# TERMS OF REFERENCE / TECHNICAL SPECIFICATIONS

## Structured Cabling and Provision of Wireless Access for PCED Library Building

Approved Budget for the Contract: Six Million, Two Hundred Thousand Pesos (6,200,000)

- A. Network Equipment, supply, installation, configuration and support: 4,500,000.00
- B. Structured Cabling: 1,700,000.00

**Detailed Requirement:**

| ITEM | NETWORK COMPONENT | |
|---|---|---|
| 1 | **Access Point - WiFi 6 Mid-Density \*\*brand new\*\*** | **27 units** |
| | Must support steering devices to the AP where it receives the best radio signal. | |
| | Must have a maximum aggregate data rate of 2.6 Gbps or higher | |
| | Must support dynamic frequency selection (DFS) | |
| | Must support 802.11a/b/g/n/ac/ax radio technologies | |
| | Must support fat least 512 associated client devices per radio, and up to 16 BSSIDs per radio or higher | |
| | Must be an indoor access point that has dual radio of 5GHz 802.11ax 4x4 MIMO and 2.4GHz 802.11ax 2x2 MIMO | |
| | Must have the following interfaces: | |
| | 10/100/1000BASE-T Ethernet network interface (RJ-45) <br> Auto-sensing link speed and MDI/MDX <br> 802.3az | |
| | Must have the following features: | |
| | IoT-ready Bluetooth 5 and Zigbee support <br> OFDMA and MU-MIMO for enhanced multi-user efficiency <br> Must have built-in technology that resolves sticky client issues for Wi-Fi 6 and Wi-Fi 5 devices <br> WPA3 and Enhanced Open security | |
| | Must include mounting bracket kit for solid surface | |
| | Must include the ff licenses: | |

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| | - License for each operational LAN-connected, mesh, or remote AP that is advertising at least one BSSID<br>- License for using intelligent application identification, policy-based traffic management and controls, or stateful user firewall features.<br>- License for each operational AP using advanced spectrum analysis and wireless intrusion protection (WIPS/WIDS) to help identify and mitigate Wi-Fi and non-Wi-Fi sources of interference, as well as containment of potential security risks. | |
| | Mounting and Installation included | |
| | Must be 100% compatible with existing Aruba Controller and Access points for easier administration, maintenance and network management | |
| | Warranty: 3 years, 8x5 advanced support with NBD on-site service | |
| | Must provide authorized reseller certificate | |
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| 2 | **Access Point - WiFi6 (BRAND NEW) High-Density** | **2 units** |
| | Must be able to continuously monitor and report hardware energy consumption | |
| | Must have a dynamic frequency selection (DFS) that optimizes the use of available RF spectrum | |
| | Must have a maximum data rate of 2.6 Gbps or higher | |
| | Must be an indoor access point that has 5GHz and 2.4GHz 802.11ax 4x4 MIMO | |
| | Must support 802.11a/b/g/n/ac/ax radio technologies | |
| | Omni-directional antennas for 4x4 MIMO with peak | |
| | Must support at least 512 associated client devices per radio, and up to 16 BSSIDs per radio | |
| | Must have the following interfaces:<br>Auto-sensing link speed (100/1000/2500/5000BASE-T) and MDI/MDX<br>802.3at/bt<br>802.3az | |
| | Must support the following features:<br>WPA3 and Enhanced Open Security<br>Built-in technology that resolves sticky client issues or Wi-Fi 6 and Wi-Fi 5 devices.<br>OOFDMA and MU-MIMO for enhanced multi-user efficiency.<br>IoT ready, Bluetooth 5 and Zigbee support. | |
| | Must include mounting bracket kit for solid surface | |
| | Must include the ff licenses:<br>License for each operational LAN-connected, mesh, or remote AP that is advertising at least one BSSID<br>License for using intelligent application identification, policy-based traffic management and controls, or stateful user firewall features | |
| | Mounting and Installation included | |

