Kingsford Hotel Bacolod — BMS

Comprehensive Technical & Commercial Proposal

Document version: 1.0 (initial issue) **Date of issue:** 2026-04-28 **Prepared for:** Megaworld Corporation **Project reference:** TUEC-PR-AUX-010 — Building Management System **Site:** Manhattan Street, The Upper East, Bacolod City, Negros Occidental **Proposal validity:** 90 days from date of issue **Currency:** Philippine Peso (PHP)

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1. Cover Letter

To Megaworld Corporation

Attention: Mr. Rome Amiel P. Gonzales

Dear Sir,

Subject: Proposal — Building Management System, Kingsford Hotel Bacolod

This proposal covers the supply, installation, testing, and commissioning of the BMS for the Kingsford Hotel Bacolod project. It is based on the documents you provided:

- **BMS Points list (TUEC)** — sheets BMS-01, BMS-02, and BMS-03 (Process and Instrumentation Diagrams), dated October 2025, prepared by R.J. Calpo & Company under the seal of Reynaldo J. Calpo, Professional Mechanical Engineer (License No. 0001784)
- **EE Plan (TUEC)** — Construction Bulletin No.8, dated 5 November 2025, prepared by Mario A. Alix Philippines, Inc., covering revised electrical layouts, load schedules, and power riser diagrams
- **Megaworld MC Standards** — DRC-004-2024 Revised BMS Standards Condotels, including Mechanical and Plumbing Points Lists

The project-specific points list governs the scope. The MC Standards serve as the baseline where the project-specific specification is silent. Where the documents are silent or ambiguous, we made the assumptions catalogued in **Section 11 (Stated Assumptions)** with their cost impact. Review those before contract execution.

Document layout:

- **Sections 1–4:** Cover letter, executive summary, project background, scope understanding.
- **Sections 5–7:** Technical — system architecture, per-subsystem descriptions, equipment list, network design, power provisions, programming and HMI, cabling philosophy.
- **Sections 8–9:** Project execution — schedule, manpower, inter-discipline coordination, quality and commissioning.
- **Section 10:** Commercial — Bill of Quantities, payment milestones, validity, acceptance terms.
- **Sections 11–13:** Risks, stated assumptions, inclusions/exclusions/clarifications matrix.
- **Appendices A–F:** Working documents (full BOQ line items, equipment takeoff, cable schedule, panel schedule, RFI list) for your engineering and commercial teams.

Our project team is available for clarification at your convenience.

We thank you for the opportunity and look forward to your favourable consideration.

Sincerely yours,

[Authorised signatory]

Project Director

[BMS Contractor Company Name]

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2. Executive Summary

This proposal addresses the design, supply, installation, programming, testing, commissioning, and one-year warranty support for a complete Building Management System covering the mechanical (HVAC and ventilation), plumbing/sanitary (hot water generation), boiler/laundry, casino MVAC (mechanical ventilation and air conditioning), and electrical-metering subsystems of the Kingsford Hotel Bacolod project.

2.1 Headline figures

Metric	Value
BMS I/O points (in scope)	**753**
BMS-monitored equipment instances	**132**
Unique equipment classes	23
BMS field panels	**8**
Estimated DDC controllers	19
Network drops (BACnet/IP + Modbus)	29
Total cable footage (estimated)	**5,033 m**
Programming objects	1,387
Operator graphic pages	49
Commissioning test items	762
Total project effort	**4,648 hr** (581 person-days)
Project duration	**16 weeks** from PO to handover
Peak on-site headcount	11 personnel (project weeks 9–10)
Grand total proposal value (VAT-inclusive)	**PHP 21,747,826**

2.2 Approach summary

Our proposal is structured around four design principles:

1. **Compliance with the project-specific specification.** Every BMS-monitored point in our proposal traces back directly to the TUEC BMS Points list (sheets BMS-01, BMS-02, BMS-03) or, where TUEC is silent, to the Megaworld MC Standards baseline. The traceability matrix is provided in Appendix A.

2. **Open standards and interoperability.** All controllers, head-end servers, and network equipment are based on BACnet/IP and Modbus open protocols. This avoids vendor lock-in, supports future integration with hotel building systems (PMS, FDAS, security), and aligns with Megaworld's portfolio standards for BMS.

3. **Operational reliability.** The head-end runs in redundant primary–standby configuration with 30-minute UPS protection. The network is logically isolated from the hotel's corporate LAN to protect availability. Energy-savings algorithms (chiller plant sequencing, demand control, peak shaving) are pre-engineered for hotel operating profiles.

4. **Auditable engineering.** This proposal is supported by a structured engineering basis (Bill of Quantities, equipment takeoff, cable schedule, panel schedule, programming object inventory, commissioning point inventory, manpower loading, risk register). Each is reproducible from the underlying source documents and is provided as appendices for transparent review.

2.3 Commercial summary

Item	PHP
Base proposal cost	15,236,740
Overhead and margin (20%)	2,742,613
Contingency reserve (7.5%)	1,438,348
Sub-total before VAT	19,417,701
VAT (12%)	2,330,124
GRAND TOTAL (VAT-inclusive)	** 21,747,826**

3. Project Background

3.1 The Kingsford Hotel Bacolod project

Kingsford Hotel Bacolod is a Megaworld Corporation development located at Manhattan Street, The Upper East, Bacolod City, Negros Occidental. The project is a mixed-use hotel and amenity facility with the following salient characteristics, as inferred from the available technical documentation:

- **Occupancy types:** hotel guestrooms (above the 3rd Floor), casino at the 2nd Level, amenity facilities at the 3rd Floor, food and beverage outlets with kitchen scope distributed from Basement to 3rd Floor, and standard hotel back-of-house operations.

- **Vertical extent:** Basement, Lower Ground Floor, Ground Floor, 2nd Floor, 3rd Amenity & Guestroom Floor, guestroom levels above, and Roofdeck.
- **Mechanical services:** centralised chilled-water plant at Ground Floor (3 chillers), condenser-water pumps and chilled-water headers at 2nd Floor pump room, cooling towers at Roofdeck, hot-water generation plants at Lower Ground and Roofdeck, steam boilers for the laundry at Lower Ground, dedicated outdoor air systems for both casino and guestroom service, precooled air handling units at Roofdeck, and air-handling units in the basement-podium back-of-house zone.
- **Electrical services:** main switchgear with multiple incoming feeders (utility, generator, automatic transfer switch), distributed sub-feeders to chiller plant, AHU plant, kitchens, lighting, hot-water plant, lifts, BMS UPS, mechanical pumps, boiler/laundry, and fire pump.
- **Project stage:** new construction, currently in detailed design and pre-procurement, with construction bulletins issued on a rolling basis (the latest electrical bulletin being No.8 dated 5 November 2025).

3.2 Project consultants and parties

Based on the documents provided to us, the project parties identified are:

Role	Entity	Reference
Owner / Developer	Megaworld Corporation	Title-block stamps + bulletin recipient
BMS-discipline engineer of record	R.J. Calpo & Company (Engr. Reynaldo J. Calpo, PME)	Author of the BMS Points list
Electrical-discipline consultant	Mario A. Alix Philippines, Inc.	Author of EE Plan revisions
Architect	Design Alliance Architecture & Planning	Title block on EE drawings
Customer representative	Mr. Rome Amiel P. Gonzales	EE bulletin recipient

3.3 Note on the term ‘Rehabilitation’

Your enquiry letter (Requirement.rtf) describes the project as the *Rehabilitation of Building Management System for the Kingsford Hotel Bacolod project*. Our review

of the supporting documents — both the BMS Points list and the EE Plan — confirms that they are stamped *Construction Bulletin* with dates of October–November 2025, and that the EE revisions reference *adjusted mechanical layout* and *added power provisions for kitchen layouts*. These are characteristic of a greenfield new-construction project at active design stage, not of a retrofit on an operating building. Our proposal is therefore costed on a greenfield basis and excludes any demolition, hot-cutover, or after-hours work that would be required for retrofit scope.

Should our reading of the project stage be incorrect, or should there be any retrofit elements within the scope, we will gladly revise our proposal accordingly. The clarification request is item Q-018 in our **Section 13 (Inclusions / Exclusions / Clarifications)** matrix.

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4. Our Understanding of the BMS Scope

Our scope analysis is summarised in the following matrix, which lists each subsystem covered by the BMS Points list along with the equipment count, the I/O point count attributable to that subsystem, and the field panel(s) serving it.

4.1 Subsystem coverage matrix

Subsystem	Equipment instances	I/O points	Reference
ventilation	71	373	A1 + A2
chilled_water	12	135	A1 + A2
common_area	4	64	A1 + A2
hot_water	19	45	A1 + A2
steam	2	42	A1 + A2
condenser_water	4	40	A1 + A2
casino_mvac	4	38	A1 + A2
power_metering	11	11	A1 + A2
btu_metering	5	5	A1 + A2
Total	**132**	**753**	

4.2 Subsystem narratives

4.2.1 Chilled Water Plant

The chilled-water plant comprises **three packaged water-cooled chillers** (CH-1, CH-2, CH-3) located at Ground Level in the chiller plant room. Each chiller is BMS-monitored via its native BACnet/IP gateway, exposing approximately twenty-four data points covering compressor status, motor load current, energy consumption, refrigerant pressures and temperatures (evaporator and condenser sides), oil pump status and oil-sump conditions, winding temperature, and the approach delta temperature and pressure for both heat exchangers.

The plant interfaces with **four primary chilled-water pumps** (PCHWP-1 through PCHWP-4, comprising three duty units plus one standby per A-CHW-001) located in the 2nd Floor pump room, each driven by a variable-frequency drive that reports speed and accepts speed command via BACnet HLI. The plant is hydraulically separated from the secondary loop by a CHW header set with supply/return temperature and pressure sensors, a differential-pressure sensor across the bypass line, and a BMS-supplied motorised bypass valve.

Heat rejection is via **three condenser-water pumps** (COMP-1 through COMP-3) at the 2nd Floor pump room, sequenced to the chillers, and **three cooling towers** (CT-1, CT-2, CT-3) at Roofdeck. Cooling-tower fan staging is controlled per condenser-water leaving temperature; basin-level alarms and motorised blowdown valves are BMS-supervised. The cooling-tower area shares a common outdoor-air temperature and humidity sensor for control of the wet-bulb-driven sequence.

