Proposal Generation Framework

How we built the Kingsford BMS proposal — a walkthrough

Agenda

- 1. The challenge — why we needed a new approach
- 2. The solution — a structured, agent-driven framework
- 3. Tier 0 — the customer's inputs (what we received)
- 4. The end-to-end flow
- 5. Tier 1 — the agent's first interpretation
- 6. Tier 2 — the engineering basis (working documents)
- 7. Tier 3 — derived working documents
- 8. Tier 4 — scope modules and integrated outputs
- 9. Tier 6 — the costed Bill of Quantities
- 10. Tier 7–8 — the customer-facing proposal and final deliverables
- 11. Design principles — applicability, determinism, mechanical/agent split
- 12. Quality and trust — why this approach is auditable
- 13. Time savings — before vs. after
- 14. v0 — this is the worst version this system will ever be
- 15. Vision — per-customer × per-discipline tracks (megaworld-bms, etc.)

The Challenge: proposals took too long, and quality was inconsistent

Why the old way wasn't working

Pain points

• Proposal preparation took 2–3 weeks per project, repeating much of the same work.

• Each estimator started from scratch, often with different assumptions.

• Junior staff had no structured framework to learn from.

• Customer asks 'where did this number come from?' — answer required digging through emails.

Hidden costs

• No clear inventory of what we'd assumed vs. confirmed.

• Schedule estimates didn't reconcile with manpower didn't reconcile with cost.

• Each new project forgot the lessons of the last.

• Customer clarifications were missed, ad-hoc, or sent late.

The Solution: structured, agent-driven, tier-based

Each step is a sub-routine the AI agent follows; documents flow in tiers

• • Two-layer separation: a reusable Master Playbook (sub-routines / agent instructions) + per-project workspace (working files)

• • 10 sequential phases (sub-routines) from intake to deliverables

• • Documents are organized in TIERS — Tier 0 = customer inputs, each generated tier reads only from lower tiers (strict DAG, no circular references)

• • Working documents capture the engineering basis at each tier

• • Mechanical helpers handle safe data aggregation between standardized formats

• • Engineering judgment stays in the agent's adaptive markdown sub-routines

• • Standard formats are the contract that lets it all stay deterministic

Tier 0

What we received from the customer

5 documents (~165 MB) — the raw material the agent reads but never produces

The 5 Tier 0 documents

What the customer sent — the agent's input boundary

Document	From	What it tells us
Customer Enquiry Letter (Requirement.rtf)	Megaworld	Scope statement: Complete supply, install, T&C of BMS
BMS Points list (TUEC).pdf, 3 sheets, 22 MB	R.J. Calpo & Co.	BMS-01 spec + I/O tabulation; BMS-02 more I/O; BMS-03 P&IDs
EE Plan (TUEC).pdf, 22 pages, 38 MB	Mario A. Alix Phils.	Construction Bulletin No.8 — revised electrical layouts and load schedules
MC Standards — ME Points List.pdf, 7 pages	Megaworld portfolio standard	Mechanical points-list baseline (DOAS, AHU, EAS, BOH templates)
MC Standards — PL Points List.pdf, 1 page	Megaworld portfolio standard	Plumbing points-list baseline (calorifiers, heat pumps, recirc pumps)

Tier 0 — Customer Enquiry Letter (Requirement.rtf)

Customer Enquiry Letter

Tier 0 — what the customer sent us

We would like to request your proposal for the Complete Supply, Delivery, Installation, Testing and Commissioning for the Rehabilitation of Building Management System for the Kingsford Ho

Source: 2026-04-kingsford-bms-AB3/_deliverables/screenshots/tier0-requirement.txt

One-paragraph scope statement. Note the word 'Rehabilitation' — the trigger for our triangulation rule on stage classification.

Tier 0 — BMS Points list (TUEC), Sheet BMS-01

el-rivera/RTRX13-Shared/Proposals/projects/2026-04-kingsford-bms-AB3/00-customer-inputs/_extracted/pages/BM

A1-format Construction Bulletin from R.J. Calpo & Co. — General BMS specifications + I/O tabulation per system.

Tier 0 — EE Plan (TUEC), Cover Letter

rojel-rivera/RTRX13-Shared/Proposals/projects/2026-04-kingsford-bms-AB3/00-customer-inputs/_extracted/pages/

Construction Bulletin No.8 cover from Mario A. Alix Phils. — adjusts mechanical layout and adds kitchen power provisions.

Tier 0 — MC Standards, Mechanical Points List

jel-rivera/RTRX13-Shared/Proposals/projects/2026-04-kingsford-bms-AB3/00-customer-inputs/_extracted/pages/M

Megaworld's CONDOTELS BMS standard for mechanical systems — applies as baseline where the project-specific is silent.

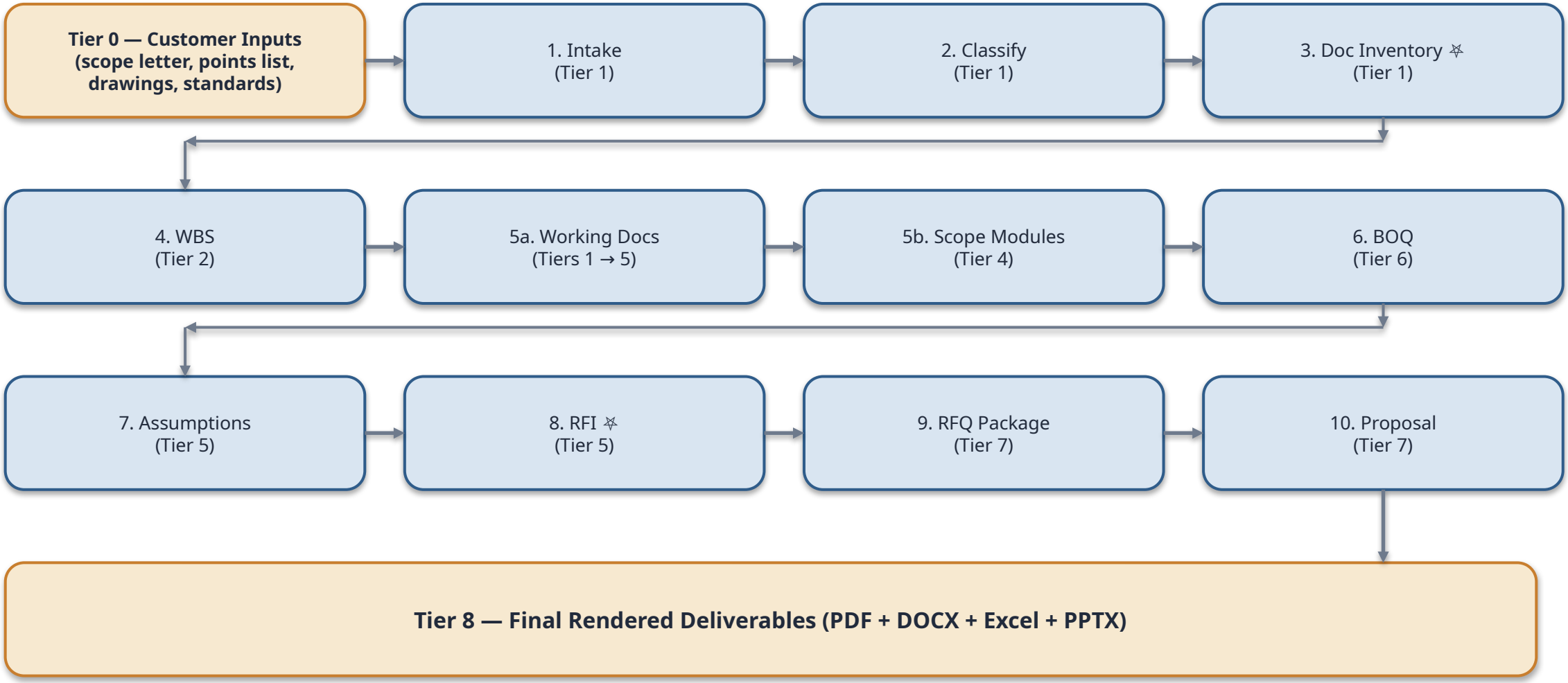
Tier 0 — MC Standards, Plumbing Points List

ojel-rivera/RTRX13-Shared/Proposals/projects/2026-04-kingsford-bms-AB3/00-customer-inputs/_extracted/pages/M

Megaworld's CONDOTELS BMS standard for plumbing — calorifiers, heat pumps, recirculating pumps.

End-to-End Flow

Each box is a sub-routine. ✲ marks gates where the team validates before continuing.



Tier 1

The agent's first interpretation

Documents produced directly from customer inputs — what the agent understands the project to be

Tier 1 — Project Requirement Brief

Project Requirement Brief

Tier 1 — agent's parsed understanding of the customer's enquiry

01 — Requirement Summary

Project: Kingsford Hotel Bacolod — Building Management System **Customer:** Megaworld Corporation (developer) / Kingsford Hotel Bacolod (operating asset) **Location:** Bacolod City, Negros Occidental, Philippines **Date prepared:** 2026-04-28

Explicit request

> "Complete Supply, Delivery, Installation, Testing and Commissioning for the Rehabilitation of Building Management System for the Kingsford Hotel Bacolod project."