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| | Must be 100% compatible with existing Aruba Controller and Access points for easier administration, maintenance and network management | |
| | Warranty: 3 years, 8x5 advanced support with NBD on-site service | |
| | Must provide authorized reseller certificate | |
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| 3 | **Access Switch** | **4 units** |
| | Must at least support 8 switches in a stack via chain or ring topology | |
| | Switching capacity: at least 128 Gbps | |
| | Throughput: at least 95 Mpps | |
| | Interfaces:<br>At least have 24x ports 10/100/1000BASE-T PoE+ ports<br>At least have 4x 10G SFP+ ports<br>At least 1x USB-C Console Port<br>At least 1x OOBM<br>At least 1x USB Type-A Host port<br>At least 1xRJ-45 Console Port | |
| | Must at least have unparalleled visibility with built-in analytics for real-time monitoring and troubleshooting | |
| | Supports the ff. configuration & management features:<br>SNMP v2 c/V3<br>RMON & sFlow<br>TFTP & SFTP<br>NTP<br>LLDP<br>UDLD | |
| | Must support the ff. Layer 2 and Layer 3 services & features:<br>VLAN support and tagging support IEEE 802.1Q (4094 VLAN IDs) and 2K VLANS simultaneously RPVST+ and PVST+ Port Mirroring STP, RSTP & MSTP IGMP ARP DNS RIPv2 OSPFv2 and OSPFv3 IPv4 and IPv6 static routing | |
| | Must support the ff. security features:<br>IPv4 & IPv6 ACL<br>RADIUS & TACACS+<br>Control Plane Policing<br>MAC-based client authentication<br>SSHv2, SSL, SNMPv3<br>Switch CPU protection<br>ICMP throttling<br>MAC address lockout<br>MAC Pinning | |
| | Must at least have the ff. port specifications:<br>24 ports 10/100/1000 BASE-T Class4 PoE Ports, supporting up to 30W per port (3 units) and 48 ports 10/100/1000 BASE-T Class 4 PoE Ports, supporting up to 30W per port (1 unit)<br>4x 1/10G SFP ports<br>1xUSB-CconsolePort<br>1x OOBM | |

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| | Must support at least 370W PoE Power | |
| | Must have fixed power supply and fans | |
| | Must have a primary airflow of front and side to back | |
| | Must support a modern, database-driven operating system that provides the ff. capabilities:<br>Easy Access To All Network State Information allows unique visibility and analytics<br>REST APIs and Python scripting for fine-grained programmability of network tasks | |
| | All software processes communicate with the database ensuring near real-time state and resiliency and allowing individual software modules to be independently upgraded for higher availability | |
| | Must include all necessary transceivers | |
| | Must be 100% compatible with existing Aruba Controller and Access Points for easier administration, maintenance and network management | |
| | Warranty: 3 years, 8x5 advanced support with NBD on-site service | |
| | Must provide authorized reseller certificate | |
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| **4** | **Distribution Switch** | **1 unit** |
| | Industry-standard CLI with a hierarchical structure for reduced training time and expense | |
| | Supports the ff. configuration & management features:<br>SNMP v2c/V3<br>RMON & sFlow<br>TFTP & SFTP & NTP | |
| | Must at least have the ff port specifications: | |
| | At least have 24x ports 1G/10G SFP+ ports At least have 4x 40G/100GbE QSFP 28 ports | |
| | Must at least have two field-replaceable, hot- swappable power supplies and fan trays | |
| | Switching capacity: at least 1.2 Tbps | |
| | Forwarding rate: at least 950 Mpps | |
| | Must support PIM Multicast Boundary | |
| | Must support DHCP IPv4, IPv6 | |
| | Must support DHCP Smart Relay | |
| | Must support IEEE 802.3ad LACP, IEEE 802.1D, IEEE 802.1w and IEEE 802.1s | |
| | Must have a primary airflow of front to back | |
| | Must support the ff. security features:<br>IPv4 & IPv6 ACL<br>Enrollment over Secure Transport (EST)<br>Control Plane Policing<br>MAC-based client authentication | |