A plant-level BTU meter (BTU-CHWS-MAIN) provides cumulative energy and instantaneous flow on the supply leg, integrated via Modbus.

4.2.2 Air Handling Units

Air handling unit scope comprises:

- **Basement-Podium Back-of-House Air Handling Units (CHWP-1.1 / 1.2 / 1.3 at Ground Level):** Three units, each chilled-water-served with VFD-driven supply fan, modulating CHW valve (ME-supplied), outdoor and return-air motorised dampers (ME-supplied), and BMS-supplied sensors for supply/mixed/return air temperature, supply air humidity, and indoor return-air CO_2 (for demand-controlled ventilation). Each unit has a BACnet/IP-native VFD interface for fan speed and control.

- **Casino-serving Air Handling Units (AHU-2M.1 / 2M.2 at 2nd Level):** Two units of similar architecture to the BOH AHUs, but with modulating dampers (position feedback as analogue input) and additional CO/CO_2 sensors at the return duct to manage indoor air quality in the casino environment. Each AHU is paired with an air-treatment ozonizer (OZ-2M.1 / OZ-2M.2) which BMS monitors for status, trip alarm, and downstream VOC level.

  Note: The TUEC tabulation indicates a total of ten BOH air handling units, of which only the three at Ground Level (CHWP-1.1/1.2/1.3) are explicitly tag-listed in the points list provided to us. The remaining seven units are identified by aggregate point counts but not by individual tag or location. The base proposal covers the three confirmed units; the additional seven are excluded pending receipt of the complete BOH AHU schedule. Refer to clarification Q-021.

4.2.3 Dedicated Outdoor Air Systems

Three DOAS units are in scope:

- **DOAS-2W (Casino MVAC at 2nd Level):** Provides conditioned outdoor air to the casino with energy recovery, modulating CHW coil, motorised dampers, and full BACnet/IP integration. Includes upstream ozonizer monitoring.
- **DOAS-RD.1 and DOAS-RD.2 (Hotel/Roofdeck DOAS serving guestroom-level fresh air):** Two units at Roofdeck providing outdoor-air supply to the upper guestroom levels with similar control architecture.

Each DOAS unit is treated as a single equipment instance with twenty-five points covering supply and exhaust fan status/HOA/trip/VFD speed/control, outdoor-air dry-bulb temperature and flow and humidity sensors, indoor mixed-air temperature and humidity, supply-air temperature, exhaust-air temperature, outdoor-air motorised damper status and command, CHW modulating valve status and command, and exhaust-fan static-pressure transmitter.

4.2.4 Precooled Air Handling Units (Roofdeck)

Two PAHU units at Roofdeck (PAHU-RD.1, PAHU-RD.2) condition outdoor air upstream of distribution to other AHUs/DOAS within the building. Each PAHU has a single-direction airflow path (no exhaust), VFD-driven fresh-air fan, modulating CHW coil and outdoor-air damper, and standard fan status/trip/HOA monitoring. Each provides a BACnet/IP gateway connection to the BMS.

4.2.5 General Ventilation

The general ventilation system comprises **sixty-eight exhaust fans** distributed across five building zones:

Zone	Fans	Composition
Ground Floor — Main Lobby	9	4 toilet exhaust + 5 general exhaust (LPG, mechanical room, storage, main rest room, etc.)
2nd Floor	13	3 toilet + 4 general (basement service, GS) + 6 general (chiller room, EF-2.x)
3rd Floor — Amenity & Guestroom	27	25 toilet exhaust (3A×2, 3B, 3C×2, 3D×20 for guestroom-block toilets) + 2 general exhaust
Basement zone	16	2 toilet + 7+7 general (mechanical room, heat-pump room, pump rooms, MFP)
Roofdeck zone	3	3 general exhaust

Each fan is monitored for motor status, hand/off/auto status, and trip alarm via auxiliary contacts at the fan starter. The TUEC tabulation indicates 181 digital inputs across the ventilation scope, while a strict 3-DI-per-fan pattern would yield 204; this 23-DI variance is reconciled by assuming that some smaller basement-zone and roofdeck fans use a 2-DI pattern (motor status + trip, no HOA) — refer to assumption A-VENT-001.

4.2.6 Plumbing / Sanitary Hotwater System

The hotwater system comprises six **calorifiers** (HWT-LZ-1/2/3 at Lower Ground and HWT-HZ-1/2/3 at Roofdeck), each monitored for tank temperature; six **heat pumps** providing primary heating (HP-LZ-1/2/3 + HP-HZ-1/2/3); and six **recirculating pumps** (RP-LZ-1/2/3 + RP-HZ-1/2/3) maintaining hotwater circulation. Each pump set is monitored for motor status, hand/off/auto status, and trip alarm. The Lower Ground and Roofdeck plants each have a hot-water header set with supply/return/make-up cold-water temperature monitoring.

Per assumption A-PL-001 — supported by the TUEC tabulation showing eighteen digital inputs and eighteen high-level interface points across the eighteen pump status types — Lower Ground pumps are wired as hardwired digital inputs to the local BMS panel (PNL-PL-LZ), while Roofdeck pumps are routed via an equipment-supplier-provided high-level interface gateway to the local BMS panel

at Roofdeck (PNL-PL-HZ). This assumption matches the project's I/O totals exactly and may be revised when the equipment vendor's panel architecture is confirmed.

4.2.7 Boiler / Laundry System

Two steam boilers (SB-1, SB-2) at Lower Ground supply steam to the laundry. Each boiler has sixteen monitored points: BMS-supplied steam pressure transmitter and feedwater temperature sensor, fluegas temperature sensor, fluegas oxygen sensor, plus equipment-supplier-provided auxiliary contacts for low/high water level, burner power, small/big fire control signals, waterfeed pump status, burner status and burner-running status, blower motor status, and fuel-oil pump status. The BMS-supplied motorised blowdown valve is commanded by digital output from the boiler-room BMS panel.

4.2.8 Electrical Metering

The electrical metering scope follows the project's *Electrical Maximum Demand Control* requirement (BMS general specification) and assumption A-EE-001:

- **Three multifunction main-switchgear meters** (MTR-MAIN-1/2/3) at the main switchgear room, covering utility, generator, and ATS/bus-tie incomers
- **Ten sub-feeder meters** (MTR-FDR-01..10) at major distribution panels covering the chiller plant, AHU plant, kitchen, lighting, hotwater plant, lifts, BMS UPS, mechanical/pumps, boiler/laundry, and fire pump

Each meter is integrated via Modbus RTU/IP and exposes five high-level interface sub-points to the BMS: instantaneous active power (kW), cumulative energy (kWh), reactive power (kVAR), three-phase RMS-average voltage (V), and three-phase RMS-average current (I). Two Modbus serial-to-IP gateways aggregate the meters at the main switchgear and distribution rooms respectively.

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5. Technical Proposal

5.1 System architecture

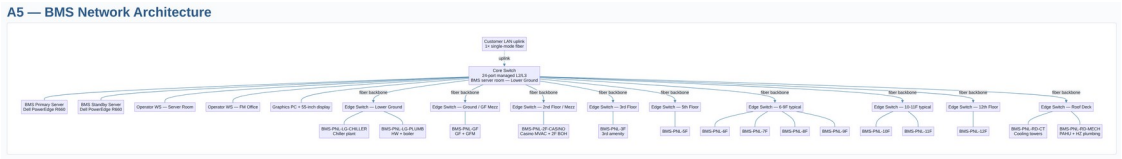
The BMS is implemented as a three-tier architecture aligned with the BMS general specification on sheet BMS-01:

Tier 1 — Head-End (server room): - Redundant primary–standby BMS server pair hosting the BMS application, point database, alarm and event management, trending, scheduling, reporting, and graphics rendering - Two operator workstations (chief engineer and front-desk / shift staff) - One graphics PC driving a 55-inch commercial display for control-room situational awareness - Online double-conversion 3 kVA UPS providing 30 minutes of full-load runtime - Server-room peripherals: KVM switch, console monitor, color laser network printer (alarm printer per spec), 19-inch equipment rack

Tier 2 — Network: - One managed Layer-2/Layer-3 core switch at the server room, providing BACnet routing, VLAN, SNMP, NTP, and the single uplink to the customer's corporate LAN - Six edge managed Layer-2 switches at the floor / zone IDFs (Lower Ground, Ground, 2nd Floor, 3rd Floor, Basement, Roofdeck) - Riser fibre — OM3 multimode 6-strand armoured — totalling 300 m across six risers, with 14 fibre transceivers (paired) - Cat6 patch and permanent links to BMS panels and BACnet/IP-native equipment (chillers, AHUs, DOAS, PAHU, BTU meter)

Tier 3 — Field: - 18 BMS field panels distributed across plant rooms and floor-level zones - ~30 DDC controllers (1 per ~40 physical I/O, plus network gateway controllers where panels host BACnet/Modbus integration) - BMS-supplied sensors, BMS-supplied modulating valve actuators where applicable, and termination of equipment-supplier-provided auxiliary contacts and ME-supplied valve/damper actuators

5.2 Network architecture and switch schedule



BMS Network Architecture

Star-and-tree topology centred on the BMS Server Room core switch, with riser fiber to floor/zone edge switches and Cat6 drops to BMS panels and BACnet/IP equipment. Source-of-truth: `05-working-docs/A5-network-architecture.md`.

The detailed switch schedule (count, locations, port counts, panel and equipment assignments) is documented in working-doc A5 — see Appendix A.5 / `05-working-docs/A5-network-architecture.md`. Network architecture summary: 1 core switch + 2 edge switches (counts derived from A4 panel locations and A5 zoning).

The IP plan uses a flat /24 BMS subnet (10.10.50.0/24) with static-block allocation: servers .10–.19, switches .20–.29, controllers .50–.99, BACnet/IP equipment .100–.199, power-meter gateways .200–.219. The BMS LAN does not route to the corporate LAN; remote access is via VPN through the customer's firewall (subject to clarification Q-012).

5.3 Head-End hardware and software

The head-end equipment list is summarised below. Detailed specifications are provided in Appendix B.

