing/Static routev6, RIP/RIPng, OSPFv2/OSPFv3, BGP/BGP+, ISIS/ISISv6, VRRP/VRRPv3, VBRP, PBR/PBRv6, IP-VRF
- Support BFD with Static, RIP, OSPF, BGP, ISIS, VRRP, Track, PIM-SM
- Support Radius, TACACS+, 802.1x and L2 Portal authentication
- Support Standard IP ACL, extended IP ACL, standard MAC ACL, extended MAC ACL, Standard
- Support G.8032 protocol and realize ms-class service switching
- Support ZTP provisioning through DHCP server and USB disk. Support SDN controller management
- Support Netconf, IP SLA, BSMv4
- Support Telnet, SSHv2, Web, Console, TR069, SNMPv2/v3

7. **SPECIFICATION OF CLOUD-BASED MANAGEMENT PLATFORM – 1 LOT (submit technical data sheet)**
   - **Hardware Specification:**
   - Processor:
     - The server shall be equipped with two processors.
     - Each processor shall provide at least 8 cores and 16 threads.
     - The maximum frequency of each processor shall not be less than 3.0 GHz.
   - Memory:
     - The server shall be equipped with at least 64 GB memory.
     - The memory subsystem shall support at least 16 memory slots for future expansion
   - Storage :
     - The server shall be equipped with at least three (3) × 1.8 TB HDDs.
     - The server shall support RAID 0, RAID 1, and RAID 5 simultaneously.
     - The server shall support installation of up to eight (8) × 2.5-inch hard disks.
   - Network Interfaces :
     - At least two (2) × 10G optical ports.
     - At least two (2) × 1G electrical ports.
     - One (1) × RJ45 dedicated management port.
   - Other Interfaces :
     - At least four (4) × USB 3.0 ports.
     - At least one (1) × VGA port.
   - Power Supply :

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- o The server shall be equipped with dual redundant power supplies.
- o Input voltage: 200–240V, 50/60 Hz
- **Software Specifications:**
  - o All Internet Gateways, Access Points (APs), and Switches shall be centrally managed through a unified cloud management platform accessible via the Internet
  - o The platform shall provide rapid service provisioning, enabling wireless service and cloud service setup within a few minutes
  - o The platform shall include comprehensive management and maintenance functions, at minimum covering:
    - ▪ Network management
    - ▪ Configuration management
    - ▪ Topology management
    - ▪ Device management
    - ▪ Alarm management
    - ▪ SSID and STA management
    - ▪ Web and Telnet remote access
  - o The platform shall adopt a multi-tenant account management mode, supporting the creation of multiple MSP accounts and sub-accounts for channel partners. It shall allow reassignment or withdrawal of sub-accounts as needed
  - o The platform shall automatically generate a network topology after device registration, and provide visibility of network status including connection/disconnection, link congestion, and device online/offline status
  - o By selecting a device icon, the platform shall provide detailed device information, including device uptime, CPU and memory utilization, interface up/down status, and traffic statistics
  - o The platform shall provide inbuilt CLI shortcut commands (e.g., Running Config, System Version, Show IP Route) to enable basic device information collection and troubleshooting
  - o The platform shall collect device alarm information in real time, support filtering by alarm level and type, and allow customization of alarm levels and threshold settings.
  - o The platform shall automatically compare the current device software version with the available uploaded version and notify users when new versions are available. The user shall have the option to upgrade based on operational requirements
- **OR**
  - Must be a public cloud-based management solution for networking equipment
  - Must come with no additional licenses and subscription
  - Must adopt an advanced full-containerization solution and a fully distributed deployment architecture
  - Must support unified cloud management: Monitoring, operation, configuration, and maintenance not only for SD-WAN routers but also for other network equipment, such as traditional routers, switches, wireless ACs, APs, and security devices
  - Must support mobile operation and maintenance capabilities through a Mobile Application version of the cloud-based management platform

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- Must support multi-user management through role-based access control
- Must support hierarchical and decentralized management for network
- Must support site management
- Must support customized dashboard to display desired monitoring statistics and other preferred information on a single page
- Must support built-in value-add services like Cloud Engineering Survey: Capability to simulate wireless AP signal and set obstacles in a specific floor plan
- The proposed public cloud-based management solution must be the same brand with the proposed AP, POE Switch and HCI.