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| | DHCP protection<br>SSHv2, SSL, SNMPv3<br>Switch CPU protection<br>ICMP throttling<br>MAC address lockout<br>MAC Pinning AND RADIUS & TACACS+ | |
| | Must support a modern, database-driven operating system that provides the ff. capabilities: | |
| | Easy access to all network state information allows unique visibility and analytics<br>REST APIs and Python scripting for fine- grained programmability of network tasks | |
| | All software processes communicate with the database ensuring near real-time state and resiliency and allowing individual software modules to be independently upgraded for higher availability | |
| | Must include all necessary transceivers | |
| | Must be 100% compatible with existing Aruba Controller and Access Points for easier administration, maintenance and network management | |
| | Warranty: 3 years, 8x5 advanced support with NBD on-site service | |
| | Must provide authorized reseller certificate | |
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| 5 | **Wireless Controller** | 1 unit |
| | Appliance based | |
| | Must support the following features:<br>Unified policy enforcement for wired and wireless traffic.<br>Visibility into over 3,800 applications with no added hardware.<br>Supports Guest Access<br>Firewall throughput: at least 4 Gbps<br>MAC User: at least 2K<br>Minimum devices: at least 128 Aps<br>Must at least have 4 x 100/1000BASE-T<br>Must at least have a maximum power consumption of 25W with USB | |
| | Supports Link Aggregation | |
| | Supports 802.1X network authentication Supports Device Onboarding | |
| | Reports on Application performance (packet loss, latency and jitter) | |
| | 1 x AC power supply | |
| | Built-in AI-Powered wireless/RF optimization | |
| | Must support stateful firewall capable of enforcement of consistent user, device, and application experience across WLAN, LAN and WAN | |
| | Must support dynamic segmentation | |
| | Must have unified communication and collaboration dashboard | |

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| | Must support integrated VPN services that support IPSEC/SSL VPNs | |
| | Must support WPA3 which brings stronger encryption and authentication methods Must support AP, Policy enforcement firewall and WIPS licenses to enhance security Must support hitless fail-over and automated load balancing | |
| | Must support seamless layer 2 and layer 3 roaming | |
| | Must have Regulatory and Safety Compliance | |
| | Must be 100% compatible with Wireless Access Points in ITEMS 1 and 2 | |
| | Must be 100% compatible with existing Aruba Controller and Access points for easier administration, maintenance and network management | |
| | Warranty & Support: Three (3) years (labor, parts and NBD on- site support) | |
| | Must provide authorized reseller certificate | |
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| **6** | **Installation, Configuration and Support** | **1 lot** |
| | **Structured Cabling** | |
| **1** | **Supply and Installation of 79 Nodes Cat-6 Cabling for Offices** | **79 nodes** |
| | The type of horizontal cables used for each work location must be Category 6 unshielded twisted pair UTP construction. | |
| | The Cat6 UTP cable must be constructed of 24 AWG copper conductors with HDPE insulation. | |
| | The copper conductors must be twisted into pairs, separated by a cross-divider; crosstalk cancellation spiral in the form of a cross that maintains constant distance between all the 4 pairs. This will ensure that even under torsion during installation, the crosstalk should be constant over the whole cable. | |
| | The copper conductors must be covered in a flame retard PVC jacket. | |
| | All UTP outlets must be covered with faceplates, including the ones for APs | |
| | The Cat6 UTP cable must be Underwriter's Laboratories (UL) listed type CM. | |
| | The Cat6 UTP cable must exceed TIA/EIA-568-C.2 Category 6 requirements. It must be tested to Class E to ensure performance for any application up to and including 1000Mbps. | |
| | The Cat6 UTP cable must meet requirement specified for current applications such as IEEE 802.3, 10/100/1000 BASE T; IEEE 802.5, 4/16/100Mbps; ATM Forum 52/155/622/1200 Mbps, 1 Gigabit Networking. | |
| | The length of each individual run of horizontal cable from the TR to the TO must not exceed 90m | |
| | The contractor/bidder must observe the bending radius and pulling strength requirements of the horizontal cable during handling and installation | |
| | Each run of cable between the TR and the TO must be continuous without any joints or splices, except where consolidation points are required. Installation practice must comply with manufacturer best practices | |