ID	Description	Qty
HE-SVR-01	BMS Primary Server — Dell PowerEdge R660, dual Xeon, 32 GB RAM, dual PSU, 2× 1 TB SSD RAID-1, Win Server (Siemens Desigo CC platform)	1
HE-SVR-02	BMS Standby Server — same spec as HE-SVR-01, hot-standby	1
HE-WS-01	Operator Workstation — Dell OptiPlex 7000, 16 GB RAM, 27-inch monitor (Siemens Desigo CC client)	2
HE-GFX-01	Graphics PC — Dell Precision 3000 + 55-inch wall-mount display (control room overview)	1
HE-UPS-01	Head-End UPS — APC Smart-UPS SRT 3 kVA online double-conversion, 30-minute runtime, rack-mount	1
HE-RACK-01	19-inch 42U server rack with cable management, side panels, locking doors	1
HE-KVM-01	8-port KVM switch with rack-mount LCD console (1U)	1
HE-MON-01	Server-room console monitor (rack-mount LCD, included in KVM lot)	1
HE-PRINTER-01	Color laser printer (HP LaserJet Pro M255dw or equivalent) — alarm reports + commissioning records	1
HE-SW-LIC	Software licenses lot — Siemens Desigo CC server + 3 client licenses + energy reporting module + graphics editor	1

Total head-end items: 10 line items, 11 units. Total continuous power: 2,150 W (head-end) + 75 W (core switch) = 2,225 W; UPS-protected.

5.4 BMS Field Panel Schedule

8 BMS field panels are deployed as follows. Each panel summary lists I/O density, controller count, and approximate power consumption.

Panel	Location	Equipment Served	Physical I/O	HLI	Net	Controllers	Power (W)
BMS-PNL-2F-CASINO	2nd Floor BOH / 2nd Floor Casino / 2nd Floor Casino MVAC Room	11 units	84	4	3	3	90
BMS-PNL-3F	3rd Floor Amenity	26 units	75	0	1	2	55
BMS-PNL-B1	Basement 1 / Basement 1 BOH	17 units	63	1	0	2	50
BMS-PNL-GF	Ground Floor / Ground Floor BOH / Ground Floor Lobby / Ground Floor	16 units	63	2	3	2	65

Panel	Location	Equipment Served	Physical I/O	HLI	Net	Controllers	Power (W)
	Mezzanine BOH / Main Switchgear Room						
BMS-PNL-LG-CHILLER	2nd Level Mechanical Room	20 units	72	60	11	2	105
BMS-PNL-LG-PLUMB	Lower Ground HW Plant / Lower Ground Laundry	13 units	40	26	1	2	55
BMS-PNL-RD-CT	Roof Deck Mechanical	4 units	40	0	0	1	25
BMS-PNL-RD-MECH	Roof Deck / Roof Deck HW Plant / Roof Deck Mechanical	25 units	185	9	10	5	175
Totals		132 units	**622**	**102**	**29**	**19**	**620**

Each panel is housed in an IP54 wall-mount metal enclosure with internal DIN-rail-mounted DDC controllers, I/O modules (16-channel AI/AO/DO and 32-channel DI), 24 VDC switching power supply, terminal blocks, signal-level surge protection, and standard cable management. Plant-room critical panels (six panels) include redundant power supplies.

5.5 Cable Schedule Summary

The cable schedule is generated from the panel-to-device topology assuming a 30 m average panel-to-device run length and an 80 m horizontal-trunk-per-floor allowance (per assumption A-001). Refinement is expected against architectural and mechanical layouts.

Cable category	Count	Length (m)
Field cables (panel ↔️ device)	194	3,409
Network/MS-TP backbone trunks	7	1,480
240V panel power feeds	8	144
Grand total	**209**	**5,033**

Cable type breakdown (field cables only):

Cable type	Length (m)
Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP)	3,409

All control and signal cables are FRLS (Fire Retardant, Low Smoke) per Philippine fire-safety code. Approximately 30 % of the total cable runs are in BMS-installed branch conduit; the remainder uses ME-contractor-provided cable trays in plant rooms (subject to Q-008).

5.6 Power Provisions Schedule

Twenty-five 240 V single-phase circuits are required to be provided by the Electrical Contractor for energising the BMS scope:

- 18 circuits to the BMS field panels (field-panel total estimated load: 1400 W)
- 1 circuit at 32 A to the head-end UPS input (head-end total estimated load: 2400 W, UPS-protected)

- 6 circuits to the network edge switches (edge total estimated load: 600 W)

Total estimated continuous BMS load: 4400 W. A detailed power-provisions schedule is included with our submittal package, listing the source panelboard, breaker rating, and circuit identification expected per BMS panel.

5.7 Programming and Configuration Approach

The programming scope is structured around the following object inventory derived from the I/O list and the description-of-operations text in the points list:

Object class	Count
Point database objects (per AI/AO/DI/DO/HLI)	724
Control loops (one per equipment with active control)	48
Alarm definitions (with priority, routing, and message)	78
Trend logs	519
Schedules (occupancy, system on/off, setbacks)	8
Scheduled reports (daily / weekly / monthly)	10
Total programmable objects	**1,387**

Estimated programming effort: 251 hours (31 person-days). This is delivered by a single BMS engineer working in parallel with site installation during weeks 4–13.

Control logic for each piece of equipment is built directly from the *Description of Operations* narrative in the points list — for example, the chilled-water plant sequencing follows the BMS-03 Process and Instrumentation Diagram for Primary Chilled Water and Condenser Water, and the cooling-tower fan staging follows BMS-03's Cooling Tower P&ID with its 14 monitor & record items, alarm definitions, and runtime/status reporting.

5.8 Operator Graphics and Reports

A total of **49 graphic pages** are developed: 26 simple (alarm summary, trend, dashboards), 18 medium (per-floor, per-system, equipment-popup templates),

and 5 complex (home page, full chiller-plant overview, full AHU/DOAS popup templates, full Boiler popup, energy-savings dashboard).

Navigation principles: - The home page provides at-a-glance KPIs and click-through to floor or system pages. - Per-floor pages display building plans with equipment overlays at their physical locations. - Per-system pages display Process and Instrumentation Diagram-style flows with all equipment in the system. - Equipment-popup templates are reused across instances (e.g., one Chiller template instantiated for CH-1, CH-2, CH-3) to ensure consistency and minimise programming duplication. - Consistent colour coding is used: green = running normal, yellow = warning, red = alarm/fault, grey = stopped or in auto.

Estimated graphics development effort: 168 hours (21.0 person-days), delivered by a graphics engineer during weeks 4–13.

5.9 Testing and Commissioning Approach

Testing and commissioning is delivered in five sequential layers:

1. **Pre-commissioning** (week 12): cable-continuity testing, megger testing where applicable, panel power-up smoke tests on all 18 panels.
2. **Point-to-point (P2P) testing** (week 13, ~93 hr): every one of the 622 physical I/O points is verified for calibration, range, polarity, and database scaling. P2P is conducted panel-by-panel to localise issues.
3. **Functional testing** (week 14, ~198 hr): each of the 132 equipment instances is verified against its description-of-operations sequence (e.g., CHW valve modulation maintains supply-air temperature).
4. **Integrated commissioning** (week 15, ~32 hr): 8 cross-system sequences are validated together — chiller plant staging, CHW differential-pressure control, AHU supply-air temperature loops, DOAS demand-controlled ventilation, hotwater system sequencing, boiler firing rate, cooling-tower fan staging, and energy-savings algorithm verification.
5. **Owner T&C / SAT** (week 15) and **Snagging / Punch-list** (weeks 15–16): formal Site Acceptance Test with the Owner's representative, followed by punch-list resolution and as-built documentation.

Total T&C effort: 323 hours (40 person-days). Plus 80 hours allocated for as-built documentation (panel general arrangements, cable schedule, riser, network architecture, O&M manuals, point database export, programming and graphics archive).

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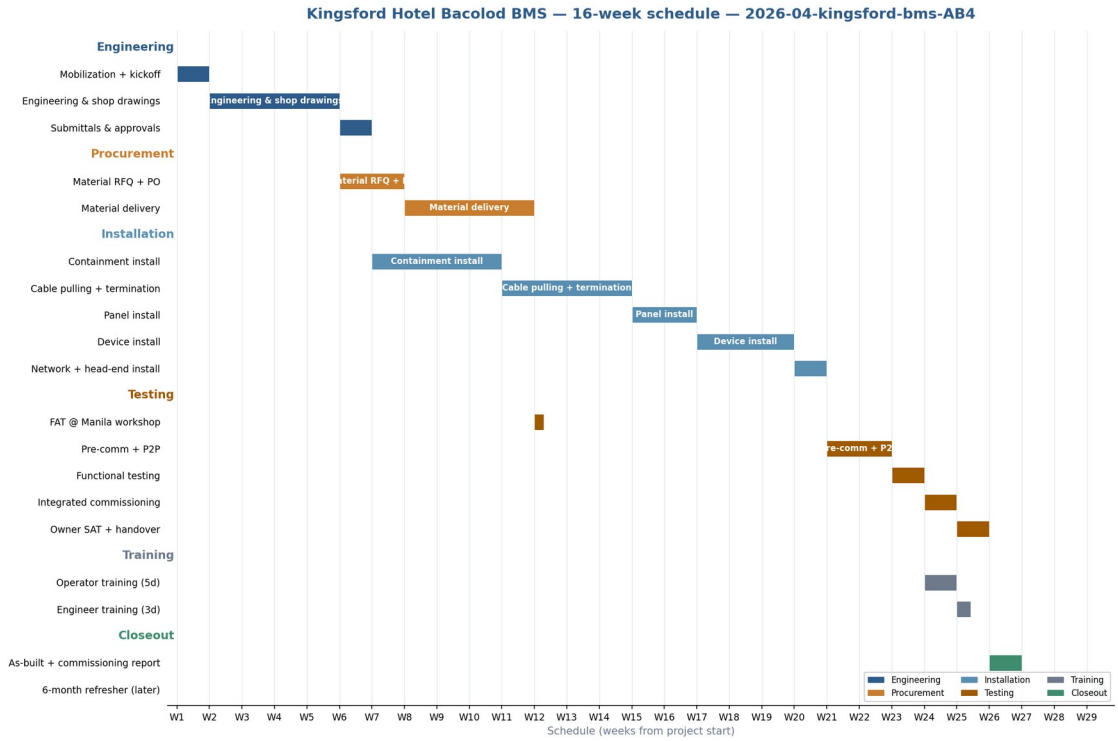
6. Project Schedule

The proposed schedule covers 16 weeks from Purchase Order to Handover, with critical milestones at weeks 4, 6, 12, 15, and 16. The visual Gantt below is auto-generated from the structured schedule (D1) and re-renders on every refresh:



Project schedule — visual Gantt

Sections colour-coded by lifecycle phase (PM & Engineering, Supply, Installation, Programming, T&C, Handover); milestones shown as diamonds. Source-of-truth: `05-working-docs/D1-schedule.md`.