- **OR**

  - **Hardware Specification:**
  - 12*10/100/1000M Base-T,8*10/25G SFP28 Ports
  - Dual Modular AC power slots
  - 1*RJ45 Console port and 1*DC0 for local management, 1* USB3.0
  - **Software Spécification:**
  - Default 64 APs, Support up to 830 APs
  - Support Centralized forwarding and Local forwarding
  - Support LACP Link Aggregation, Port Isolation, VLAN, STP/RSTP/MSTP, Error-Disable
  - Support Static Route v4/v6, RIP/RIPng, OSPF, OSPFv3, Routing Policy, DHCP Client, DHCP Server, DHCP Relay
  - Support Port Security, IP Source Guard, DHCP Snooping, DHCP Option82, AAA(Authentication, Authorization, Accounting, Radius, TACACS), 802.1X
  - SNMP v1/v2/v3, SNMP Trap, MIB, SYSLOG, Telemetry, Netconf, WEB (HTTP/HTTPS), CLI (Telnet, SSH), Cloud Management, Ping, Tracert, FTP/TFTP, Debug, Keepalive Gateway, SLA, SPAN, RSPAN, LLDP, NDSP, RMON, IPFIX, BSM, Resource Alert
  - Support VRRP, Track, BFD
  - Open, WPA-PSK, WPA-802.1X, WPA2-PSK, WPA2-802.1X, WPA3-PSK, WPA3-802.1X, Portal Authentication (External Portal, Local Portal, MAC Authentication, No-perception Authentication.), Portal URL Redirection, Portal Server Escape
  - Support WIDS, User Isolation, SSID Hidden, SAVI, Anti-Rouge, Service Status Control, Wireless Access Control, ARP Suppression Protection
  - Support RRM, Set Working Channel Manually, Set Transmit Power Manually, Channel Auto Adjust
  - Support L2 Roaming & L3 Roaming
  - Support AP LED Control, AP LLDP Control, STA IPv6 Service, ARP Proxy Answer, ARP Broadcast to Unicast, DHCP Broadcast to Unicast
  - Support WMM(Wi-Fi Multimedia, sub-set of 802.11e), WMF(Wireless Multicast Forwarding)
  - Support 1+1 Backup, 1:1 Backup, HAP (Hybrid Access Point, AP Escape), Uplink Integrity Detection, Uplink Track Check, Wireless-related Configuration Synchronization
  - Support RF Detection, Packet Capture on Airports

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8. **SPECIFICATIONS OF DOOR ACCESS CONTROLLER – 120 UNITS (submit technical data sheet)**
   - 8" LCD with a resolution of 1280 × 800.
   - 2-MP CMOS dual-lens camera
   - Supports 100,000 users (including up to 50 administrators), 100,000 faces, 500,000 cards, 100,000 passwords, and 300,000 records.
   - Multiple unlock methods including face, IC card, password, fingerprint and QR code. User can configure scheduled unlock methods, or combine them to create user's own personal unlock methods.
   - Recognizes faces 0.3 m to 3 m away (0.98 ft-9.84 ft), and is suitable for recognition of people with a height of 0.9 m to 2.4 m (2.95 ft–94.49 ft).
   - Adopts deep learning face recognition algorithms to accurately recognize more than 360 key points of a target's face, offers contactless passage and performs face recognition at 0.2 sec/person.
   - User Type: Normal, VIP, patrol, guest, customized users
   - Supports face mask detection
   - Displays video and image advertisements
   - Recognizes up to 6 human faces at the same time
   - Supports person management on the webpage, including adding, deleting and editing persons
   - Operating Temperature -30°C ~ 60°C
   - Storage temperature -40°C ~ 70°C
   - Operating humidity 0% ~ 90% (RH), non-condensing
   - Protection: IP65
   - Interfaces: 1x RS485,1x Wiegand, 2x Alarm in, 2x Alarm out
   - Accessory: include wall-mounted bracket, magnetic lock, exit button, emergency break glass, power supply and other necessary accessories.