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| | The cable manufacturer must be ISO 9001 and 14001 registered | |
| | DISTRIBUTION OF NODES:<br>First Floor:       31<br>Second Floor:    19<br>Third Floor:       17<br>Fourth Floor:     12 | |
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| **2** | **Fiber Optic Backbone** | **1 lot** |
| | The Building Backbone Subsystem must include vertical runs of in-building cable between the MDF and the IDF of the building | |
| | Opti-Core Fiber Optic Distribution Cable must be used | |
| | The contractor/bidder must supply and install multi-core fiber optic cables (at least 10-cores) as the vertical/horizontal backbone cables | |
| | The contractor/bidder must observe the bending radius and pulling strength requirements of all backbone cables during handling and installation. | |
| | Each optical fiber must be buffered with color-coded PVC for identification of multi-core fiber optics cable. The connector type must be LC connector. | |
| | The fiber optic cable must meet the NEC requirements for OFNR or OFNP and comply with Bell core, FDDI, TIA/EIA-568-C.3, IEC and ICEA standards. | |
| | All Multimode optical fiber cables must be graded index with core/cladding construction of 50/125 m; the fiber must be compliant to the performance specifications for OM3 Multimode fiber detailed in ISO11801. | |
| | The fiber optic cable must be protected by means of either a cable tray/panel or a dedicated fiber routing system at all times. Each end of the fiber optic cable must contain a slack storage box with approximately five (5) meters of cable slack. | |
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| **3** | **Horizontal Cable Manager** | **6 units** |
| | Horizontal cable manager must be used with a patch panel. | |
| | The horizontal cable manager must be capable of managing cables on the front, of any 19" Data rack | |
| | The horizontal cable manager must consist of a 1-piece construction that is moulded out of plastic. | |
| | The horizontal cable manager must have pass through holes that incorporate integral bend radius control as well as finger with rounded edges. | |
| | The horizontal cable manager must have rigid end fingers that incorporate integral bend radius control. | |

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| | The horizontal cable manager must be available in 1RU, front only. | |
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| **4** | **Patch cords** | **1 lot** |
| | All Category 6 patch cords must be factory terminated and supported by the system manufacturer with modular plugs featuring EASY CONTROL BY TURNING BOOT | |
| | The type of cable used for station cords must be 4 pair Category 6 unshielded twisted pair UTP of a stranded construction. Each patch cord must be QC, 100% performance tested at the factory in a channel test to the proposed TIA/EIA-568-C.2 Category 6 standard | |
| | All patch cords must contain a molded strain relief for the cable termination. | |
| | All patch cords must consist of round, 32 AWG tinned copper, stranded conductors insulated with solid polyolefin, tightly twisted into individual pairs and jacketed with flame retardant PVC. | |
| | All patch cords must come in standard lengths of one meter for Switch to Patch Panel and 3 meters for TO to Desktop, IP Phone and AP. | |
| | All patch cords must be UL rated 1863 and meets IEC 60603-7 | |
| | All patch cords must be dual rated to meet CM and LSZH flame ratings. | |
| | All patch cords must meet ANSI/TIA-968-A and FCC Part 68 Subpart F; contacts plated with 50 micro-inches of gold. | |
| | The length of each station patch cord in the Work Area must be 3 meters. | |
| | All patch cords must have labels on it to provide identification of performance level, length, and quality control number | |
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| **5** | **Cable Tray** | **1 lot** |
| | All cables must be protected by cable tray system at all times. Each end of cables must contain a slack storage box with approximately three (3) meters of cable slack. | |
| | Must be solid metallic bottom with solid metal covers. | |
| | Dimensions: Total numbers of network nodes, cctv, door access and fiber plus 30% space allowance | |
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| **6** | **Patch Panels** | **1 lot** |
| | The patch panel must be modular with snap-in modular jack, and allow front access. | |
| | Modular patch panels must consist of a metal panel with molded snap-in faceplates which can be front releasable. | |