Wk	Phase	Key activities
1	Mobilization + Engineering	Site mobilization, kick-off meeting, engineering team starts, first MEP coordination meetings
2	Engineering	Panel layouts, IO list submittal, control sequence design, network design
3	Engineering	Continued; submittals package #1 (head-end + network) issued
4	Engineering / Supply	Engineering wraps; submittals package #2 (panels + sensors); long-lead supply orders

Wk	Phase	Key activities
		placed
5	Supply / FAT	Standard supply orders placed; FAT preparation; head-end FAT in vendor facility
6	Supply	Cables, conduit, sensors arrive on site; staging
7	Installation	First-fix containment in plant rooms; head-end server-room build-out begins
8	Installation	Plant-room cable pulling; head-end installation continues; network core switch in place
9	Installation	Plant-room device installation + termination; floor-level first-fix on multiple floors
10	Installation	Floor-level cable pulling (all floors); plant-room pre-comm checks begin
11	Installation	Floor-level device install + termination; head-end software config
12	Installation / T&C	Final installation tasks; pre-commissioning sweeps; programming + graphics nearing completion
13	T&C	Point-to-point testing per panel; programming + graphics complete; integration tests start
14	T&C	Functional testing per system
15	T&C	Integrated commissioning; Owner T&C / SAT
16	Handover	Operator training (16 hrs over 2 days); as-built drawings + O&M handover; warranty start

Critical milestones:

- **Week 4:** Engineering complete, all submittals issued.
- **Week 6:** All supply on site.
- **Week 7:** Site installation start (mobilization).
- **Week 12:** Installation complete (mech-ready for T&C).
- **Week 14:** Functional testing complete.
- **Week 15:** SAT complete.
- **Week 16:** Handover, warranty start.

7. Manpower Plan

Total project effort: **4,648 hours (581 person-days)** across the project duration. Manpower is loaded as follows, with peak headcount of 11 personnel on site during weeks 9–10:

Wk	PM	Eng	Wireman	Tech	Graphics	Total
1	1	2	0	0	0	3
2	1	2	0	0	0	3
3	1	2	0	0	0	3
4	1	2	0	0	0	3
5	1	1	0	0	0	2
6	1	1	0	0	0	2
7	1	1	4	0	0	6
8	1	1	6	1	1	10
9	1	1	6	2	1	**11**
10	1	1	6	2	1	**11**
11	1	1	4	2	1	9
12	1	1	2	3	1	8
13	1	1	1	3	1	7
14	1	1	0	3	0	5
15	1	2	0	2	0	5
16	1	1	0	1	0	3

Effort budget by phase:

Phase	Hours	Person-days
Engineering & Design (1.2)	320	40
Project Management (1.1, 3.1)	720	90
Submittals & FAT (1.3, 1.4)	120	15
Installation (3.0)	3166	396
Programming (4.1)	251	31

Phase	Hours	Person-days
Graphics (4.2)	168	21
Testing & Commissioning (5.x)	323	40
SAT + Documentation + Training (5.5–5.7, 6.x)	200	25
Total	**~4,648**	**~581**

8. Inter-Discipline Coordination

BMS scope interfaces with multiple disciplines on the project. The following matrix summarises the demarcation points and the items requiring coordination meetings:

BMS ↔️ Mechanical Contractor: - BMS supplies wiring and termination of motorised iso valves on chillers and cooling towers (CHW + COW R&S); ME supplies the valves and actuators. - BMS supplies wiring, termination, and AO command for AHU modulating CHW valves; ME supplies the valves and actuators. - BMS supplies wiring and AO/DI for AHU and DOAS dampers (OA, RA); ME supplies the dampers and actuators. - BMS supplies HLI integration to AHU/DOAS/PAHU VFDs; Equipment Supplier supplies the VFDs with BACnet/Modbus interface cards. - BMS reads pump/fan/heat-pump auxiliary contacts (motor status, HOA, trip); Equipment Supplier provides aux contacts at the equipment terminal block. - BMS supplies thermowells and temperature sensors on CHW pipework; ME provides pipe bosses for the thermowells.

BMS ↔️ Electrical Contractor: - EE Contractor provides 25 dedicated 240 V single-phase circuits to BMS panels and head-end UPS input per A7 power schedule. - BMS supplies multifunction power meters (13 units) and CTs (39 units); EE provides switchgear cutouts and CT installation coordination. - BMS supplies internal panel distribution (DIN-rail breakers, terminal blocks, surge protection); EE supplies the feeder cables and breakers.

BMS ↔️ IT / Customer Network: - BMS LAN is logically isolated from the customer's corporate LAN. - Single 1 Gbps uplink at the core switch to a customer-

provided network drop in the customer's IT closet, subject to firewall configuration. - Customer IT provides DNS allocation, NTP source (or time synchronization to local Internet time), and any VPN access for vendor remote support.

BMS ↔️ Civil / Architectural: - BMS provides panel and equipment locations in submittal drawings. - Civil provides wall penetrations, fire-stopping, panel-room access doors, and the server-room build-out (walls, finishes, cooling, fire suppression).

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9. Quality Management

9.1 Quality framework

Our quality framework follows industry standards expected by Megaworld for hotel projects:

- **Engineering quality:** all submittals pass internal peer review prior to issuance; all panel general arrangement drawings are signed off by the BMS engineer of record before fabrication.
- **Material quality:** Tier-1 brand selection, factory-tested controllers, FRLS-compliant cabling per fire code, IP54 indoor enclosures.
- **Installation quality:** site supervision by a BMS technician at all times during cable pulling and panel installation; daily quality logs maintained.
- **Commissioning quality:** P2P testing 100 % coverage of physical I/O; functional testing 100 % coverage of equipment; integrated commissioning of all cross-system sequences.
- **Documentation quality:** as-built drawings, O&M manuals, point database export, and programming/graphics archive delivered before handover acceptance.

9.2 Factory Acceptance Test

Prior to site mobilization, a Factory Acceptance Test is conducted at the BMS vendor's facility (week 5). The FAT covers:

- Demonstration of controller programming with simulated I/O
- Demonstration of representative graphics pages (home page, sample equipment popup, alarm summary)

- BACnet integration with a sample equipment vendor's panel (typically a chiller controller demo)
- Validation of redundancy failover at the head-end
- Acceptance signed by the customer's engineering representative

9.3 Site Acceptance Test

After integrated commissioning at week 15, the Site Acceptance Test (SAT) is conducted. The SAT covers:

- Full operator walkthrough of all graphic pages with the customer's chief engineer
- Live demonstration of three random equipment functional sequences
- Live demonstration of one cross-system integrated sequence (typically chiller plant staging)
- Demonstration of energy-savings algorithm with sample scenarios
- Alarm propagation and acknowledgment workflow
- Acceptance signed by the Owner's representative; warranty period commences

9.4 Warranty

The warranty period is **one year from manufacturer (per equipment vendor warranty)** plus **one year of on-site defect liability** by ourselves. During the on-site defect liability period:

- Site visits in response to fault calls within 24 hours of report
- Replacement of any defective BMS-supplied component at no charge
- Programming or graphics adjustments at no charge
- Software updates to the BMS server software within the manufacturer's release schedule
- Telephone support during business hours

Optional 1-year preventive-maintenance contract is available as an extension after the warranty period.

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10. Commercial Proposal

10.1 Pricing summary

Item	PHP
Base proposal cost (material + labor + services)	15,236,740
+ Overhead and margin (20%)	2,742,613
+ Contingency reserve (7.5%)	1,438,348
Sub-total before VAT	19,417,701
+ VAT (12%)	2,330,124
GRAND TOTAL (VAT-inclusive, PHP)	** 21,747,826**

10.2 Cost breakdown by section

WBS	Section	Subtotal (PHP)	% of base
1.0	Project Management & Engineering	1,688,000	11.1%
2.0	Material Supply	10,829,700	71.1%
3.0	Installation	1,654,530	10.9%
4.0	Programming & Configuration	486,000	3.2%
5.0	Testing & Commissioning	487,310	3.2%
6.0	Training & Handover	91,200	0.6%
	Base total	** 15,236,740**	**100.0%**

10.3 Cost pool breakdown

Pool	Subtotal (PHP)	% of base
Material	9,883,700	64.9%
Labor	4,187,040	27.5%
Service/Lot	1,166,000	7.7%

10.4 Optional items (priced separately on request)

Item	Pricing basis
1-year preventive maintenance contract (post-warranty)	Quote on request
FDAS integration (subject to FDAS vendor specs)	Quote on request
PMS integration (guestroom occupancy → FCU control)	Quote on request, subject to FCU scope confirmation
Additional administrator training (8 hr session)	~PHP 30,000 per session
Vendor factory training (overseas)	Quote on request, varies by vendor and location
Spare-parts inventory beyond warranty stock	5% of critical-replacement items, quote on request

10.5 Payment milestones

We propose the following payment schedule (subject to customer's commercial terms):

Milestone	%	Trigger
Mobilization advance	10%	Upon PO + signed contract
Engineering complete	15%	Submittals approved (Week 4)
Long-lead materials delivered	25%	Site delivery (Weeks 5–6)
Standard materials delivered	20%	Site delivery (Weeks 6–7)

Milestone	%	Trigger
Installation complete	15%	Mech-ready at Week 12
T&C complete + SAT	10%	Customer SAT signed (Week 15)
Handover + warranty start	5%	Documentation accepted (Week 16)
Total	**100%**	

10.6 Validity and acceptance

This proposal is valid for **90 days** from the date of issue (2026-04-28).

To accept this proposal, please countersign the acceptance block in **Section 14** or issue your standard Purchase Order referencing this proposal document.