— Source: `00-customer-inputs/Requirement.rtf`

Parties

Role	Entity	Notes
Owner / Developer	Megaworld Corporation	Apparent — "Megaworld Standards" referenced in the drawing title blocks
Consultant (ME)	TUEC (per filename of the BMS Points list)	Reviewer signature: F. Villa-Real II, 05Dec25
Consultant (EE)	TUEC (per filename of the EE Plan)	EE Construction Bulletin No.8
Main contractor	(not stated)	

Project context

- Building type: Hotel / Hospitality (Kingsford Hotel Bacolod)
- Stage: cover letter says "Rehabilitation"; technical evidence (Construction Bulletin No.8 dated November 2025; BMS Points list stamped Construction Bulletin Oct 2025; no existing-system inventory provided) supports **Greenfield (new construction)**. See `02-classification.md` . Q-018 raised to confirm wording.
- Reference standards mentioned: Megaworld MC Standards (BMS Points List, ME and PL chapters).
- Schedule mentioned: (not stated)
- Commercial signals: (not stated) — assumed standard PH market terms (PHP currency, 12% VAT, 60–90 day proposal validity, retention/payment per local norm). Q-014.

Documents in customer inputs

File	Type	One-line description

Generated from Tier 0 customer enquiry letter + supporting docs. The agent's parsed understanding of who, what, and where.

Tier 1 — Project Classification (with triangulation evidence)

Project Classification

Tier 1 — discipline × stage tagging with triangulation evidence

02 — Classification

Project: Kingsford Hotel Bacolod — BMS **Date:** 2026-04-28

Discipline

- **Primary:** BMS
- **Secondary:** Power metering (EE) integration via Modbus

Stage

- **Greenfield (new construction)**
- Cited evidence:
  - EE Plan stamped *"Electrical Construction Bulletin No.8"*, November 2025 — design adjustments for new construction
  - BMS Points list stamped *"Construction Bulletin"* Oct 2025
  - No existing-system inventory provided (no controller make/model/age, no head-end specs, no demolition scope)
  - Cover letter wording "Rehabilitation" treated as weak evidence per Phase-2 triangulation rule
- Q-018 raised for the customer to confirm the wording mismatch.

Scope type

- [x] Supply
- [x] Installation
- [x] Programming
- [x] Testing & Commissioning
- [ ] Training (assumed in scope per standard practice; Q-015 confirms duration)
- [ ] Maintenance (assumed not in scope; offered as Option in 7.0; Q-016 confirms)

Facility type

- Hotel / Hospitality (Kingsford Hotel Bacolod). No casino floor evident in the inputs — straight hotel, not `bms-hospitality-casino`.

Estimated tier

Discipline × stage tagging. Note the triangulation table: technical-document evidence (Construction Bulletins) overrides the cover letter's 'rehabilitation' wording.

Tier 1 — A1 I/O List (the foundation)

A1 — I/O List (the foundation)

Tier 1 — translated from customer's BMS Points list and MC Standards into our standard YAML schema · showing field: io_list · 554 record(s)

project: Kingsford Hotel Bacolod — BMS · **date:** 2026-04-28 · **source:** MC Standards (ME + PL Points list) + Project-spe… · **status:** draft

id	system	equipment_class	equipment_instance	location	point_description	type	field_device
P0001	HVAC-Chillers	Chiller (Package Water-Cooled)	CH-1	Plant Room (Basement)	Chiller 1 BACnet HLI (status, motor current, kW,…	HLI	BACnet IP card
P0002	HVAC-Chillers	CHW Supply Main Header	HDR-CHWS	Plant Room	Entering Chilled Water Temperature CH-1	AI	Temperature Sensor
P0003	HVAC-Chillers	CHW Return Main Header	HDR-CHWR	Plant Room	Leaving Chilled Water Temperature CH-1	AI	Temperature Sensor
P0004	HVAC-Chillers	Condenser Water Header	HDR-COW	Roofdeck	Condenser Water Supply T CH-1	AI	Temperature Sensor
P0005	HVAC-Chillers	Chiller (Package Water-Cooled)	CH-2	Plant Room (Basement)	Chiller 2 BACnet HLI (status, motor current, kW,…	HLI	BACnet IP card
P0006	HVAC-Chillers	CHW Supply Main Header	HDR-CHWS	Plant Room	Entering Chilled Water Temperature CH-2	AI	Temperature Sensor
P0007	HVAC-Chillers	CHW Return Main Header	HDR-CHWR	Plant Room	Leaving Chilled Water Temperature CH-2	AI	Temperature Sensor
P0008	HVAC-Chillers	Condenser Water Header	HDR-COW	Roofdeck	Condenser Water Supply T CH-2	AI	Temperature Sensor
P0009	HVAC-Chillers	Chiller (Package Water-Cooled)	CH-3	Plant Room (Basement)	Chiller 3 BACnet HLI (status, motor current, kW,…	HLI	BACnet IP card
P0010	HVAC-Chillers	CHW Supply Main Header	HDR-CHWS	Plant Room	Entering Chilled Water Temperature CH-3	AI	Temperature Sensor
P0011	HVAC-Chillers	CHW Return Main Header	HDR-CHWR	Plant Room	Leaving Chilled Water Temperature CH-3	AI	Temperature Sensor
P0012	HVAC-Chillers	Condenser Water Header	HDR-COW	Roofdeck	Condenser Water Supply T CH-3	AI	Temperature Sensor
P0013	HVAC-Chillers	CHW Bypass Header	HDR-CHW-BP	Plant Room	CHW differential pressure	AI	Differential Pressure Sensor
P0014	HVAC-Chillers	CHW Bypass Header	HDR-CHW-BP	Plant Room	Bypass valve command	AO	Electric Valve Actuator
P0015	HVAC-Chillers	CHW Bypass Header	HDR-CHW-BP	Plant Room	Bypass valve status	AI	Position Feedback
P0016	HVAC-Chillers	BTU Meter	BTU-CHWS-MAIN	Plant Room	Plant CHW BTU (Modbus: flow, supply T, return T,…	HLI	Ultrasonic BTU Meter
P0017	HVAC-Pumps	Primary CHW Pump	CHWP-1.1	Plant Room	Pump motor status	DI	Auxiliary Contact
P0018	HVAC-Pumps	Primary CHW Pump	CHWP-1.1	Plant Room	Pump HOA status	DI	Auxiliary Contact

… showing 18 of 554 rows

Translated from BMS Points list + MC Standards into our standard YAML schema. 716 points; every row cites its source. Most downstream documents read from this.

Tier 2

The engineering basis begins

WBS, applicability matrix, and the first round of derived working documents

Tier 2 — Working Documents Applicability Matrix

Working-Documents Applicability Matrix

Tier 2 — what we need × what the customer gave us × what we generate

Working-Documents Applicability Matrix

Project: Kingsford Hotel Bacolod — BMS (AB-Run-3) **Classification:** `bms-greenfield` **Date:** 2026-04-28

Working doc	R/N-A	CP/AG	Source / Location	Notes
A1 I/O list	R	AG	`A1-io-list.yaml`	Generated by `_scripts/build-a1.py` from MC Standards points list
A2 Equipment takeoff	R	AG	`A2-equipment-takeoff.yaml`	Helper
A3 Cable schedule	R	AG	`A3-cable-schedule.yaml`	Helper; lengths from `A3-route-lengths.yaml` typical-ranges (drawings raster)
A4 Panel schedule	R	AG	`A4-panel-schedule.yaml`	Helper
A5 Network architecture	R	AG	`A5-network-architecture.md`	Mermaid + render
A6 Head-end equipment	R	AG	`A6-head-end-equipment.yaml`	Authored to schema
A7 Power provisions	R	AG	`A7-power-provisions.yaml`	Authored to schema
B1 Programming objects	R	AG	`B1-programming-objects.yaml`	Helper; trend strategy from `B1-trend-strategy.yaml`
B2 Graphics pages	R	AG	`B2-graphics-pages.yaml`	Authored to schema
B3 Commissioning points	R	AG	`B3-commissioning-points.yaml`	Helper
B4 Installation manhours	R	AG	`B4-installation-manhours.yaml`	Helper; site factors from `B4-site-factors.yaml`
C1 C/O matrix	R	AG	`C1-co-matrix.md`	Helper
C2 Coordination matrix	R	AG	`C2-coordination-matrix.md`	Authored
C3 Inclusions/Exclusions	R	AG	`C3-inclusions-exclusions.md`	Authored
D1 Schedule	R	AG	`D1-schedule.md`	Authored
D2 Manpower loading	R	AG	`D2-manpower-loading.md`	Authored

The agent's check-and-translate-and-generate plan. R/N-A × CP/AG/CP+AG marking for all 17 working-doc types.