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| | The modular patch panel must support the appropriate Category 6 cabling and must facilitate cross-connection and inter-connection using RJ45 8 position 8 conductor modular plug patch cords. | |
| | Patch panels must accept all Mini-Com modules for UTP, STP, fiber, or A/V applications and must mount to standard 19" racks | |
| | The modular patch panel must be able to accommodate 24 AWG cable conductors. | |
| | The modular patch panel must be Underwriter's Laboratories (UL) listed. | |
| | The modular patch panel must be of 1RU 24-port for 19" rack mounting. | |
| | High density 1RU 48-port or 2RU 72-port configuration might be used if rack space is limited. | |
| | Separate modular patch panel must be used for the termination of voice and data. | |
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| **7** | **Uninterruptible Power Supply** | **4 units** |
| | 1KVA (3 units) and 2KVA (1 unit) port: USB, RS232 External Battery, Railkit for rack deployment, SNMP card CP504B included | |
| | Warranty: 2 years, 1 year battery warranty | |
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| **8** | **Racks and Cabinets** | **4 units** |
| | Wall Mount Cabinet (3ft height) (1 unit) | |
| | 19" Standard Opening Flexiglass front door with camlock and key Detachable side panels with camlock and ventilation Fixed type back panel 2 pcs exhaust fans at the top Vertical power strip 6 co., 3 prong, 22v, 20Amp fuse capacity with 1 meter power cord Ring-type vertical cable manager at the back At least 20pcs cage nuts and screws Black (power coated) and bolted type | |
| | Wall Mount Cabinet (2ft height) (3 units) | |
| | 19" Standard Opening<br>Flexiglass front door with camlock and key<br>Detachable side panels with camlock and ventilation<br>Fixed type back panel<br>2 pcs exhaust fans at the top<br>Vertical power strip 6 co., 3 prong, 22v, 20Amp fuse capacity with 1 meter power cord<br>Ring-type vertical cable manager at the back<br>20pcs cage nuts and screws<br>Black (power coated) and bolted type | |
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| 9 | **Scope of Work** | |
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| | Supply and installation of roughing-in materials | |
| | Supply, installation and cable pulling of Cat6 UTP cable. | |
| | Fluke testing, tagging and harnessing of cables | |
| | Copper termination | |
| | Fiber Optic termination | |
| | Submission of as-built plan and documentation | |
| | Horizontal cabling must be terminated to CAT6 patch panel | |
| | One meter patch cords must be used for the equipment side while 3-meter patch cords must be used for the customer/workstation side. | |
| | Cable must not exceed 100-meter distance from the IDF/MDF per floor | |
| | All cables must have fluke test result | |
| | The structured cabling system warranty should be at least 20 years | |
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| 10 | **Contractor/Bidder Requirements** | |
| | Bidder must have actual or similar deployment with the offered solution | |
| | The bidder must provide a single line diagram and proposed plans on CAD format | |
| | The bidder must be an authorized installer/distributor or reseller of the brand being offered. A current and valid certification authorizing the bidder to participate in this project must be submitted. | |
| | The bidder must have at least One (1) Certified Data Centre Professional (CDCP) | |
| | Must have Certified Engineers of the Switching and Mobility solution being offered | |
| | Must have (1) Senior Certified PMP to oversee the entire project and (1) PMP certified for the daily monitoring and documentation | |
| | All Certified individuals must be employed in the company for at least 2 years and must submit company IDs / credentials | |