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11. Stated Assumptions

The following assumptions form the basis of this proposal. We have tagged them with their cost-impact-if-wrong so that you may readily identify which ones materially affect pricing or schedule. Should any need to be revised, we will gladly amend the proposal.

Project context assumptions:

1. **Project stage — Greenfield (new construction).** Our base proposal is priced for new-construction scope. *If retrofit elements are included, pricing is revised — typically +30% for demolition, hot cutover, and after-hours work.*
2. **Required project duration — 16 weeks from Purchase Order to Handover.** *If a shorter duration is required, we re-plan with augmented crew and overtime — typically +20–30% on labor.*
3. **Working hours — Standard daytime construction (8 am–5 pm Mon–Sat).** No night-work or special-access premium has been priced.
4. **Site mobilization access:** unobstructed access to all plant rooms and floors as MEP installation progresses, per standard greenfield sequencing.

Scope assumptions:

5. **BMS scope coverage — Per the project-specific points list (TUEC).** Items not in the points list (e.g., per-guestroom Fan-Coil Unit controls, domestic cold-water booster pumps) are *not* in our base scope. *If FCU scope is confirmed in scope, +30–40% on BMS scope.*
6. **Brand selection — Tier-1 BACnet/IP equipment per the BMS general specification.** *Specific brand will be selected per Megaworld portfolio standardization once confirmed.*
7. **Cable lengths — Estimated at 30 m average panel-to-device run plus 80 m horizontal trunk per floor.** Refinement is expected when complete architectural and mechanical layouts are made available.
8. **Quantity of BOH AHUs — Three units (CHWP-1.1/1.2/1.3) at Ground Level.** The TUEC tabulation indicates a total of ten BOH AHUs but only three are tag-listed. *Additional AHUs, if confirmed, are priced separately.*
9. **Plumbing pump status routing:** Lower-Ground pumps wired as hardwired DI, Roofdeck pumps via equipment-panel HLI. Total point count is unaffected; if assumption is revised, panel I/O module sizing may shift.
10. **Power metering — 13 multifunction meters (3 main + 10 sub-feeder).** *Refined upon receipt of complete electrical drawing set.*

Network and integration assumptions:

11. **Network architecture — Isolated BMS LAN, flat /24 subnet, single uplink to customer's corporate LAN.** No VLAN segmentation in base proposal.
12. **Integration scope — None with PMS / FDAS / CCTV / ACS in base proposal.** Each integration is available as a priced option.
13. **Customer LAN uplink:** Customer IT provides one 1 Gbps drop into the BMS server room with appropriate firewall rules.

Commercial assumptions:

14. **Payment terms:** 30-day net.
15. **Retention:** 10% retention released at handover.
16. **Warranty:** 1-year manufacturer warranty + 1-year on-site defect liability.
17. **Liquidated damages:** none included in base.
18. **Currency:** PHP-denominated.
19. **VAT:** 12% applied to the grand total per Philippine tax code.

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12. Risk Management

Our risk register identifies thirteen project risks, of which five are scored Medium/High likelihood × High impact (score 6/9). Our mitigation strategies are summarised below:

Risk	Likelihood × Impact	Mitigation
Scope expansion via FCU confirmation	M × H	Explicit FCU exclusion in inclusions; if confirmed, priced as discrete add-on with separate WBS branch and BOQ
Long-lead chiller controller / equipment delivery slip	M × H	Day-1 PO ordering; expedite premium budgeted as contingency; Tier-2 alternative supplier identified during RFQ
Existing BOH AHU schedule incomplete	H × M	Base scope covers 3 confirmed AHUs; 7 additional priced as option pending confirmation
MEP contractor sequencing delays	H × M	Weekly coordination meetings from Week 1; MEP hand-over dates submitted with engineering submittals; 1-week internal slack embedded in installation phase
Customer schedule pressure	M × H	Q-007 surfaced immediately; if shorter required, propose with

Risk	Likelihood × Impact	Mitigation
(< 16 weeks required)		explicit overtime + crew premium
Site survey discovers unforeseen conditions	L × H	Site survey before T&C; if retrofit, contingency reserve 5% in BOQ
FAT failure (programming bug)	L × M	Internal pre-FAT in vendor facility; 1-2 week recovery if needed
Brand standardization affects supplier lock-in	L × M	Multi-brand RFQ in Phase 9 (parallel quotes); flexibility in pricing
Commercial terms tighter than assumed	M × M	LD risk priced as 1–2% contingency
Insufficient cable length per A-001	L × M	Material BOQ +10% safety margin
Network/ IT firewall delays	M × L	IT coordination meeting in Week 4–5; BMS LAN can operate isolated for T&C if needed
Insufficient contingen	(always present)	7.5% contingency baked into the proposal

Risk	Likelihood × Impact	Mitigation
cy reserve		
FDAS / PMS / CCTV / ACS integration scope creep	M × M	Explicit exclusion in proposal; each integration offered as discrete priced option

13. Inclusions / Exclusions / Clarifications

13.1 Inclusions

Per Sections 4–9 (Project Understanding, Technical Proposal, Project Execution). All material supply, installation, programming, testing, commissioning, training, and warranty support for the BMS system as described.

13.2 Exclusions

The following are NOT in our base proposal scope. They are either supplied by other contractors, civil works, or hotel building systems beyond the BMS perimeter:

Item	Reason for exclusion
Mechanical equipment supply (chillers, cooling towers, pumps, AHUs, DOAS, PAHU, fans, calorifiers, heat pumps, recirculating pumps, boilers, ozonizers)	Mechanical Contractor / Equipment Supplier scope
Mechanical valves and	Mechanical Contractor scope

Item	Reason for exclusion
dampers (motorised iso valves, modulating CHW valves on AHUs/DOAS, OA/RA dampers)	
VFDs and motor starters	Equipment Supplier scope
Switchgear, MCCs, panelboards, breakers	Electrical Contractor scope
240 V power circuits to BMS panels and head-end UPS input	Electrical Contractor scope (per A7 schedule provided to EE)
Civil works (panel plinths, core drilling, server-room build-out, finishes)	Civil Contractor scope
FDAS integration	Excluded pending integration scope confirmation
PMS / CCTV / ACS integration	Excluded pending integration scope confirmation
Per-guestroom FCU controls	Excluded pending FCU scope confirmation
Domestic cold-water booster pump monitoring	Excluded pending Q-020
Demolition /	N/A for greenfield

Item	Reason for exclusion
removal of existing equipment	
1-year preventive maintenance contract	Available as priced option
Vendor factory training (overseas)	Available as priced option
Spare-parts inventory beyond warranty stock	Available on request

13.3 Clarifications (open items)

The following items have been assumed in this proposal at industry-standard practice; customer confirmation will refine the proposal. Each is listed with its priority and the default assumed.

P1 — Critical (cost-swing potential > 10%):

ID	Subject	Default assumed
Q-018	Project stage (greenfield vs. retrofit)	Greenfield, per technical documents
Q-007	Required completion duration	16 weeks from PO

P2 — Important (refines pricing):

ID	Subject	Default assumed
Q-001	Contracting entity	Megaworld Corporation
Q-005	Architectural floor plans	Cable lengths estimated per typical density
Q-008	Mechanical (HVAC) layout drawings	Equipment locations inferred from points list
Q-011	Complete electrical	Metering count assumed per construction-

ID	Subject	Default assumed
	drawing set	bulletin scope
Q-009	Working-hour constraints	Standard daytime greenfield construction

P3 — Useful (refines pricing precision):

ID	Subject	Default assumed
Q-003	TUEC project / contract code	Confirmed via document title
Q-004	Construction-bulletin completeness	Latest ‘for construction’ set assumed
Q-012	Integration scope (PMS, FDAS, CCTV, ACS)	None — isolated BMS LAN with single uplink
Q-013	Brand standardization / Megaworld portfolio	Tier-1 BACnet/IP brand per BMS spec
Q-014	Commercial terms	Standard local market
Q-015	Training scope	16-hr operator training included
Q-016	Maintenance contract scope	Not included; offered as option
Q-017	CONDOTELS standard vs. hotel-specific spec	CONDOTELS standard governs unless silent
Q-019	Per-guestroom FCU scope	Not in scope
Q-020	Domestic cold-water booster pump scope	Not in scope
Q-021	Complete BOH AHU schedule	Three confirmed at GND Level

14. Acceptance

We thank you for the opportunity to bid for this important project. Should you wish to accept this proposal, please countersign below or issue your standard Purchase Order referencing this document.

The undersigned acknowledges and accepts the terms and conditions stated in this proposal, including the stated assumptions in Section 11 and the inclusions/exclusions/clarifications in Section 13.

For [BMS Contractor]	**For Megaworld Corporation**
Signed: _____	Signed: _____
Name:	Name:
Title:	Title:
Date:	Date:

Appendix A — Detailed Bill of Quantities

This appendix provides the complete itemised Bill of Quantities, comprising **86 line items** across the seven WBS sections. Items flagged 'RFQ' are subject to refinement based on supplier quotations.