Tier 2 — Work Breakdown Structure

Work Breakdown Structure

Tier 2 — 94 leaves across 7 lifecycle-phase branches

04 — Work Breakdown Structure

Project: Kingsford Hotel Bacolod — BMS **Classification:** `bms-greenfield` **Date:** 2026-04-28

Level-1 outline

1.0 Project Management & Engineering 2.0 Material Supply 3.0 Installation 4.0 Programming & Configuration 5.0 Testing & Commissioning 6.0 Training & Handover 7.0 Optional / Out-of-scope

Detailed WBS

1.0 Project Management & Engineering

WBS	Title	Module	Source	Working docs	Status
1.1	Project management	bms/project-management-engineering	Standard scope	D1, D2	In scope
1.2	Engineering & design	(same)	Spec requires submittals	A1–A7, B1–B2	In scope
1.3	Submittals & approvals	(same)	Standard	—	In scope
1.4	Factory Acceptance Test	(same)	Medium-tier	—	In scope

2.0 Material Supply

WBS	Title	Module	Working docs
2.1	Head-end equipment (server, workstations, graphics PC, UPS)	bms/head-end	A6
2.2	Network infrastructure (switches, fiber, IDF)	bms/network-infrastructure	A5
2.3	BMS field cabinets and controllers	bms/controller-panel	A4
2.4	Field devices — HVAC	bms/field-devices-hvac	A2
2.5	Field devices — Plumbing	bms/field-devices-plumbing	A2
2.6	Field devices — Electrical metering	bms/field-devices-power	A2
2.7	Cabling and containment	bms/cabling-and-containment	A3

94 leaves across 7 lifecycle-phase branches (PM, Supply, Install, Programming, T&C, Training, Optional). Each leaf cites a module template.

Tier 2 — A2 Equipment Takeoff

A2 — Equipment Takeoff

Tier 2 — derived from A1 (135 equipment instances grouped by class, location, panel) · showing field: takeoff · 161 record(s)

project: Kingsford Hotel Bacolod — BMS

id	equipment_class	quantity	location	system	panel	primary_co	io_summary
AHU-AMEN-3F	AHU (Chilled-Water-Served)	1	3F	VENT-AHU	PNL-3F	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
AHU-BALL-2F	AHU (Chilled-Water-Served)	1	2F	VENT-AHU	PNL-2F	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
AHU-BOH-2F	AHU (Chilled-Water-Served)	1	2F	VENT-AHU	PNL-BOH-2F	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
AHU-BOH-BSMT	AHU (Chilled-Water-Served)	1	Basement	VENT-AHU	PNL-BSMT	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
AHU-LOBBY-GF	AHU (Chilled-Water-Served)	1	GF	VENT-AHU	PNL-GF	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
AHU-REST-2F	AHU (Chilled-Water-Served)	1	2F	VENT-AHU	PNL-2F	BMS Contractor	{'physical_io': 12, 'hli_subpoints': 0, 'network…
BTU-CHWS-MAIN	BTU Meter	1	Plant Room	HVAC-Chillers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 0, 'hli_subpoints': 1, 'network_…
CAL-1	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CAL-2	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CAL-3	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CAL-4	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CAL-5	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CAL-6	Calorifier (Hot Water Storage Tank)	1	Plant Room	PL-Calorifiers	PNL-CHPLANT-GND	BMS Contractor	{'physical_io': 1, 'hli_subpoints': 0, 'network_…
CH-1	Chiller (Package Water-Cooled)	1	Plant Room (Basement)	HVAC-Chillers	PNL-CHPLANT-GND	Equipment Supplier	{'physical_io': 0, 'hli_subpoints': 1, 'network_…
CH-2	Chiller (Package Water-Cooled)	1	Plant Room (Basement)	HVAC-Chillers	PNL-CHPLANT-GND	Equipment Supplier	{'physical_io': 0, 'hli_subpoints': 1, 'network_…
CH-3	Chiller (Package Water-Cooled)	1	Plant Room (Basement)	HVAC-Chillers	PNL-CHPLANT-GND	Equipment Supplier	{'physical_io': 0, 'hli_subpoints': 1, 'network_…
CHWP-1.1	Primary CHW Pump	1	Plant Room	HVAC-Pumps	PNL-CHPLANT-GND	Equipment Supplier	{'physical_io': 3, 'hli_subpoints': 2, 'network_…
CHWP-1.2	Primary CHW Pump	1	Plant Room	HVAC-Pumps	PNL-CHPLANT-GND	Equipment Supplier	{'physical_io': 3, 'hli_subpoints': 2, 'network_…

… showing 18 of 161 rows

Auto-derived from A1: 135 equipment instances grouped by class, location, panel, and primary supplier.

Tier 2 — A4 Panel Schedule

A4 — Panel Schedule

Tier 2 — derived from A1 (18 panels with I/O density + controller estimates) · showing field: panels · 8 record(s)

project: Kingsford Hotel Bacolod — BMS

id	location	system_scope	equipment_served	io_summary	controller_estimate	power_estimate_w	enclosure_assumption
PNL-2F	2F / panel	['Network', 'VENT-AHU', 'VENT-DOAS', 'VENT-EAS',…	{'instance_count': 35, 'instances': ['AHU-BALL-2…	{'physical_io': 138, 'hli_subpoints': 0, 'networ…	{'ddc_controllers': 4, 'network_gateway': 1, 'to…	105	Wall-mount IP54 metal cabinet, sized per control…
PNL-3F	3F / panel	['Network', 'VENT-AHU', 'VENT-EAS', 'VENT-FCU']	{'instance_count': 33, 'instances': ['AHU-AMEN-3…	{'physical_io': 105, 'hli_subpoints': 0, 'networ…	{'ddc_controllers': 3, 'network_gateway': 1, 'to…	80	Wall-mount IP54 metal cabinet, sized per control…
PNL-BOH-2F	2F / panel	['Network', 'VENT-AHU']	{'instance_count': 2, 'instances': ['AHU-BOH-2F'…	{'physical_io': 12, 'hli_subpoints': 0, 'network…	{'ddc_controllers': 1, 'network_gateway': 1, 'to…	55	Wall-mount IP54 metal cabinet, sized per control…
PNL-BSMT	Basement / panel	['Network', 'PL-Boiler', 'VENT-AHU', 'VENT-EAS']	{'instance_count': 4, 'instances': ['AHU-BOH-BSM…	{'physical_io': 23, 'hli_subpoints': 0, 'network…	{'ddc_controllers': 1, 'network_gateway': 1, 'to…	55	Wall-mount IP54 metal cabinet, sized per control…
PNL-CHPLANT-GND	Plant Room / Plant Room (Basement) / panel	['HVAC-Chillers', 'HVAC-Pumps', 'Network', 'PL-C…	{'instance_count': 31, 'instances': ['BTU-CHWS-M…	{'physical_io': 65, 'hli_subpoints': 10, 'networ…	{'ddc_controllers': 2, 'network_gateway': 1, 'to…	55	Wall-mount IP54 metal cabinet, sized per control…
PNL-GF	GF / Main Switchgear / Sub-Distribution Board / …	['Network', 'Power-EE', 'VENT-AHU', 'VENT-DOAS',…	{'instance_count': 47, 'instances': ['AHU-LOBBY-…	{'physical_io': 126, 'hli_subpoints': 13, 'netwo…	{'ddc_controllers': 4, 'network_gateway': 1, 'to…	105	Wall-mount IP54 metal cabinet, sized per control…
PNL-HE-GF	panel	['Network']	{'instance_count': 1, 'instances': ['NET-PNL-HE-…	{'physical_io': 0, 'hli_subpoints': 0, 'network_…	{'ddc_controllers': 1, 'network_gateway': 1, 'to…	55	Wall-mount IP54 metal cabinet, sized per control…
PNL-RD	Roofdeck / panel	['HVAC-Chillers', 'HVAC-Cooling-Towers', 'Networ…	{'instance_count': 8, 'instances': ['CT-1', 'CT-…	{'physical_io': 54, 'hli_subpoints': 0, 'network…	{'ddc_controllers': 2, 'network_gateway': 1, 'to…	55	Wall-mount IP54 metal cabinet, sized per control…

Auto-derived from A1: 18 BMS panels with I/O density, controller estimate, power consumption.

Tier 2 — C1 Contractor / Owner Matrix

C1 — Contractor / Owner Matrix

Tier 2 — supplier responsibility per equipment class (BMS / ME / EE / Equipment Supplier / Owner)

C1 — Contractor / Owner-Supplied Matrix

Project: Kingsford Hotel Bacolod — BMS **Generated from:** A1-io-list.yaml **Generator:** `_playbook/tools/generate-c1-co-matrix.py`

This matrix shows, per equipment class, which **BMS-side field devices** are supplied by which party. It is the contractual-scope-boundary view derived from the points list `C/O` column.