9. **5MP IR Vari-focal Bullet Network Camera – 20 UNITS (submit technical data sheet)**
   - 5-MP 1/2.7" CMOS image sensor
   - Outputs max. 5 MP (2960 × 1668) @20 fps, and supports 2688 × 1520 (2688 × 1520) @25/30 fps.
   - Video Compression: H.265; H.264; H.264H; H.264B; MJPEG (Only supported by the sub stream)
   - Built-in IR LED, and the max. illumination distance is 60 m
   - ROM: 128 MB, RAM:256 MB
   - Electronic Shutter Speed: Auto/Manual 1/3 s–1/100,000 s
   - Min. Illumination: 0.007 lux@F1.5 (Color, 30 IRE), 0.0007 lux@F1.5 (B/W, 30 IRE), 0 lux (Illuminator on)
   - S/N Ratio >56 dB
   - Pan/Tilt/Rotation Range: Pan: 0°–360°, Tilt: 0°–90°, Rotation: 0°–360°
   - Stream Capability: 2 streams
   - White Balance: Auto; natural; street lamp; outdoor; manual; regional custom
   - Intelligent monitoring: Intrusion, tripwire (the two functions support the classification and accurate detection of vehicle and human).
   - 12 VDC/PoE power supply
   - IP67, IK10 (optional) protection

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10. **SPECIFICATIONS OF 128CH 16HDDs NETWORK VIDEO RECORDER – 1 UNIT (submit technical data sheet)**
    o Video Input: 128 channels
    o Video Output: 2 VGA, 4 HDMI; VGA: 1920 × 1080, 1280 × 1024, 1280 × 720; HDMI1&2: 3840 × 2160, 1920 × 1080, 1280 × 1024, 1280 × 720;  HDMI3: 7680 × 4320, 3840 × 2160, 1920 × 1080, 1280 × 1024, 1280 × 720; HDMI4: 1920 × 1080, 1280 × 1024, 1280 × 720
    o Resolution: 32 MP; 24 MP; 16 MP; 12 MP; 8 MP; 6 MP; 5 MP; 4 MP; 3 MP; 1080p; 960p; 720p; D1; CIF
    o Multi-screen Display: Main Screen: 1/4/8/9/16/25/36/64, Sub Screen: 1/4/8/9/16/25/36
    o AI by Recorder supports 8-channel face detection and recognition, up to 40 face databases and 300,000 face images; 8-channel metadata; 32-channel perimeter protection; 32-channel SMD Plus.
    o Video Compression: Smart H.265+; H.265; Smart H.264+; H.264
    o Audio Compression: G.711a; G.711u; PCM; G726
    o Network Protocol: HTTP; HTTPS; TCP/IP; IPv4; IPv6; UDP; SNMP; NTP; DHCP; DNS; SMTP; UPnP; IP Filter; PPPoE; FTP; DDNS; Alarm Server; IP Search (Supports IP camera, DVR, NVS, etc.); Multicast; P2P; Auto Registration; iSCSI
    o Disk Interface: 16 SATA ports, each disk can contain up to 20 TB
    o Network Interace: 4 (10/100/2500 Mbps Ethernet port, RJ-45)
    o Serial interface: 2x RS-485, 1x RS-232
    o USB interface: 2 x USB 2.0 ports, 2 x USB 3.0 ports
    o Power Supply: 100–240 VAC, 60±2% Hz
    o Operating Temperature: –10 °C to +55 °C (14 °F to +131 °F)

11. **SPECIFICATIONS OF HARD DRIVE 10TB – 1 UNIT (submit technical data sheet)**
    o ENTERPRISE HARD DRIVE 10TB
    o 30 days video retention

12. **SPECIFICATIONS OF UPS 650VA – 5 units (submit technical data sheet)**
    o Ratings: 650VA / 390W
    o Input voltage 220/230/240 Vac 1 Phase 50Hz/60Hz
    o Output voltage 220/230/240 Vac 1 Phase 50Hz/ 60Hz
    o Overload & Short circuit protection
    o Battery: 1x 12V/7Ah
    o Interface: 4x US Standard Socket
    o LED display
    o Boost and buck AVR for voltage stabilization
    o Cold start
    o Auto Sensing Frequency

13. **SPECIFICATIONS OF 75-inch Digital Signage – 2 UNITS (submit technical data sheet)**
    o 75 inches industrial-grade panel
    o Suppport working for 24 hours a day
    o Backlight : DLED
    o Aspect Ratio: 9: 16
    o LCD Technology: IPS /VA
    o Brightness: Typical 320 cd/m²