A.1 1.0 Project Management & Engineering

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
1.1	Project management (off-site, full duration, 16 weeks)	640	hr	1,500	960,000	
1.1	Site mobilization (week 1)	80	hr	1,500	120,000	
1.2	Engineering & design (system architecture, panel layouts, IO list, sequences,	320	hr	1,200	384,000	

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	network)					
1.3	Submittals & approvals administration	80	hr	1,200	96,000	
1.4	Factory Acceptance Test (FAT) delivery	1	lot	80,000	80,000	
1.4	FAT support hours (BMS engineer)	40	hr	1,200	48,000	
	Section subtotal				** 1,688,000**	

A.2 2.0 Material Supply

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
2.1.1	BMS Server (Primary) — dual-CPU, 16+ GB RAM, redundant PSU	1	each	350,000	350,000	Yes
2.1.1	BMS Server (Standby, redundancy)	1	each	350,000	350,000	Yes
2.1.2	Operator Workstation	2	each	80,000	160,000	Yes
2.1.3	Graphics PC + 55-inch Display	1	set	150,000	150,000	Yes
2.1.4	Head-End UPS (3 kVA, 30-min	1	each	90,000	90,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	runtime)					
2.1.5	Software licenses (server + 3 client + energy module + graphics editor)	1	lot	600,000	600,000	Yes
2.1.6	Server-room peripherals (KVM, console monitor, color laser printer, 19-inch rack)	1	lot	80,000	80,000	Yes
2.2.1	Core managed L2/L3 switch (24-port + 4 SFP)	1	each	120,000	120,000	Yes
2.2.2	Edge managed L2 switch (16-port + 2 SFP)	3	each	35,000	105,000	Yes
2.2.2	Edge managed L2 switch (8-port + 2 SFP)	3	each	18,000	54,000	Yes
2.2.3	Riser fiber, OM3 multimode 6-strand armored	300	m	280	84,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
2.2.3	Fiber transceivers (1G SX/LX, paired)	14	each	8,000	112,000	Yes
2.2.4	IDF wall-mount enclosures (9U)	6	each	18,000	108,000	Yes
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (small, IP54 wall-mount)	10	each	40,000	400,000	Yes
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (medium, IP54 wall-mount)	6	each	80,000	480,000	Yes
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (large, IP54 wall-mount)	2	each	150,000	300,000	Yes
2.3.5	DDC controllers (incl. network gateway controllers)	30	each	90,000	2,700,000	Yes
2.3.5	AI input modules (16-channel)	14	each	40,000	560,000	Yes
2.3.	AO output	6	each	45,000	270,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
5	modules (16-channel)					
2.3.5	DI input modules (32-channel)	15	each	30,000	450,000	Yes
2.3.5	DO output modules (16-channel)	2	each	35,000	70,000	Yes
2.3.5	24VDC switching power supplies (5A, redundant for 6 critical panels)	24	each	8,000	192,000	Yes
2.3.5	Terminal blocks (push-in 2.5 mm²)	900	each	80	72,000	Yes
2.3.5	Surge protection (signal-level SPD)	36	each	5,000	180,000	Yes
2.3.5	Cable management hardware (DIN rail, ducts, ferrules) per panel	18	lot	8,000	144,000	Yes
2.4.1	Temperature sensor — immersion/thermowell (water-side)	12	each	4,500	54,000	Yes
2.4.	Temperature	50	each	3,000	150,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
1	sensor — duct insertion					
2.4.1	Temperature sensor — outdoor (weatherproof)	1	each	6,000	6,000	Yes
2.4.2	Humidity sensor (duct/outdoor)	24	each	6,500	156,000	Yes
2.4.3	Pressure sensor — water-side	6	each	8,000	48,000	Yes
2.4.3	Differential pressure sensor (CHW header)	1	each	12,000	12,000	Yes
2.4.3	Pressure sensor — duct static	4	each	8,000	32,000	Yes
2.4.4	Flow sensor — water (insertion)	9	each	25,000	225,000	Yes
2.4.4	BTU meter (ultrasonic, Modbus)	1	each	80,000	80,000	Yes
2.4.5	Modulating valve actuator (BMS-supplied for CHW bypass)	1	each	12,000	12,000	Yes
2.4.	CO2 sensor	5	each	8,000	40,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
8	(duct return)					
2.4.8	CO sensor (duct return, casino)	2	each	10,000	20,000	Yes
2.4.8	VOC sensor (ozonizer return)	2	each	12,000	24,000	Yes
2.4	Mounting brackets, thermowells, valve fittings	1	lot	2,000	2,000	Yes
2.5.1	Tank temperature sensor (calorifiers)	6	each	3,500	21,000	Yes
2.5.2	HW header temperature sensors (supply/return/MUCW)	6	each	4,500	27,000	Yes
2.5.3	Pump aux-contact wiring kits (heat pumps + recirc pumps)	12	each	1,500	18,000	Yes
2.5.4	Boiler steam pressure sensor	2	each	12,000	24,000	Yes
2.5.4	Boiler feedwater temperature sensor	2	each	4,500	9,000	Yes
2.5.4	Boiler fluegas temperature	2	each	8,000	16,000	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	sensor (high-temp)					
2.5.4	Boiler fluegas O2 sensor (zirconia)	2	each	30,000	60,000	Yes
2.5.4	Boiler motorized blowdown valve (BMS-supplied actuator)	2	each	18,000	36,000	Yes
2.6.1	Multifunction power meter (Main switchgear class)	3	each	90,000	270,000	Yes
2.6.1	Multifunction power meter (Sub-feeder class)	10	each	35,000	350,000	Yes
2.6.2	Current transformers (split-core, sized per ampacity)	39	each	4,000	156,000	Yes
2.6.4	Modbus serial-to-IP gateway	2	each	25,000	50,000	Yes
2.6	Modbus shielded TP cable	300	m	80	24,000	Yes
2.7.1	4C × 1.5 mm² shielded FRLS control/signal	3136	m	95	297,920	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	cable					
2.7.1	6C × 1.5 mm² shielded FRLS (where conductor count > 4)	272	m	130	35,360	Yes
2.7.2	BACnet MS/TP shielded TP cable (low-cap)	150	m	90	13,500	Yes
2.7.3	Cat6 4P × 23 AWG U/UTP FRLS cable	700	m	90	63,000	Yes
2.7.5	Conduit (PVC HW 25 mm)	1509	m	120	181,080	Yes
2.7	3C × 2.5 mm² FRLS panel power feed cable	144	m	110	15,840	Yes
2.7.6	Cable identification (labels, ferrules, marker tags) — full project lot	1	lot	30,000	30,000	Yes
2.7.5	Cable management (junction boxes, cable ties) per panel field	18	lot	5,000	90,000	Yes
	Section subtotal				** 10,829,700**	

A.3 3.0 Installation

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
3.0	Installation labor — Wireman / Electrician (cable pulling, conduit, panel install, terminations)	2058.2	hr	350	720,370	
3.0	Installation labor — BMS Technician (testing, pre-comm)	791.6	hr	700	554,120	
3.0	Installation labor — Engineer / Supervisor (oversight, fault resolution)	316.7	hr	1,200	380,040	
	Section subtotal				** 1,654,530**	

A.4 4.0 Programming & Configuration

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
4.1	Controller programming (point database, control loops, schedules, alarms, reports,	251	hr	1,200	301,200	

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	trends)					
4.2	Graphics development (35 pages: navigation, floor, system, popups, alarm, trend, reports)	168	hr	1,100	184,800	
	Section subtotal				** 486,000**	

A.5 5.0 Testing & Commissioning

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
5.1	Pre-commissioning (cable continuity, megger, panel power-up smoke test) — covered in B4	0	lot	0	0	
5.2	Point-to-point (P2P) testing	93.3	hr	700	65,310	
5.3	Functional testing per equipment	198	hr	700	138,600	
5.4	Integrated commissioning (cross-system sequences, energy	32	hr	1,200	38,400	

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	savings)					
5.5	Owner T&C / SAT support (1 week)	40	hr	1,200	48,000	
5.6	Snagging / punch-list resolution	30	hr	700	21,000	
5.7	As-built documentation package (drawings, O&M, point database, programming archive)	1	lot	80,000	80,000	
5.7	As-built documentation engineer hours	80	hr	1,200	96,000	
	Section subtotal				** 487,310**	

A.6 6.0 Training & Handover

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
6.1	Operator training — on-site, 16 hours over 2 days, up to 6 operators	1	lot	60,000	60,000	
6.1	Training delivery hours (1 trainer × 16	16	hr	1,200	19,200	

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	hr)					
6.3	Documentation handover (formal, with sign-off)	8	hr	1,500	12,000	
	Section subtotal				** 91,200**	

A.7 7.0 Optional / Out-of-scope

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
7.1	[OPTION] 1-year preventive maintenance contract (post-warranty)	1	yr	0	0	Yes
7.2	[OPTION] Additional administrator training (8 hr session)	0	lot	30,000	0	
7.3	[OPTION] FDAS integration (BACnet/Modbus from fire panel + smoke control sequences)	0	lot	0	0	Yes
7.4	[OPTION] PMS integration	0	lot	0	0	Yes

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	RFQ
	(guestroom occupancy → BMS for FCU control)					
	Section subtotal				** 0**	

Appendix B — Equipment Takeoff

The complete equipment takeoff below lists each of the **132 BMS-monitored equipment instances** with location, panel assignment, primary supplier, and BMS-side I/O point counts.

B.1 Summary

Equipment Class	Count
Exhaust Fan (Toilet)	53
Multifunction Power Meter (Feeder)	10
Exhaust Fan (General)	8
Precooled Air Handling Unit	7
Heat Pump	6
Calorifier (Hot Water Storage Tank)	6
Recirculating Pump	6
BTU Meter	5
AHU (Chilled-Water-Served)	4
Chiller (Package Water-Cooled)	3
Cooling Tower	3
Condenser Water Pump	3
DOAS Unit	3
Primary CHW Pump	3
AHU (Modulating CHW-served)	2

Equipment Class	Count
Ozone Generator (UV-light or Corona)	2
Steam Boiler	2
CHW Bypass Header	1
CHW Return Main Header	1
CHW Supply Main Header	1
Cooling Tower (Common)	1
Hot Water Header Set	1
Multifunction Power Meter (Main)	1
Total instances	**132**

B.2 Detailed equipment list

ID	Equipment Class	Location	Panel	Primary C/O	I/O
AHU-2F-1	AHU (Chilled-Water-Served)	2nd Floor BOH	BMS-PNL-2F-CASINO	BMS Contractor	16
AHU-2M.1	AHU (Modulating CHW-served)	2nd Floor Casino MVAC Room	BMS-PNL-2F-CASINO	BMS Contractor	17
AHU-2M.2	AHU (Modulating CHW-served)	2nd Floor Casino MVAC Room	BMS-PNL-2F-CASINO	BMS Contractor	17
AHU-B1-1	AHU (Chilled-Water-Served)	Basement 1 BOH	BMS-PNL-B1	BMS Contractor	16
AHU-GF-1	AHU (Chilled-Water-Served)	Ground Floor BOH	BMS-PNL-GF	BMS Contractor	16
AH	AHU (Chilled-Water-	Ground	BMS-	BMS Contractor	16