Suppliers: - **BMS Contractor** — we (the proposing party) supply - **ME Contractor** — Mechanical contractor supplies (typically valves, dampers, motorized actuators) - **EE Contractor** — Electrical contractor supplies (power metering related — varies by project) - **Equipment Supplier** — Manufacturer / Equipment vendor supplies (auxiliary contacts on motors/pumps, native equipment data via BACnet/Modbus, VFDs) - **Owner** — Customer / building owner supplies

Overall Summary

Supplier	Total BMS I/O Points	Share
Equipment Supplier	328	59.2%
ME Contractor	128	23.1%
BMS Contractor	98	17.7%
Total	**554**	**100%**

Per-Equipment-Class Breakdown

FCU (guestroom/zone, hardwired) · 90 units, 270 I/O points

Instances: FCU-2F.01, FCU-2F.02, FCU-2F.03, FCU-2F.04, FCU-2F.05, FCU-2F.06, FCU-2F.07, FCU-2F.08, FCU-2F.09, FCU-2F.10, FCU-2F.11, FCU-2F.12, FCU-2F.13, FCU-2F.14, FCU-2F.15, FCU-2F.16, FCU-2F.17, FCU-2F.18, FCU-2F.19, FCU-2F.20, FCU-2F.21, FCU-2F.22, FCU-2F.23, FCU-2F.24, FCU-2F.25, FCU-2F.26, FCU-2F.27, FCU-2F.28, FCU-2F.29, FCU-2F.30, FCU-3F.01, FCU-3F.02, FCU-3F.03, FCU-3F.04, FCU-3F.05, FCU-3F.06, FCU-3F.07, FCU-3F.08, FCU-3F.09, FCU-3F.10, FCU-3F.11, FCU-3F.12, FCU-3F.13, FCU-3F.14, FCU-3F.15, FCU-3F.16, FCU-3F.17, FCU-3F.18, FCU-3F.19, FCU-3F.20, FCU-3F.21, FCU-3F.22, FCU-3F.23, FCU-3F.24, FCU-3F.25, FCU-3F.26, FCU-3F.27, FCU-3F.28, FCU-3F.29, FCU-3F.30, FCU-GF.01, FCU-GF.02, FCU-GF.03, FCU-GF.04, FCU-GF.05, FCU-GF.06, FCU-GF.07, FCU-GF.08, FCU-GF.09, FCU-GF.10, FCU-GF.11, FCU-GF.12, FCU-GF.13, FCU-GF.14, FCU-GF.15, FCU-GF.16, FCU-GF.17, FCU-GF.18, FCU-GF.19, FCU-GF.20, FCU-GF.21, FCU-GF.22, FCU-GF.23, FCU-GF.24, FCU-GF.25, FCU-GF.26, FCU-GF.27, FCU-GF.28, FCU-GF.29, FCU-GF.30

Supplier	I/O Count	Provides
Equipment Supplier	180	Auxiliary Contact (90×), Relay Output (90×)
ME Contractor	90	Valve Actuator (90×)

Auto-derived from A1: per-equipment-class supplier responsibility — BMS / ME / EE / Equipment Supplier / Owner — with I/O counts.

Tier 3

Derived working documents

Cable schedule, network architecture, commissioning inventory — built on Tier 2

Tier 3 — A3 Cable Schedule

A3 — Cable Schedule

Tier 3 — derived from A1+A2+A4 (200 cables, 6,810 m total, with cable types and lengths per A-001) · showing field: field_cables · 258 record(s)

project: Kingsford Hotel Bacolod — BMS

id	from	to	equipment_class	system	location	cable_type	spec_source
C0001	PNL-3F	AHU-AMEN-3F (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	3F	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0002	PNL-3F	AHU-AMEN-3F (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	3F	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0003	PNL-3F	AHU-AMEN-3F (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	3F	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default
C0004	PNL-2F	AHU-BALL-2F (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0005	PNL-2F	AHU-BALL-2F (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0006	PNL-2F	AHU-BALL-2F (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default
C0007	PNL-BOH-2F	AHU-BOH-2F (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0008	PNL-BOH-2F	AHU-BOH-2F (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0009	PNL-BOH-2F	AHU-BOH-2F (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default
C0010	PNL-BSMT	AHU-BOH-BSMT (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	Basement	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0011	PNL-BSMT	AHU-BOH-BSMT (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	Basement	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0012	PNL-BSMT	AHU-BOH-BSMT (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	Basement	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default
C0013	PNL-GF	AHU-LOBBY-GF (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	GF	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0014	PNL-GF	AHU-LOBBY-GF (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	GF	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0015	PNL-GF	AHU-LOBBY-GF (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	GF	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default
C0016	PNL-2F	AHU-REST-2F (BMS Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	rule:bms_signal_default
C0017	PNL-2F	AHU-REST-2F (Equipment Supplier)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (equipment aux contacts — stat…	rule:equipment_aux_default
C0018	PNL-2F	AHU-REST-2F (ME Contractor)	AHU (Chilled-Water-Served)	VENT-AHU	2F	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — …	rule:me_actuator_default

… showing 18 of 258 rows

Auto-derived from A1+A2+A4 with cable-length assumption A-001. 200 cable runs; 6,810 m total.

Tier 3 — A5 Network Architecture (formatted MD)

A5 — Network Architecture

Tier 3 — topology (1 core + 6 edge switches), riser fiber, IP plan, switch schedule

A5 — Network Architecture

Project: Kingsford Hotel Bacolod — BMS **Date:** 2026-04-28

Topology

The BMS runs on an isolated /24 LAN segregated from the customer corporate LAN. A 24-port managed L2/L3 core switch lives in the GF server room; edge switches at each riser zone connect to the core via OM3 multimode fiber (6-strand, armored). Field panels uplink to their nearest edge switch via Cat6 (BACnet/IP). MS/TP backbone interconnects panel controllers within each zone.

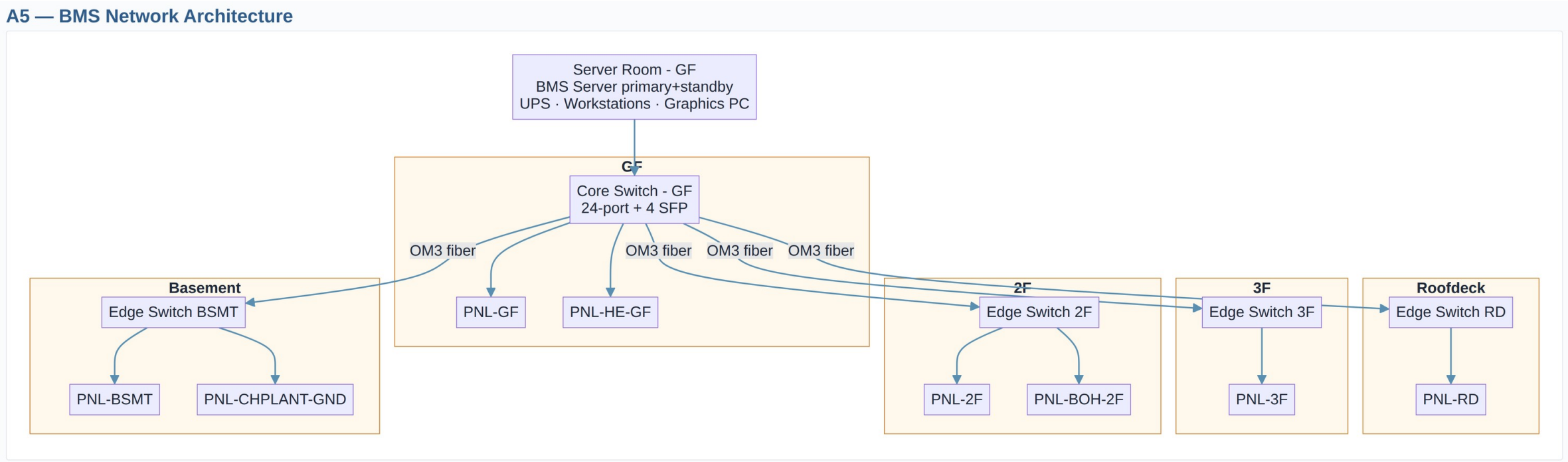
- Core: 1× managed L2/L3 24-port + 4× SFP (BACnet routing, VLAN, SNMP)
- Edge: 3× 16-port + 3× 8-port managed L2 (per riser zone)
- Riser fiber: ~300 m OM3 6-strand armored
- Cat6: ~700 m drops + trunk
- IDF closets: 6 wall-mount enclosures

Topology — visual

```
graph TD
  HEADEND[Server Room - GF<br/>BMS Server primary+standby<br/>UPS · Workstations · Graphics PC]
  CORE[Core Switch - GF<br/>24-port + 4 SFP]
  HEADEND --> CORE
  subgraph Roofdeck
    SW_RD[Edge Switch RD]
    PNL_RD[PNL-RD]
    SW_RD --> PNL_RD
  end
  subgraph 3F
    SW_3F[Edge Switch 3F]
    PNL_3F[PNL-3F]
    SW_3F --> PNL_3F
  end
  subgraph 2F
    SW_2F[Edge Switch 2F]
    PNL_2F[PNL-2F]
    PNL_BOH[PNL-BOH-2F]
```

Hand-curated topology and switch schedule. 1 core + 6 edge switches, OM3 fiber backbone, flat /24 IP plan.