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- o 1.07B colors
- o Resolution : 2160 (H) × 3840 (V)
- o Built-in Android 11.0 system
- o 4 cores A55, 1.92 GHZ CPU
- o 4GB RAM, 32GB RAM
- o Video Decoding : Support H.265 HEVC MP-10@L5.1 up to 2160p@60 fps ; H.264 AVC HP@L5.1 up to 2160p@30 fps; VP9 Profile 2 up to 2160p@60 fps, H.264 MVC up to 1080p@60 fps
- o Video Format: mp4, avi, mov, mkv, wmv
- o Interfaces: 1 × RJ–45 10/100/1000 Mbps; 1x USB 2.0, 1x USB 3.0; 1x TF Card slot; 1x HDMI 2.0 input, 1x 3.5mm jack output
- o 2x 5W speaker
- o Power Supply: 100–240 VAC, 50/60 Hz

14. **SPECIFICATIONS OF 1600 KGS. X 9 STOPS PASSENGER MACHINEROOM TYPE, WITH GEARLESS TRACTION MACHINE – 2 UNITS (submit technical data sheet)**

- Elevator Type : Passenger Elevator
- Rated Capacity : 1600kgs.
- No. of Stops : 9 stops / 9 floors / 9 door openings
- Floor Marking : 1,2,3,4,5,6,7,8,9
- Speed : 1.75 m/s
- Door Type / Arrangement : Center Opening
- Car and Landing Door Finish : Hair Stainless Steel Finish
- Car Ceiling : Hairline Stainless Steel Finish w/ LED light and Fan
- Car Right Side Panel : Hairline Stainless Steel Finish
- Car Left Side Panel : Hairline Stainless Steel Finish
- Car Rear Panel : Hairline Stainless Steel Finish
- Car Flooring : PVC Anti Slide Tiles
- Car Dimension : 1450mm (W) x 2350mm (D) x 23000mm (H)
- Door Dimension : 1100mm (W) x 2200mm (H)
- Hoistway Dimension : 5000mm (W) x 2700mm (D) - DUPLEX
- Power Supply : 220V, 3 Phase, 60Hz – verify at site
- Overhead Clearance (OH) : 4800mm
- Hoistway Pit Depth : 1800mm
- Car Finish : For ceiling and flooring, submit sample designs (Catalog) based on the proprietary standards of the brand
- Others : Automatic Rescue Device, Voice Synthesizer, Automatic Voltage Regulator, Braille Push Button, Handrail Handicap COP, Earthquake Censor, Card Reader VIP Function, Built-in Intercom System, one (1) – Year Warranty Comprehensive Preventive Maintenance (CPM) Services

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15. **SPECIFICATIONS OF 50KW Solar Inverter equipment – 1 lot**
    o **Specification of Smart Power Sensor – 1 unit (submit technical data sheet)**
        o Power grid type : 3P4W/3P3W
        o Input voltage (line voltage) : 90 ~ 500 Vac
        o Power consumption : ≤ 1.5 W
        o Line voltage : 90 ~ 1000 Vac (> 500 with external PT)
        o Phase voltage : 52~577 Vac
        o Current : 0 ~ 80 A(>80 with external CTs )
        o Voltage / Current : ±0.5 %
        o Power / Energy : ±1 %
        o Frequency : ±0.01 Hz
        o Interface : RS485
        o Baud rate :4800/9600/19200/115200(Default 9600bps)
        o Communication protocol : Modbus-RTU
        o Accessories : RS485 Cable (10 m / 33 ft.) and 3 CT 250 A/50 mA (5 m)
        o Mounting type : DIN35 Rail
    o **Specification of Smart Logger 3000A - 1 unit (submit technical data sheet)**
        o Max. Number of Manageable Devices : 80
        o WAN : WAN x 1, 10 / 100 / 1000 Mbps
        o LAN : LAN x 1, 10 / 100 / 1000 Mbps
        o RS485 : COM x 3, 1200 / 2400 / 4800 / 9600 / 19200 / 115200 bps, 1000 m
        o Digital / Analog Input / Output : DI x 4, DO x 2, AI x 4
        o Active DO : 12V, 100mA (connection with relay, sensor)
        o Ethernet : Modbus-TCP, IEC 60870-5-104
        o RS485 : Modbus-RTU, IEC 60870-5-103 (standard), DL / T645
        o LED : LED Indicator x 3 – RUN, ALM, 4G
        o WEB : Embedded Web
        o USB : USB 2.0 x 1
        o APP : Solar APP Communicated by WLAN for Commissioning
        o AC Power Supply : 100 V~240 V, 50 Hz / 60 Hz
        o DC Power Supply : 12V / 24 V
        o Power Consumption : Typical 8 W, Max. 15 W
        o Protection Degree : IP20
        o Installation Options : Wall Mounting, DIN Rail Mounting, Tabletop Mounting
    o **Specifications of 615-635 Watt Solar Panel – 50 units (submit technical datasheet)**
        o Cell Type : N- type Mono-crystalline
        o No. of cells : 156 (78×2)
        o Dimensions : 2465×1134×30 mm
        o Weight : 34.0 kg
        o Front Glass : 2.0 mm, Anti-Reflection Coating