ID	Equipment Class	Location	Panel	Primary C/O	I/O
U-GFM-1	Served)	Floor Mezzanine BOH	PNL-GF		
BTU-1	BTU Meter	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
BTU-2	BTU Meter	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
BTU-3	BTU Meter	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
BTU-4	BTU Meter	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
BTU-5	BTU Meter	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
CH-1	Chiller (Package Water-Cooled)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	28
CH-2	Chiller (Package Water-Cooled)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	28
CH-3	Chiller (Package Water-Cooled)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	28
CH	CHW Bypass Header	2nd Level	BMS-	BMS Contractor	5

ID	Equipment Class	Location	Panel	Primary C/O	I/O
W-BYPASS		Mechanical Room	PNL-LG-CHILLER		
CHW-HDR-R	CHW Return Main Header	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	2
CHW-HDR-S	CHW Supply Main Header	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	2
CT-1	Cooling Tower	Roof Deck Mechanical	BMS-PNL-RD-CT	BMS Contractor	12
CT-2	Cooling Tower	Roof Deck Mechanical	BMS-PNL-RD-CT	BMS Contractor	12
CT-3	Cooling Tower	Roof Deck Mechanical	BMS-PNL-RD-CT	BMS Contractor	12
CT-COMMON	Cooling Tower (Common)	Roof Deck Mechanical	BMS-PNL-RD-CT	BMS Contractor	4
CWP-1	Condenser Water Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	6
CWP-2	Condenser Water Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	6
CWP-3	Condenser Water Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	6

ID	Equipment Class	Location	Panel	Primary C/O	I/O
DOAS-2F-CASINO	DOAS Unit	2nd Floor Casino MVAC Room	BMS-PNL-2F-CASINO	BMS Contractor	26
DOAS-RD1	DOAS Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	26
DOAS-RD2	DOAS Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	26
EF-1	Exhaust Fan (General)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3
EF-1.2A	Exhaust Fan (General)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
EF-1MR.1	Exhaust Fan (General)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
EF-1STO.1	Exhaust Fan (General)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
EF-LPG.1	Exhaust Fan (General)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
EF-MRF.1	Exhaust Fan (General)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
EF-RD.1	Exhaust Fan (General)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
EF-RD.2	Exhaust Fan (General)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3
HP-HZ-1	Heat Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
HP-HZ-2	Heat Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
HP-HZ-3	Heat Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
HP-LZ-1	Heat Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
HP-LZ-2	Heat Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
HP-LZ-3	Heat Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
HW-HEADERS	Hot Water Header Set	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	BMS Contractor	3
HWT-HZ-1	Calorifier (Hot Water Storage Tank)	Roof Deck HW Plant	BMS-PNL-RD-MECH	BMS Contractor	1
HWT-	Calorifier (Hot Water Storage Tank)	Roof Deck HW Plant	BMS-PNL-	BMS Contractor	1

ID	Equipment Class	Location	Panel	Primary C/O	I/O
HZ-2			RD-MECH		
HWT-HZ-3	Calorifier (Hot Water Storage Tank)	Roof Deck HW Plant	BMS-PNL-RD-MECH	BMS Contractor	1
HWT-LZ-1	Calorifier (Hot Water Storage Tank)	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	BMS Contractor	1
HWT-LZ-2	Calorifier (Hot Water Storage Tank)	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	BMS Contractor	1
HWT-LZ-3	Calorifier (Hot Water Storage Tank)	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	BMS Contractor	1
ION-2F-1	Ozone Generator (UV-light or Corona)	2nd Floor Casino	BMS-PNL-2F-CASINO	Equipment Supplier	2
ION-2F-2	Ozone Generator (UV-light or Corona)	2nd Floor Casino	BMS-PNL-2F-CASINO	Equipment Supplier	2
PAHU-01	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PAHU-02	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PAHU-03	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16

ID	Equipment Class	Location	Panel	Primary C/O	I/O
PA HU-04	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PA HU-05	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PA HU-06	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PA HU-07	Precooled Air Handling Unit	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	16
PC HWP-1	Primary CHW Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	8
PC HWP-2	Primary CHW Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	8
PC HWP-3	Primary CHW Pump	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	Equipment Supplier	8
PM-CASINO-FB	Multifunction Power Meter (Feeder)	2nd Floor Casino	BMS-PNL-2F-CASINO	BMS Contractor	1
PM-CHILLER-1	Multifunction Power Meter (Feeder)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1

ID	Equipment Class	Location	Panel	Primary C/O	I/O
PM-CHILLER-2	Multifunction Power Meter (Feeder)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
PM-CHILLER-3	Multifunction Power Meter (Feeder)	2nd Level Mechanical Room	BMS-PNL-LG-CHILLER	BMS Contractor	1
PM-ELEVATOR	Multifunction Power Meter (Feeder)	Ground Floor	BMS-PNL-GF	BMS Contractor	1
PM-KITCHEN-2F	Multifunction Power Meter (Feeder)	2nd Floor BOH	BMS-PNL-2F-CASINO	BMS Contractor	1
PM-LAUNDRY-LG	Multifunction Power Meter (Feeder)	Lower Ground Laundry	BMS-PNL-LG-PLUMB	BMS Contractor	1
PM-LIGHTING-GUEST	Multifunction Power Meter (Feeder)	3rd Floor Amenity	BMS-PNL-3F	BMS Contractor	1
PM-LOBBY-GF	Multifunction Power Meter (Feeder)	Ground Floor	BMS-PNL-GF	BMS Contractor	1
PM-	Multifunction Power	Main	BMS-	BMS Contractor	1

ID	Equipment Class	Location	Panel	Primary C/O	I/O
MAIN	Meter (Main)	Switchgear Room	PNL-GF		
PM-ROOF DECK-MECH	Multifunction Power Meter (Feeder)	Roof Deck Mechanical	BMS-PNL-RD-MECH	BMS Contractor	1
RP-HZ-1	Recirculating Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
RP-HZ-2	Recirculating Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
RP-HZ-3	Recirculating Pump	Roof Deck HW Plant	BMS-PNL-RD-MECH	Equipment Supplier	3
RP-LZ-1	Recirculating Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
RP-LZ-2	Recirculating Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
RP-LZ-3	Recirculating Pump	Lower Ground HW Plant	BMS-PNL-LG-PLUMB	Equipment Supplier	3
SB-1	Steam Boiler	Lower Ground Laundry	BMS-PNL-LG-PLUMB	Equipment Supplier	21
SB-2	Steam Boiler	Lower Ground Laundry	BMS-PNL-LG-PLUMB	Equipment Supplier	21

ID	Equipment Class	Location	Panel	Primary C/O	I/O
TEF-1.1	Exhaust Fan (Toilet)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
TEF-1.2	Exhaust Fan (Toilet)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
TEF-1.3	Exhaust Fan (Toilet)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
TEF-1.4	Exhaust Fan (Toilet)	Ground Floor Lobby	BMS-PNL-GF	Equipment Supplier	3
TEF-2.1	Exhaust Fan (Toilet)	2nd Floor BOH	BMS-PNL-2F-CASINO	Equipment Supplier	3
TEF-2.3	Exhaust Fan (Toilet)	2nd Floor BOH	BMS-PNL-2F-CASINO	Equipment Supplier	3
TEF-2B.3	Exhaust Fan (Toilet)	2nd Floor BOH	BMS-PNL-2F-CASINO	Equipment Supplier	3
TEF-3A.1	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3A.2	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3B	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3C.1	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3C.	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
2					
TEF-3D.1	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.10	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.11	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.12	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.13	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.14	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.15	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.16	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
TEF-3D.17	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.18	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.19	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.2	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.20	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.3	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.4	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.5	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.6	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
7					
TEF-3D.8	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-3D.9	Exhaust Fan (Toilet)	3rd Floor Amenity	BMS-PNL-3F	Equipment Supplier	3
TEF-B.1	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.10	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.11	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.12	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.13	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.14	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.15	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF	Exhaust Fan (Toilet)	Basement 1	BMS-	Equipment	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
-B.16			PNL-B1	Supplier	
TEF-B.2	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.3	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.4	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.5	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.6	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.7	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.8	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-B.9	Exhaust Fan (Toilet)	Basement 1	BMS-PNL-B1	Equipment Supplier	3
TEF-GS.1	Exhaust Fan (Toilet)	Ground Floor	BMS-PNL-GF	Equipment Supplier	3
TEF-GS.2	Exhaust Fan (Toilet)	Ground Floor	BMS-PNL-GF	Equipment Supplier	3
TEF-RD.1	Exhaust Fan (Toilet)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3
TEF-RD.2	Exhaust Fan (Toilet)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3

ID	Equipment Class	Location	Panel	Primary C/O	I/O
TEF-RD.3	Exhaust Fan (Toilet)	Roof Deck	BMS-PNL-RD-MECH	Equipment Supplier	3

Appendix C — Cable Schedule Summary

Total cable footage: **5,033 m** across 194 field cables, 7 trunks, and 8 power feeds.

C.1 Field cable summary by panel

Panel	Field cable length (m)
BMS-PNL-RD-MECH	52
BMS-PNL-LG-CHILLER	33
BMS-PNL-3F	26
BMS-PNL-2F-CASINO	20
BMS-PNL-GF	20
BMS-PNL-B1	19
BMS-PNL-LG-PLUMB	13
BMS-PNL-RD-CT	11

C.2 Trunk and backbone cabling

ID	From	To	Cable type	Length (m)
T0195	BMS Server Room (head-end)	All BMS panels at 2nd Floor	Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP) — riser fibe…	80
T0196	BMS Server Room (head-end)	All BMS panels at 3rd Floor	Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP) — riser fibe…	80
T0197	BMS Server	All BMS	Cat6 4P × 23 AWG U/UTP, FRLS jacket	80

ID	From	To	Cable type	Length (m)
	Room (head-end)	panels at Basement	(BACnet/IP) — riser fibe…	
T0198	BMS Server Room (head-end)	All BMS panels at Ground	Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP) — riser fibe…	80
T0199	BMS Server Room (head-end)	All BMS panels at Lower Ground	Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP) — riser fibe…	80
T0200	BMS Server Room (head-end)	BMS panel controllers (per topology id ?)	BACnet MS/TP shielded twisted-pair trunk, 1pr × 22 AWG low-c…	380
T0201	BMS Server Room (head-end)	BMS panel controllers (per topology id ?)	BACnet MS/TP shielded twisted-pair trunk, 1pr × 22 AWG low-c…	700