Tier 3 — A5 Network Architecture (visual diagram)



uto-rendered from the A5 mermaid block. Star-and-tree centered on the core switch; riser fiber to per-floor edge switches; BACnet/IP equipment direct to the floor switch

Tier 3 — B3 Commissioning Point Inventory

B3 — Commissioning Point Inventory

Tier 3 — 666 test items (P2P + functional + integrated) → 313 hours of T&C · showing field: functional_test_inventory · 161 record(s)

project: Kingsford Hotel Bacolod — BMS

equipment	equipment_class	location
AHU-AMEN-3F	AHU (Chilled-Water-Served)	3F
AHU-BALL-2F	AHU (Chilled-Water-Served)	2F
AHU-BOH-2F	AHU (Chilled-Water-Served)	2F
AHU-BOH-BSMT	AHU (Chilled-Water-Served)	Basement
AHU-LOBBY-GF	AHU (Chilled-Water-Served)	GF
AHU-REST-2F	AHU (Chilled-Water-Served)	2F
BTU-CHWS-MAIN	BTU Meter	Plant Room
CAL-1	Calorifier (Hot Water Storage Tank)	Plant Room
CAL-2	Calorifier (Hot Water Storage Tank)	Plant Room
CAL-3	Calorifier (Hot Water Storage Tank)	Plant Room
CAL-4	Calorifier (Hot Water Storage Tank)	Plant Room
CAL-5	Calorifier (Hot Water Storage Tank)	Plant Room
CAL-6	Calorifier (Hot Water Storage Tank)	Plant Room
CH-1	Chiller (Package Water-Cooled)	Plant Room (Basement)
CH-2	Chiller (Package Water-Cooled)	Plant Room (Basement)
CH-3	Chiller (Package Water-Cooled)	Plant Room (Basement)
CHWP-1.1	Primary CHW Pump	Plant Room
CHWP-1.2	Primary CHW Pump	Plant Room

... showing 18 of 161 rows

Auto-derived from A1+A2: every physical I/O for P2P, every equipment for functional tests, plus 8 cross-system integrated sequences. 313 hours of T&C.

Tier 4

Integrated outputs and scope modules

Manpower, schedule, risks, and the 11 scope-module instances

Tier 4 — B4 Installation Manhour Takeoff

B4 — Installation Manhour Takeoff

Tier 4 — 3,336 hours derived from A2+A3+A4 with standard production rates · showing field: line_items · 13 record(s)

project: Kingsford Hotel Bacolod — BMS

task	quantity	unit	rate_h_per_unit	hours	notes
Cable pulling (control + network + power feeds)	7445	m	0.33	2456.8	Total 7445 m. Includes 6864 m field, 485 m trunk…
Conduit installation (BMS-scope branch conduit)	2605	m	0.13	338.7	Conduit fraction = 35% of total cable. Basis: Gr…
BMS field panel installation	8	panels	5.0	40.0	Mount, dress, internal verification. Pre-built i…
Field device installation (per equipment class)	161	devices	per-class (see notes)	158.5	Per-class breakdown: FCU (guestroom/zone, hardwi…
Cable termination (both ends per cable)	516	ends	0.25	129.0	258 field cables × 2 ends
Cable continuity / insulation testing	258	cables	0.25	64.5	Pre-terminate continuity + post-terminate insula…
Panel power-up + smoke test (pre-commissioning)	8	panels	1.0	8.0	Initial energization, smoke check, controller bo…
Network drop setup (patch + label + connectivity)	8	drops	0.5	4.0	BACnet/IP and Modbus drops
Field analog sensor calibration	93	AI points	0.6	55.8	Calibrate 93 analog sensors against reference; t…
Fire-stopping / sealed cable penetrations	154	penetrations	0.5	77.0	Estimated 30% of cable ends require sealed penet…
Site safety attendance (toolbox, JHA, HSE briefi…	3332.3	h	0.05	166.6	5% uplift on labor base hours
Punch-list / rework allowance	3332.3	h	0.05	166.6	5% of base labor for as-installed deviations and…
As-built documentation (red-line + point DB expo…	3332.3	h	0.04	133.3	4% of base labor for as-built drawings, red-line…

Auto-derived from A2+A3+A4 using standard production rates. 3,336 hours installation labor; 417 person-days.

Tier 4 — D1 Project Schedule

D1 — Project Schedule

Tier 4 — 16-week Gantt reconciled with B4 manhours (peak 11 personnel weeks 9–10)

D1 — Project Schedule

Project: Kingsford Hotel Bacolod — BMS **Date:** 2026-04-28 **Duration:** 16 weeks (PO → Handover)

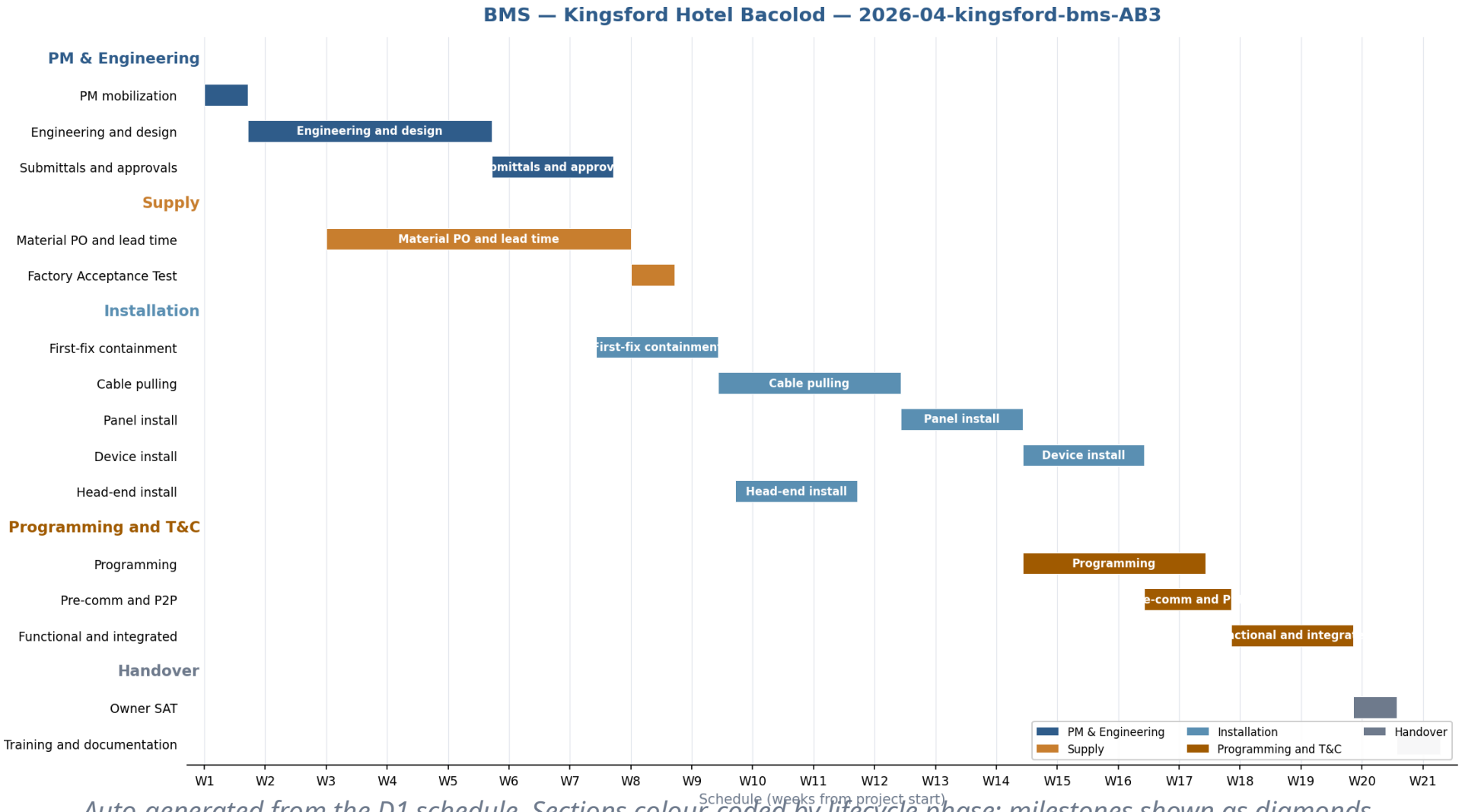
```
gantt
title BMS — Kingsford Hotel Bacolod
dateFormat  YYYY-MM-DD
section PM & Engineering
PM mobilization              :a1, 2026-05-01, 5d
Engineering and design       :a2, after a1, 28d
Submittals and approvals     :a3, after a2, 14d
section Supply
Material PO and lead time    :b1, 2026-05-15, 35d
Factory Acceptance Test      :b2, after b1, 5d
section Installation
First-fix containment        :c1, 2026-06-15, 14d
Cable pulling                :c2, after c1, 21d
Panel install                :c3, after c2, 14d
Device install               :c4, after c3, 14d
Head-end install             :c5, 2026-07-01, 14d
section Programming and T&C
Programming                  :d1, after c3, 21d
Pre-comm and P2P             :d2, after c4, 10d
Functional and integrated    :d3, after d2, 14d
section Handover
Owner SAT                    :e1, after d3, 5d
Training and documentation   :e2, after e1, 5d
```

Critical milestones

Week	Milestone
4	Engineering submittals issued
6	Material PO closed; FAT prep
9	First-fix containment complete

Hand-curated 16-week schedule reconciled with B4 manhours. Reveals: 4-person crew can't fit; need 6-person.

Tier 4 — D1 Project Schedule (visual Gantt)



Auto-generated from the D1 schedule. Sections colour-coded by lifecycle phase; milestones shown as diamonds.