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- o Back Glass              : 2.0 mm, Heat Strengthened Glass
- o Frame                  : Anodized Aluminium Alloy
- o Junction Box           : IP68 Rated
- o Protection Class       : Class II
- o IEC Fire Type          : Class C
- o Output Cables          : 4.0 mm$^2$ (+): 400 mm , (-): 200 mm or Customized Length
- o Maximum Power - Pmax [Wp]              : 635
- o Maximum Power Voltage - Vmp [V]        : 47.86
- o Maximum Power Current - Imp [A]        : 13.27
- o Open-circuit Voltage - Voc [V]         : 57.21
- o Power Tolerance                        : 0 _ + 3 %
- o Temperature Coefficients of Pmax       : -0.29 %/o$
- o Temperature Coefficients of Voc        : -0.25 %/o$
- o Temperature Coefficients of Isc        : 0.045 %/o$
- o Maximum Power - Pmax [Wp]              : 479
- o Maximum Power Voltage - Vmp [V]        : 44.98
- o Maximum System Voltage                 : 1500 VDC (IEC)
- o Maximum Series Fuse Rating             : 30 A

16. **SPECIFICATIONS OF SOUND SYSTEM – 1 Lot**
    - o **Active DSP-controlled Full Range Loudspeaker with Bracket – 10 pcs. (submit technical data sheet)**
    - o Type: Active DSP-controlled full range loudspeaker
    - o Frequency Response(-10dB): 42Hz-20kHz
    - o Horizontal Coverage: 90°/60°
    - o Vertical Coverage: 60°/90°
    - o Maximum Calculated SPL/1M (Continuous/Peak): 128dB/134dB
    - o HF Driver: Customized driver, 1.75" voice coil and 1.0" exit
    - o LF Driver: Customized 12" driver, 3.0" voice coil
    - o **DSP:** Processor: 48kHz signal sampling frequency, FIR filtering Presets: MAIN, LF BOOST, W/SUB
    - o **AMPLIFIER**
        - o Amplifier Circuitry: Class D Power (RMS standards): 1100W
        - o Peak Power: 2200W
        - o Frequency Response (1W 8Ω 2ch): 20Hz-20kHz(±0.5dB)
        - o Intermodulation Distortion: ＜0.05%
        - o Total Harmonic Distortion: ＜0.05%
        - o Cooling System: Cooling with fans, air convection
        - o Protection: DC protection, short circuit protection, overheat protection, input overload protection, output overload protection, soft startup protection, overvoltage protection, undervoltage protection
        - o Signal Input: Female XLR (Mono jack 6.35)
        - o Signal Output: Male XLR
        - o Power Input: IEC power connector
        - o Working Voltage: 100-130V~ or 220-240V~ (±10%,50/60Hz）
        - o Power consumption (1/8 output power): 95