Appendix D — Programming Object and Commissioning Inventory

D.1 Programming object summary

Object class	Count	Programming hours
Point database	724	72.4
Control loops	48	96.0
Alarms	78	11.7
Trends	519	51.9
Schedules	8	4.0
Reports	10	15.0
Total	**1,387**	**251.0**

D.2 Control loop inventory

Equipment instances requiring programmed control sequences:

Equipment	Class	Location
AHU-2F-1	AHU (Chilled-Water-Served)	2nd Floor BOH
AHU-2M.1	AHU (Modulating CHW-served)	2nd Floor Casino MVAC Room
AHU-2M.2	AHU (Modulating CHW-served)	2nd Floor Casino MVAC Room
AHU-B1-1	AHU (Chilled-Water-Served)	Basement 1 BOH
AHU-GF-1	AHU (Chilled-Water-Served)	Ground Floor BOH
AHU-GFM-1	AHU (Chilled-Water-Served)	Ground Floor Mezzanine BOH
BTU-1	BTU Meter	2nd Level Mechanical Room
BTU-2	BTU Meter	2nd Level Mechanical Room
BTU-3	BTU Meter	2nd Level Mechanical Room

Equipment	Class	Location
BTU-4	BTU Meter	2nd Level Mechanical Room
BTU-5	BTU Meter	2nd Level Mechanical Room
CH-1	Chiller (Package Water-Cooled)	2nd Level Mechanical Room
CH-2	Chiller (Package Water-Cooled)	2nd Level Mechanical Room
CH-3	Chiller (Package Water-Cooled)	2nd Level Mechanical Room
CHW-BYPASS	CHW Bypass Header	2nd Level Mechanical Room
CT-1	Cooling Tower	Roof Deck Mechanical
CT-2	Cooling Tower	Roof Deck Mechanical
CT-3	Cooling Tower	Roof Deck Mechanical
CWP-1	Condenser Water Pump	2nd Level Mechanical Room
CWP-2	Condenser Water Pump	2nd Level Mechanical Room
CWP-3	Condenser Water Pump	2nd Level Mechanical Room
DOAS-2F-CASINO	DOAS Unit	2nd Floor Casino MVAC Room
DOAS-RD1	DOAS Unit	Roof Deck Mechanical
DOAS-RD2	DOAS Unit	Roof Deck Mechanical
HP-HZ-1	Heat Pump	Roof Deck HW Plant
HP-HZ-2	Heat Pump	Roof Deck HW Plant
HP-HZ-3	Heat Pump	Roof Deck HW Plant
HP-LZ-1	Heat Pump	Lower Ground HW

Equipment	Class	Location
		Plant
HP-LZ-2	Heat Pump	Lower Ground HW Plant
HP-LZ-3	Heat Pump	Lower Ground HW Plant
PAHU-01	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-02	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-03	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-04	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-05	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-06	Precooled Air Handling Unit	Roof Deck Mechanical
PAHU-07	Precooled Air Handling Unit	Roof Deck Mechanical
PCHWP-1	Primary CHW Pump	2nd Level Mechanical Room
PCHWP-2	Primary CHW Pump	2nd Level Mechanical Room
PCHWP-3	Primary CHW Pump	2nd Level Mechanical Room
RP-HZ-1	Recirculating Pump	Roof Deck HW Plant
RP-HZ-2	Recirculating Pump	Roof Deck HW Plant
RP-HZ-3	Recirculating Pump	Roof Deck HW Plant
RP-LZ-1	Recirculating Pump	Lower Ground HW Plant
RP-LZ-2	Recirculating Pump	Lower Ground HW Plant
RP-LZ-3	Recirculating Pump	Lower Ground HW Plant

Equipment	Class	Location
SB-1	Steam Boiler	Lower Ground Laundry
SB-2	Steam Boiler	Lower Ground Laundry

D.3 Commissioning point inventory

Test category	Count	Commissioning hours
P2P (point-to-point)	622	93.3
Functional tests	132	198.0
Integrated sequences	8	32.0
Total	**762**	**323.3**

Appendix E — Panel Schedule (Detailed)

Per-panel I/O density, controller count, network drops, and equipment instances served:

BMS-PNL-2F-CASINO — 2nd Floor BOH / 2nd Floor Casino / 2nd Floor Casino MVAC Room

- **Equipment served:** 11 instances — AHU-2F-1, AHU-2M.1, AHU-2M.2, DOAS-2F-CASINO, ION-2F-1, ION-2F-2, PM-CASINO-FB, PM-KITCHEN-2F, …
- **System scope:** casino_mvac, common_area, power_metering, ventilation
- **I/O summary:** 84 physical · 4 HLI · 3 Network · 91 total
- **Controller estimate:** 3 DDC + 1 gateway = 3 controllers
- **Power estimate:** 90 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-3F — 3rd Floor Amenity

- **Equipment served:** 26 instances — PM-LIGHTING-GUEST, TEF-3A.1, TEF-3A.2, TEF-3B, TEF-3C.1, TEF-3C.2, TEF-3D.1, TEF-3D.10, …
- **System scope:** power_metering, ventilation

- **I/O summary:** 75 physical · 0 HLI · 1 Network · 76 total
- **Controller estimate:** 2 DDC + 1 gateway = 2 controllers
- **Power estimate:** 55 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-B1 — Basement 1 / Basement 1 BOH

- **Equipment served:** 17 instances — AHU-B1-1, TEF-B.1, TEF-B.10, TEF-B.11, TEF-B.12, TEF-B.13, TEF-B.14, TEF-B.15, …
- **System scope:** common_area, ventilation
- **I/O summary:** 63 physical · 1 HLI · 0 Network · 64 total
- **Controller estimate:** 2 DDC + 0 gateway = 2 controllers
- **Power estimate:** 50 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-GF — Ground Floor / Ground Floor BOH / Ground Floor Lobby / Ground Floor Mezzanine BOH / Main Switchgear Room

- **Equipment served:** 16 instances — AHU-GF-1, AHU-GFM-1, EF-1.2A, EF-1MR.1, EF-1STO.1, EF-LPG.1, EF-MRF.1, PM-ELEVATOR, …
- **System scope:** common_area, power_metering, ventilation
- **I/O summary:** 63 physical · 2 HLI · 3 Network · 68 total
- **Controller estimate:** 2 DDC + 1 gateway = 2 controllers
- **Power estimate:** 65 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-LG-CHILLER — 2nd Level Mechanical Room

- **Equipment served:** 20 instances — BTU-1, BTU-2, BTU-3, BTU-4, BTU-5, CH-1, CH-2, CH-3, …
- **System scope:** btu_metering, chilled_water, power_metering
- **I/O summary:** 72 physical · 60 HLI · 11 Network · 143 total
- **Controller estimate:** 2 DDC + 1 gateway = 2 controllers
- **Power estimate:** 105 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-LG-PLUMB — Lower Ground HW Plant / Lower Ground Laundry

- **Equipment served:** 13 instances — HP-LZ-1, HP-LZ-2, HP-LZ-3, HW-HEADERS, HWT-LZ-1, HWT-LZ-2, HWT-LZ-3, PM-LAUNDRY-LG, …
- **System scope:** hot_water, power_metering, steam
- **I/O summary:** 40 physical · 26 HLI · 1 Network · 67 total
- **Controller estimate:** 1 DDC + 1 gateway = 2 controllers
- **Power estimate:** 55 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-RD-CT — Roof Deck Mechanical

- **Equipment served:** 4 instances — CT-1, CT-2, CT-3, CT-COMMON
- **System scope:** condenser_water
- **I/O summary:** 40 physical · 0 HLI · 0 Network · 40 total
- **Controller estimate:** 1 DDC + 0 gateway = 1 controllers
- **Power estimate:** 25 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

BMS-PNL-RD-MECH — Roof Deck / Roof Deck HW Plant / Roof Deck Mechanical

- **Equipment served:** 25 instances — DOAS-RD1, DOAS-RD2, EF-1, EF-RD.1, EF-RD.2, HP-HZ-1, HP-HZ-2, HP-HZ-3, …
- **System scope:** hot_water, power_metering, ventilation
- **I/O summary:** 185 physical · 9 HLI · 10 Network · 204 total
- **Controller estimate:** 5 DDC + 1 gateway = 5 controllers
- **Power estimate:** 175 W
- **Enclosure:** Wall-mount IP54 metal cabinet, sized per controller count + 30% spare

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Appendix F — Customer Clarification Request List (RFI)

The following clarifications, if answered, will allow us to refine our proposal further. Items are grouped by priority and tagged with the recipient discipline.

P1 — Critical (cost-swing potential > 10%, please prioritize):

ID	Question	Default assumed
Q-018	Confirm project is greenfield (cover letter said ‘rehabilitation’).	Greenfield, per technical documents
Q-007	What is the required project completion date or duration?	16 weeks from PO

P2 — Important (refines pricing):

ID	Question	Default assumed
Q-001	Confirm contracting entity (cover letter does not name requesting party).	Megaworld Corporation
Q-005	Please share the complete architectural floor-plan set.	Cable lengths per typical density
Q-008	Please share the mechanical (HVAC) layout drawings.	Plant-room cable runs and control wiring estimated
Q-011	Please share the complete electrical drawing set.	Power metering per A-EE-001
Q-009	Confirm working-hour constraints.	Standard daytime construction

P3 — Useful (refines pricing precision):

ID	Question	Default assumed
Q-003	Confirm ‘TUEC’ project / contract code.	Confirmed via document title
Q-004	Confirm complete latest ‘for construction’ set.	Bulletin No.8 + standard set
Q-012	Network/IT integration scope.	None in base; integrations as options

ID	Question	Default assumed
Q-013	Brand preferences / Megaworld portfolio standardization.	Tier-1 BACnet/IP
Q-014	Commercial terms (payment, retention, warranty, LD, currency).	Standard local market
Q-015	Training scope.	16-hr operator training included
Q-016	Maintenance contract scope.	Not included; offered as option
Q-017	Hotel scope vs. CONDOTELS standard.	CONDOTELS governs
Q-019	Per-guestroom FCU scope.	Not in scope
Q-020	Domestic cold-water booster pump scope.	Not in scope
Q-021	Complete BOH AHU schedule (only 3 of 10 location-tagged in points list).	3 confirmed

End of proposal. Editable BOQ and supporting working documents are in the accompanying Excel and Word files.