Tier 6

Bill of Quantities — the costed output

86 line items aggregated from working docs + pricing rate library — PHP 21.98 M grand total

Tier 6 — Bill of Quantities

06 — Bill of Quantities

Tier 6 — 86 line items aggregated from working docs + pricing rate library; PHP 21.98 M grand total

06 — Bill of Quantities (BOQ)

Project: Kingsford Hotel Bacolod — BMS **Currency:** PHP **Total line items:** 86 · **RFQ-required:** 63 (73.3%) **Generated:** by `_playbook/tools/generate-06-boq.py` from working docs A1–B4 + pricing defaults

Pricing structure

- Base subtotal: **PHP 16,111,720**
- Overhead & margin (18%): PHP 2,900,110
- Cost + overhead: PHP 19,011,830
- Contingency (6.0%): PHP 1,140,710
- Cost + contingency: PHP 20,152,539
- VAT (12%): PHP 2,418,305
- **Grand total: PHP 22,570,844**
- *Optional items (7.x), priced separately:* PHP 0 (most TBD per Q-012/Q-015/Q-016)

Section subtotals

Section	Subtotal	% of base
1.0	PHP 1,688,000	10.5%
2.0	PHP 11,129,220	69.1%
3.0	PHP 2,282,680	14.2%
4.0	PHP 413,220	2.6%
5.0	PHP 507,400	3.1%
6.0	PHP 91,200	0.6%
Base total	**PHP 16,111,720**	**100.0%**

Cost pool breakdown (base, excl. optional)

Mechanical aggregation: the BOQ generator reads working docs A1–B4 and applies the pricing rate library. Every line cites its source.

Tier 7

Customer-facing synthesis

The proposal narrative + supplier RFQ package

Tier 7 — Customer Proposal Draft

10 — Customer Proposal Draft

Tier 7 — synthesizes 01–09 into customer-facing narrative with cover letter, technical proposal, commercial summary

Proposal — Building Management System

Kingsford Hotel Bacolod

Date: 2026-04-28 **Validity:** 90 days from issue **Currency:** PHP

Cover letter

Subject: Proposal for the 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: the requirement letter, the Megaworld MC Standards points list (ME and PL chapters), the BMS Points list (TUEC) Construction Bulletin, and the EE Plan (TUEC) Construction Bulletin No.8. Where the documents were silent or ambiguous, we made the assumptions catalogued in Section 7. Review those before contract.

The base price is PHP 22.6 M including VAT. Optional items (preventive maintenance, FDAS / PMS integration, additional training) are priced separately in Section 9.

The cover-letter wording “Rehabilitation” does not match the technical inputs (Construction Bulletins for new construction). We have classified the project as greenfield and raised this as Open Item Q-018 for confirmation.

1. Executive summary

A BMS for a medium-tier Philippine hotel — chilled-water plant, cooling towers, primary CHW pumps, condenser-water pumps, DOAS, AHUs, sample-floor FCU controls, EAS, calorifiers, heat pumps, recirculating pumps, steam boiler, and multifunction power metering. 554 BMS I/O points across 161 equipment instances, organised into 8 BMS field panels with 21 DDC controllers. The head end runs in primary-standby on Dell PowerEdge servers with Siemens Desigo CC. The network is an isolated /24 LAN with a 24-port managed core in the GF server room and 6 edge switches per riser zone, OM3 fiber riser. Schedule: 16 weeks PO to handover.

2. Project background

The project is the new construction of the Kingsford Hotel Bacolod, a Megaworld hotel-tier asset in Bacolod City. The BMS scope follows the Megaworld MC Standards points list. The project-specific BMS sheets (BMS-01..04+) are Construction Bulletin schematic diagrams confirming system zoning; the readable text input is the MC Standards.

3. Scope of work

Per WBS in Section 4. Key inclusions:

- Head-end equipment (1 server primary + 1 standby, 2 workstations, 1 graphics PC + 55-inch wall display, 3 kVA UPS).
- Network infrastructure (1 core switch, 6 edge switches, OM3 riser fiber, 6 IDF closets).
- 18 BMS field panels with 30 DDC controllers and I/O modules.
- Field instrumentation per the points list (BMS-supplied sensors, BMS-supplied valve actuators on bypass headers, ME-supplied valves and dampers wired by BMS).

sizes Tiers 1–6 into a customer-facing narrative: cover letter, executive summary, technical proposal, schedule, commercial summary, stated assumptions, inclusions/excl

Tier 8

Final rendered deliverables

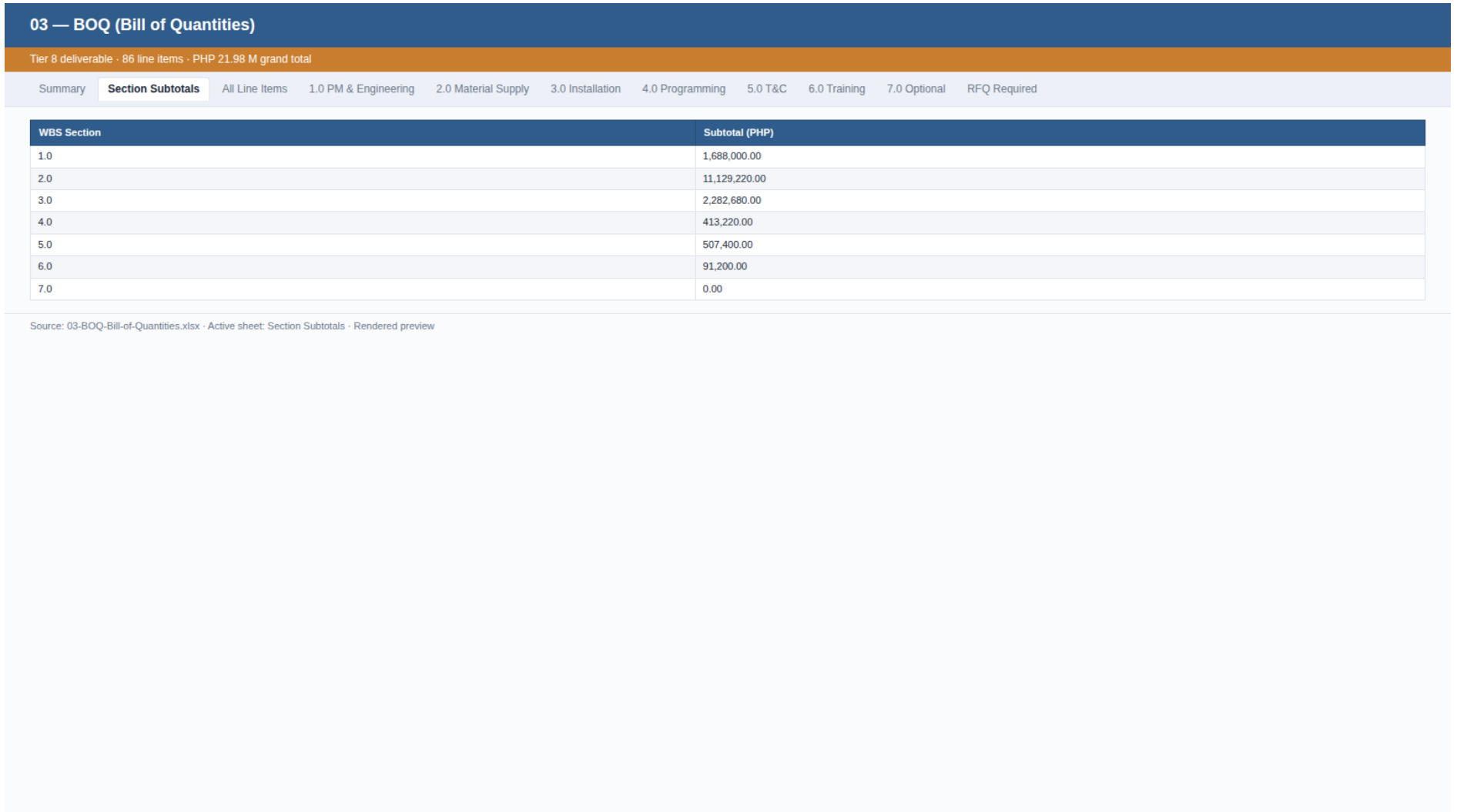
13 customer-ready files produced from a single command

Tier 8 — Final Deliverables Package

Mechanical helpers render Tier 7 markdown/YAML into PDF / DOCX / Excel / PPTX

File	Format	Size	Pages / Sheets / Slides
01-Initial-Overview	PDF	80 KB	7 pages
02-Proposal-Draft	PDF	239 KB	30 pages
03-BOQ-Bill-of-Quantities	Excel	29 KB	11 sheets
04-A1-IO-List	Excel	51 KB	2 sheets
05-A2-Equipment-Takeoff	Excel	18 KB	2 sheets
06-A3-Cable-Schedule	Excel	20 KB	4 sheets
07-A4-Panel-Schedule	Excel	10 KB	3 sheets
08-Open-Items-RFI	Word	15 KB	—
09-Stated-Assumptions	Word	16 KB	—
10-Proposal-Comprehensive	PDF + DOCX	1.5 MB + 50 KB	92 pages
11-Customer-Proposal-Presentation	PowerPoint	74 KB	31 slides
12-Internal-Methodology-Presentation	PowerPoint	70 KB	this deck

Tier 8 — BOQ (Bill of Quantities), Section Subtotals



03 — BOQ (Bill of Quantities)

Tier 8 deliverable · 86 line items · PHP 21.98 M grand total

Summary | **Section Subtotals** | All Line Items | 1.0 PM & Engineering | 2.0 Material Supply | 3.0 Installation | 4.0 Programming | 5.0 T&C | 6.0 Training | 7.0 Optional | RFQ Required

WBS Section	Subtotal (PHP)
1.0	1,688,000.00
2.0	11,129,220.00
3.0	2,282,680.00
4.0	413,220.00
5.0	507,400.00
6.0	91,200.00
7.0	0.00

Source: 03-BOQ-Bill-of-Quantities.xlsx · Active sheet: Section Subtotals · Rendered preview

The Excel file the team opens. Multi-sheet workbook — Summary, Section Subtotals, All Line Items, per-WBS sheets, RFQ Required filter. PHP 21.98 M grand total.