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- **CABINET**
  - Cabinet Material: CNC machined plywood
  - Coating: Durable Polyurea Coating
  - Cabinet Color: Black
  - Grille: Iron mesh
  - Handles: 2 side
  - Monitor Angle: Symmetrical 45° monitoring Angle
  - Hanging Hardwares: M8 screw
  - Pole Mount: Base hole Φ35mm,   0° or 10° options
  - Speaker Dimension (W×H×D): 355x599x349mm
- **Active DSP-controlled Compact Subwoofer – 2pcs. (submit technical data sheet)**
  - Frequency Response(-6dB anechoic chamber): 32Hz-400Hz
  - Maximum Calculated SPL/1M (Continuous/Program/Peak): 132dB/135dB/138dB
  - LF Driver: Customized ferrite driver, 4" voice coil
  - Crossover and Slope: Controlled by DSP
  - Signal Input / Output: Female XLR input, male XLR output
  - Power Input / Output: Powercon connector
  - Working Voltage: 220-240V 50Hz
  - **DSP:** Processor: 96KHz signal sampling frequency, 56bit precision Presets: 80Hz, 100Hz, 120Hz
  - **AMPLIFIER**
    - Amplifier: Class D
    - Power (RMS standards): 1600W
    - Frequency Response (1W 8Ω 2ch): 20Hz-20KHz (±0.5dB)
    - Intermodulation Distortion (20Hz-20KHz, half power): <0.05%
    - Total Harmonic Distortion (20Hz-20KHz, rated power 8Ω): <0.05%
    - Cooling: Cooling with fans
    - Protection: DC protection, short circuit protection, output overload protection, soft startup protection, overvoltage protection, undervoltage protection
  - **CABINET**
    - Cabinet: CNC made of excellent wood
    - Dimensions (WxHxD): 590 x 639 x 800mm
    - Net Weight: 63.0 kg
- **40 Channel Digital Mixing Console – 1pc. (submit technical data sheet)**
  - **MIXER**
    - Max I/O Capacity: 40x Input / 25x Output
    - Number of Analog Input Channels: 32 (32 Mono / 0 Stereo)
    - Number of Mic Preamps: 32
    - Number of Analog Output Channels: 16
    - Mix Routing: 2x Main LRC, 6x Bus, 6x Matrix
    - 6x Aux Send
    - Groups: 6x Mute Group, 8x DCA Group
    - Presets: 100x Scene, 500x Cue, 100x Snippet
    - Display: Main Display: 7" LCD (Daylight-Viewable) Channel Display: LCD (Backlit)
    - Faders & Level Adjustment: 25 Fader (Touch Sensitive)
    - Meters: Main Meter: 24-Segment LED

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- **SIGNAL PROCESSING**
  - Input Polarity: Normal/Reverse
  - Dynamic Processing: Input Channels, Buses, Master, Mono Channels, Stereo Channels: Compressor Input Channels: Gate
  - EQ: 6-Band Parametric
  - Graphic EQ: Yes
  - Solo/Mute: Solo, Mute per Input Channel, Bus, FX Bus Mute per Master
  - Built-In Effects: 8x Stereo 16x Mono
  - Audio Delay: Yes
  - Automatic Mic Mixing: No
- **DIGITAL AUDIO**
  - Sample Rates: 48 kHz
  - Bit Depth: AD/DA Conversion: 24-Bit
- **PERFORMANCE**
  - Frequency Response: 20 Hz to 20 kHz 0/-1 dB (at 48 kHz)
  - Max Input Level: 1/4" TRS Input: +21 dBu Mic Input: +23 dBu
  - Analog Dynamic Range: Input to Output: 106 dB
  - I/O Impedance: 1/4" TRS Input: 20 Kilohms (Unbalanced) 40 Kilohms (Balanced)
  - Mic Input: 10 Kilohms (Unbalanced)
  - 10 Kilohms (Balanced)
  - XLR Output: 50 Ohms (Balanced/Unbalanced)
  - 1/4" TRS Output: 50 Ohms (Balanced/Unbalanced)
  - Headphone Output: 40 Ohms
  - Noise Floor: XLR All Outputs: -85 dBu Unweighted (at Unity Gain)
  - XLR All Outputs: -88 dBu Unweighted (with Inputs Muted)
  - 1/4" Aux Output: -83 dBu Unweighted
  - THD+N: Mic Input:
  - < 0.01% at Unity Gain
  - < 0.03% at +40 dB Gain
  - Signal Generator: Yes
- **CONNECTIVITY**
  - Analog Inputs: 32x XLR Mic Input
  - 6x 1/4" TRS Balanced Aux Input
  - 1x Stereo RCA Aux Input
  - 1x XLR Talkback Input
  - Analog Outputs: 16x XLR Balanced Main/Bus Output
  - 6x 1/4" TRS Balanced Aux Output
  - 1x Stereo RCA Aux Output
  - 2x XLR Control Room/Monitor Output
  - 2x 1/4" TRS Balanced Control Room/Monitor Output
  - 1x 1/4" TRS Headphone Output
  - Phantom Power: +48 V (Selectable on Individual Inputs)
  - Digital I/O: 1x RJ45 (Control)
  - 1x etherCON Ultranet
  - 2x etherCON AES50/SuperMAC
  - 1x XLR AES3 Output
  - MIDI I/O: 1x MIDI 5-Pin In

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- o 1x MIDI 5-Pin Out
- o USB I/O: 1x USB-A (Audio Playback, External Memory)
- o 1x USB-B (Control)
- o USB I/O Capacity: 32x Input / 32x Output
- o Expansion Ports: 2x 32 x 32 I/O Card
- o Wireless: No
- o Mobile App Compatible: Yes: Android & iOS
- o App Name: M32-Mix, M32-Q
- o Functionality: Adjust Settings, Remote Control, Setup
- o External Display I/O: No
- o **RECORDING**
  - o Max Multitrack Recording: 32 Tracks
  - o Media Support: SDHC, USB Drive
- o **COMPATIBILITY**
  - o OS Compatibility: Computer: Windows / macOS
  - o Mobile: Android/iOS
  - o OS Compatibility: Windows, macOS
- o **POWER:** Input Power: 100 to 240 VAC, 50 / 60 H
- o **Digital I/O Stage Box – 1 pc (submit technical data sheet)**
  - o Processor: A/D-D/A Conversion (Cirrus Logic A/D CS5368, D/A CS4385): 24-Bit at 44.1 / 48 kHz, 114 dB Dynamic Range
  - o Networked I/O Latency (Stage box in > Console Processing > Stage box Out): 1.1 ms
  - o Performance: **Input/Output Characteristics**
  - o Frequency Response at 48 kHz Sample Rate, at Any Gain: 20 Hz to 20 kHz, 0 dB to -1 dB
  - o Dynamic Range, Analog Mic In to Analog Out: 107 dB, 22 Hz to 22 kHz, Unweighted
  - o A/D Dynamic Range, Mic Preamp to Converter: 109 dB, 22 Hz - 22 kHz, Unweighted
  - o D/A Dynamic Range, Converter, and Output: 110 dB, 22 Hz - 22 kHz, Unweighted
  - o Crosstalk Rejection at 1 kHz, Adjacent Channels: 100 dB
  - o **Output Characteristics**
    - o Output Impedance, XLR 50 Ohms
    - o Maximum Output Level, XLR +21 dBu
    - o Residual Noise Level, Unity Gain, XLR < -86 dBu, 22 Hz to 22 kHz, Unweighted
    - o Residual Noise Level, Muted, XLR < -100 dBu, 22 Hz to 22 kHz, Unweighted
  - o **INPUTS/OUTPUTS**
    - o USB/IO: 1 x USB-B Female Input
    - o Audio I/O: 32x XLR 3-Pin Line/Mic Input
    - o 16x XLR 3-Pin Line Output
    - o Digital I/O: AES50 SuperMAC Networking at 48 or 44.1 kHz, 24-Bit PCM: 2 x 48 channels, Bidirectional
    - o AES50 SuperMAC Cable Length, Cat 5e Shielded: Up to 328.1' / 100 m
    - o ULTRANET Networking at 48 or 44.1 kHz, 22-Bit PCM: 1 x 16 Channels, Unidirectional