Tier 8 — BOQ · All Line Items

03 — BOQ · All Line Items

Tier 8 deliverable · WBS-grouped, costed, RFQ-flagged

Summary | Section Subtotals | **All Line Items** | 1.0 PM & Engineering | 2.0 Material Supply | 3.0 Installation | 4.0 Programming | 5.0 T&C | 6.0 Training | 7.0 Optional | RFQ Required

WBS	Description	Qty	Unit	Unit Price (PHP)	Extended (PHP)	Source	Rate Source	RFQ Required
1.1	Project management (off-site, full duration, 16 weeks)	640	hr	1500	960000	D2 PM 1 FTE × 16 wk	internal	
1.1	Site mobilization (week 1)	80	hr	1500	120000	D1 + B4 mobilization	internal	
1.2	Engineering & design (system architecture, panel layouts, …	320	hr	1200	384000	D2 engineering allocation	internal	
1.3	Submittals & approvals administration	80	hr	1200	96000	within engineering budget	internal	
1.4	Factory Acceptance Test (FAT) delivery	1	lot	80000	80000	D1 week 5	default	
1.4	FAT support hours (BMS engineer)	40	hr	1200	48000	D2 week 5	internal	
2.1.1	BMS Server (Primary) — dual-CPU, 16+ GB RAM, redundant PSU	1	each	350000	350000	A6 HE-SVR-01	default	✓
2.1.1	BMS Server (Standby, redundancy)	1	each	350000	350000	A6 HE-SVR-02	default	✓
2.1.2	Operator Workstation	2	each	80000	160000	A6 HE-WS-01, HE-WS-02	default	✓
2.1.3	Graphics PC + 55-inch Display	1	set	150000	150000	A6 HE-GFX-01	default	✓
2.1.4	Head-End UPS (3 kVA, 30-min runtime)	1	each	90000	90000	A6 HE-UPS-01	default	✓
2.1.5	Software licenses (server + 3 client + energy module + gra…	1	lot	600000	600000	A6 HE-SW-*	default	✓
2.1.6	Server-room peripherals (KVM, console monitor, color laser…	1	lot	80000	80000	A6 HE-PRINTER, HE-RACK, HE-KVM, HE-MON	default	✓
2.2.1	Core managed L2/L3 switch (24-port + 4 SFP)	1	each	120000	120000	A5 SW-CORE	default	✓
2.2.2	Edge managed L2 switch (16-port + 2 SFP)	3	each	35000	105000	A5 SW-GND/2F/RD	default	✓
2.2.2	Edge managed L2 switch (8-port + 2 SFP)	3	each	18000	54000	A5 SW-LZ/3F/BSMT	default	✓
2.2.3	Riser fiber, OM3 multimode 6-strand armored	300	m	280	84000	A5	default	✓
2.2.3	Fiber transceivers (1G SX/LX, paired)	14	each	8000	112000	A5	default	✓
2.2.4	IDF wall-mount enclosures (9U)	6	each	18000	108000	A5	default	✓
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (small, IP54 wall-mount)	10	each	40000	400000	A4 panels (small I/O)	default	✓
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (medium, IP54 wall-mount)	6	each	80000	480000	A4 panels (medium I/O)	default	✓
2.3.1+2.3.2+2.3.3+2.3.4	BMS field cabinet (large, IP54 wall-mount)	2	each	150000	300000	A4 panels (large I/O)	default	✓
2.3.5	DDC controllers (incl. network gateway controllers)	30	each	90000	2700000	A4 total_controllers	default	✓
2.3.5	AI input modules (16-channel)	8	each	40000	320000	93 AI + 25% spare ÷ 16 (per A3-cable-spec-rules.yaml spare…	default	✓

… showing 24 of 86 rows

Source: 03-BOQ-Bill-of-Quantities.xlsx · Active sheet: All Line Items · Rendered preview

86 costed line items, WBS-grouped, RFQ-flagged. Every quantity traces to a working doc; every rate to the pricing rate library.

Tier 8 — A1 I/O List (Excel)

04 — A1 I/O List (Excel)

Tier 8 deliverable · 716 points across HVAC / plumbing / electrical

Summary | All IO Points

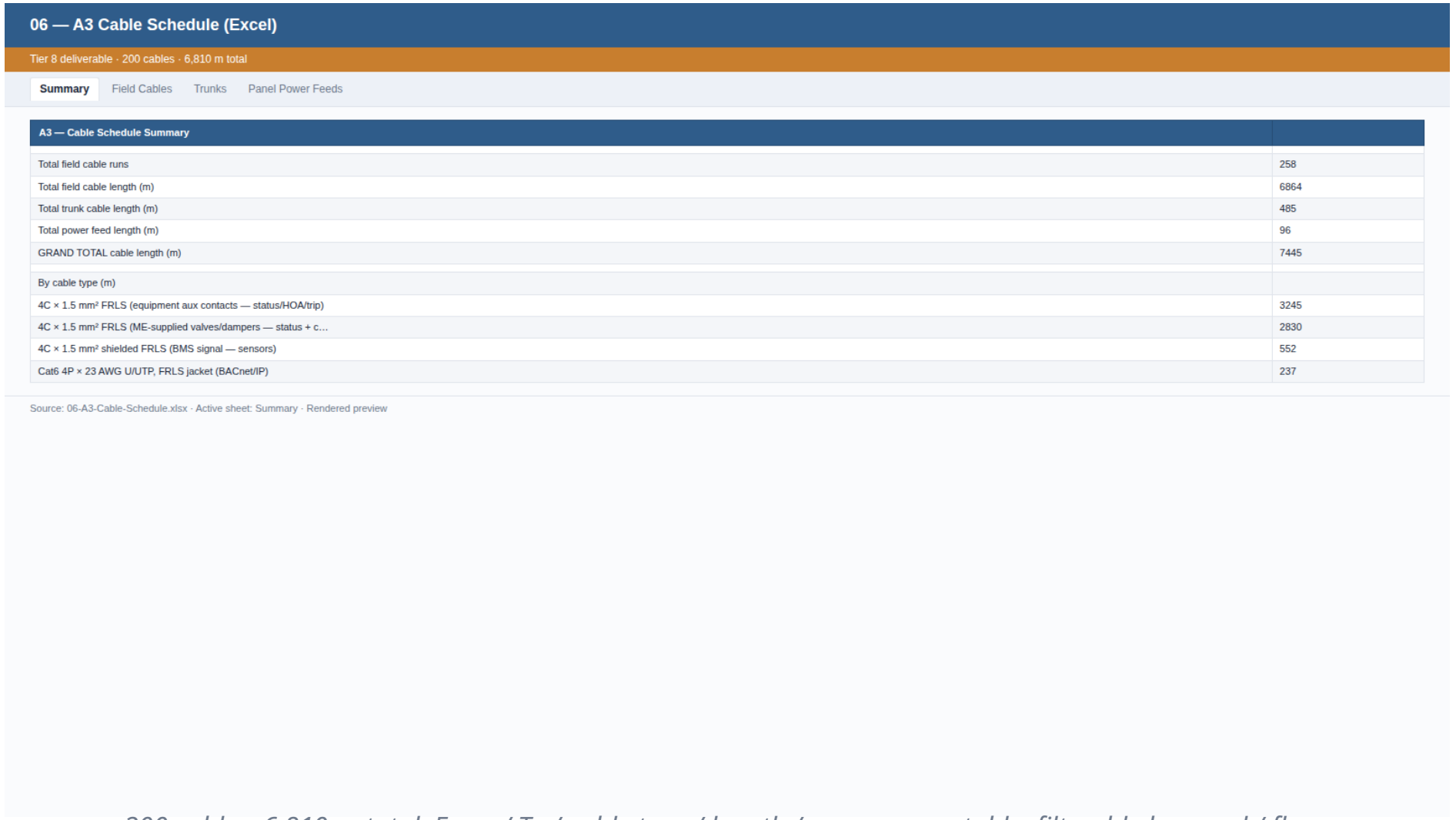
A1 — Consolidated I/O List Summary	
Project	Kingsford Hotel Bacolod — BMS
Total I/O rows	554
By type	
DI	203
DO	183
AI	93
AO	44
HLI	23
Network	8
By C/O	
Equipment Supplier	328
ME Contractor	128
BMS Contractor	98
By system	
VENT-FCU	270
VENT-AHU	72
VENT-DOAS	63
HVAC-Pumps	29
HVAC-Cooling-Towers	20
HVAC-Chillers	16

... showing 24 of 43 rows

Source: 04-A1-IO-List.xlsx · Active sheet: Summary · Rendered preview

716 points across HVAC / plumbing / electrical, with system / equipment / location / panel / point description / type / source.