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- o ULTRANET Cable Length, Cat 5 Shielded: Up to 246.1' / 75 m
- o ADAT Output at 48 or 44.1 kHz, 24-Bit PCM: 2 x 8 Channels, Unidirectional
- o TOSLINK Optical, Cable Length: 16.4' / 5 m, Typical
- o AES/EBU output at 48 or 44.1 kHz, 24-Bit PCM: 2 x 2 Channels, Unidirectional
- o XLR, 110 Ohms Balanced, Cable Length: 16.4' / 5 m, Typical
- o Microphone Input: PRO Preamplifiers
- o Input Impedance, XLR: 10 Kilohms
- o Non-Clip Maximum Input Level, XLR +23.5 dBu
- o HD + Noise, Unity Gain, 0 dBu Out < 0.01%, Unweighted
- o THD + Noise, +45 dB Gain, 0 dBu Out < 0.03%, Unweighted
- o Phantom Power, Switchable per Input 48 V
- o Equivalent Input Noise at +45 dB Gain, (150 Ohms Source) < -126 dBu, 22 Hz - 22 kHz, Unweighted
  - o **POWER**
    - o Power Source: AC Input (Included), AC Input Power: 100 to 240 VAC, 50 / 60 Hz, Power Consumption: 55
- o **UPS 1200VA – 1 pc and Cat6A 300m – 2 rolls**
- o **Wireless Dual Channel Microphone Set with AV Case – 2 sets (submit technical data sheet)**
  - o Description: Dual Channel Microphone
  - o Frequency Range: 470.000MHz to 509.750MHz
  - o Frequency Response: 50Hz~18KHz + 3dB
  - o Modulation: FM
  - o Oscillation Mode: Phase Locked Frequency Synthesizer
  - o Sensitivity: Offset degree is equal to 25KHz, the 6dB V, S/N>60dB
  - o Offset: ±45KHz; Bandwidth: 24MHz; S/N Ratio: >100dB; T.H.D.: <0.5% @ 1KHz; Output Voltage: -20dBV/100Ω Balanced -4dBV/5KΩ Unbalanced
  - o Output Socket: XLR Balanced and Unbalanced Socket Φ6.3
  - o AC Power Supply: 0.5 to 1A, 12 to 15V DC
- o **Audio Interface – 1 pc. (submit technical data sheet)**
  - o MICROPHONE INPUTS, Frequency Response 20-20kHz ± 0.06dB, Dynamic Range 116dB (A-Weighted), THD+N -100dB @ 8dB gain, Noise EIN -127dBu (A-Weighted), Maximum Input Level 16dBu, Gain Range 69dB, Impedance 3kΩ, POWER, USB900mA, External (Optional)4.5W
- o **Power sequencer -1 pc.**
  - o Line Voltage: 220V 50-60Hz
  - o Number of Outlets: 9
  - o USB Charging: Yes
  - o Front Panel Meter: Digital Voltmeter
  - o Front Media Lights: Two 220V Incandescent bulb, 5W each
  - o AC Protection Technology: Spike & surge protection
  - o Maximum Current Rating:  10 (Amps)
- o **Customized Flight Case – 1 pc.**
- o **Speaker Bracket – 8 pcs.**
- o **Consumables, Connectors, Rough ins, Electrical supply-per speaker, Contingencies, Installation, Configuration, Testing and Training – 1 lot**

# PHILIPPINE NORMAL UNIVERSITY
### The National Center for Teacher Education

## FACILITIES MANAGEMENT & SUSTAINABILITY OFFICE

**BAGONG PILIPINAS**

📍 **Taft Ave. cor. Ayala Blvd., Ermita, Manila**   📞 **(+632) 5317-1768 loc. 779**   ✉ **fmso@pnu.edu.ph**

## X. DETAILED UNIT PRICE ANALYSIS (DUPA) FORM

**DETAILED UNIT PRICE ANALYSIS (DUPA)**

NAME OF PROJECT:
LOCATION:

Item No. / Description
Unit of Measurement
Output per hour

| | Designation | No. of Person | No. of Hours | Hourly Rate | Amount |
|---|---|---|---|---|---|
| A. | Labor | | | | |
| | Sub-Total for A | | | | |

| | Name and Capacity | No. of Units | No. of Hours | Rental Rate | Amount |
|---|---|---|---|---|---|
| B. | Equipment | | | | |
| | Sub-Total for B | | | | |

| | | | | |
|---|---|---|---|---|
| C. | Total (A + B) | | | |
| D. | Output per hour = | | | |
| E. | Direct Unit Cost (C / D) | | | |

| | Name and Specifications | Unit | Quantity | Unit Cost | Amount |
|---|---|---|---|---|---|
| F. | Materials | | | | |
| | Sub-Total for F | | | | |

| | | | | |
|---|---|---|---|---|
| G. | Direct Unit Cost (E + F) | | | |
| H. | Overhead, Contingencies & Miscellaneous (OCM) | | % of G | |
| I. | Contractor Profit (CP) | | % of G | |
| J. | Value Added Tax (VAT) | | 12% of (G + H + I) | |
| K. | Total Unit Cost | | G + H + I + J | |

Prepared / Submitted by:

_____
Signature Over Printed Name
Company

*Structural Works*
Prepared by:

ALFREDO G. ALARCON, JR.
Civil Engineer

*Electrical and Mechanical Works*
Prepared by:

MARK ANTHONY Q. AMUL
Electrical Engineer

*Architectural Works*
Prepared by:

JOHN D. TADEJA JR.
Architect

Submitted by:

PROF. JOHN P. NATIVIDAD
Director