Tier 8 — A3 Cable Schedule (Excel)



06 — A3 Cable Schedule (Excel)

Tier 8 deliverable · 200 cables · 6,810 m total

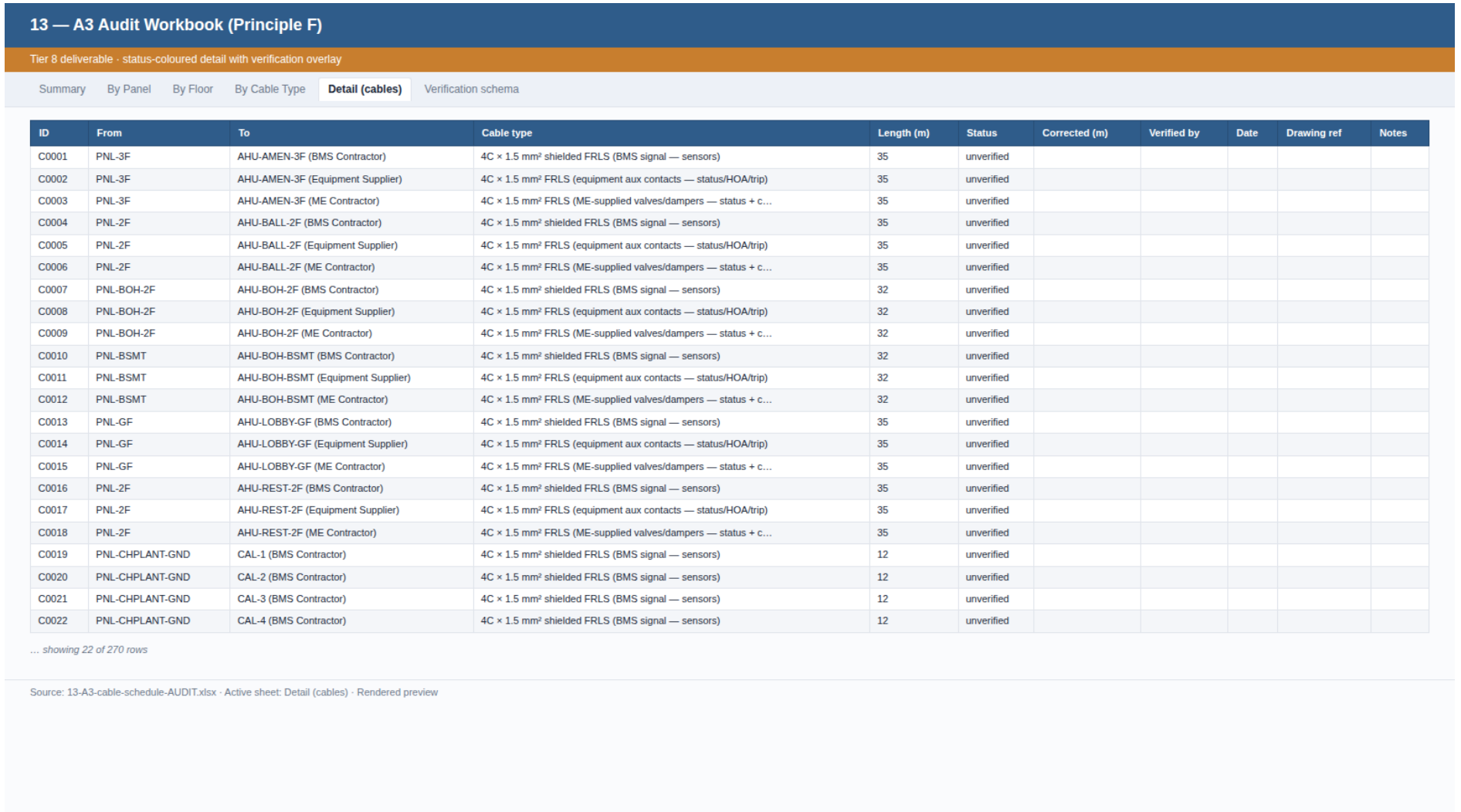
Summary | Field Cables | Trunks | Panel Power Feeds

A3 — Cable Schedule Summary	
Total field cable runs	258
Total field cable length (m)	6864
Total trunk cable length (m)	485
Total power feed length (m)	96
GRAND TOTAL cable length (m)	7445
By cable type (m)	
4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	3245
4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	2830
4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	552
Cat6 4P × 23 AWG U/UTP, FRLS jacket (BACnet/IP)	237

Source: 06-A3-Cable-Schedule.xlsx · Active sheet: Summary · Rendered preview

200 cables, 6,810 m total. From / To / cable type / length / source — sortable, filterable by panel / floor.

Tier 8 — A3 Audit Workbook (Principle F)



13 — A3 Audit Workbook (Principle F)

Tier 8 deliverable · status-coloured detail with verification overlay

Summary | By Panel | By Floor | By Cable Type | **Detail (cables)** | Verification schema

ID	From	To	Cable type	Length (m)	Status	Corrected (m)	Verified by	Date	Drawing ref	Notes
C0001	PNL-3F	AHU-AMEN-3F (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	35	unverified					
C0002	PNL-3F	AHU-AMEN-3F (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	35	unverified					
C0003	PNL-3F	AHU-AMEN-3F (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	35	unverified					
C0004	PNL-2F	AHU-BALL-2F (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	35	unverified					
C0005	PNL-2F	AHU-BALL-2F (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	35	unverified					
C0006	PNL-2F	AHU-BALL-2F (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	35	unverified					
C0007	PNL-BOH-2F	AHU-BOH-2F (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	32	unverified					
C0008	PNL-BOH-2F	AHU-BOH-2F (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	32	unverified					
C0009	PNL-BOH-2F	AHU-BOH-2F (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	32	unverified					
C0010	PNL-BSMT	AHU-BOH-BSMT (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	32	unverified					
C0011	PNL-BSMT	AHU-BOH-BSMT (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	32	unverified					
C0012	PNL-BSMT	AHU-BOH-BSMT (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	32	unverified					
C0013	PNL-GF	AHU-LOBBY-GF (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	35	unverified					
C0014	PNL-GF	AHU-LOBBY-GF (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	35	unverified					
C0015	PNL-GF	AHU-LOBBY-GF (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	35	unverified					
C0016	PNL-2F	AHU-REST-2F (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	35	unverified					
C0017	PNL-2F	AHU-REST-2F (Equipment Supplier)	4C × 1.5 mm² FRLS (equipment aux contacts — status/HOA/trip)	35	unverified					
C0018	PNL-2F	AHU-REST-2F (ME Contractor)	4C × 1.5 mm² FRLS (ME-supplied valves/dampers — status + c…	35	unverified					
C0019	PNL-CHPLANT-GND	CAL-1 (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	12	unverified					
C0020	PNL-CHPLANT-GND	CAL-2 (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	12	unverified					
C0021	PNL-CHPLANT-GND	CAL-3 (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	12	unverified					
C0022	PNL-CHPLANT-GND	CAL-4 (BMS Contractor)	4C × 1.5 mm² shielded FRLS (BMS signal — sensors)	12	unverified					

… showing 22 of 270 rows

Source: 13-A3-cable-schedule-AUDIT.xlsx · Active sheet: Detail (cables) · Rendered preview

Per-cable Detail with status-coloured cells (green/red/yellow/grey) — auto-filter so the team can isolate unverified rows for site walkthroughs.

Tier 8 — Comprehensive Proposal (PDF cover page)

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)

---

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.

The customer-facing PDF. ~92 pages: cover letter, executive summary, technical proposal, schedule, commercial summary, stated assumptions, inclusions/exclusions.

Principles

Why the framework holds together

Five design principles that govern every project

Design Principles A–F

These principles govern when to extend the framework and what to keep adaptive

	Principle	Why it matters
A	Mechanical helpers operate only on standardized agent-prepared data	Customer document interpretation stays adaptive, in agent instructions
B	Engineering judgment lives in agent instructions	Agent CAN write project-specific helpers when needed; permanent tools are mechanical
C	The applicability check is foundational	Phase 5a always begins with 'what we need vs. what's given'
D	Determinism through standard formats — and translation when needed	Customer-provided docs are translated to standard format BEFORE downstream work
E	Document tier classification (the dependency DAG)	Strict tier ordering; no circular references; build order is known
F	Transparency and auditability — never hide weak spots	Auto-generated quantities the team must verify get a verification overlay + sibling audit workbook

Determinism through standard formats

Standard formats are the contract that lets mechanical helpers run reliably

Standard formats (the contract)

Every working-doc type has ONE canonical format:

• I/O list — standard YAML schema (id, system, equipment, location, point description, type, field device, C/O, source, ...)

• BOQ — standard YAML schema (line items with WBS, qty, unit, rate, source, RFQ flag)

• Cable, panel, equipment takeoff — each has a single canonical format

• Pricing rate library + equipment-class defaults — standard YAML, peer-reviewable

Translation at the entry boundary

When the customer supplies a document that covers a working-doc type:

1. The agent transcribes it into our standard format BEFORE proceeding.

2. Each translated row cites the customer's source file for traceability.

3. Schema mismatches surface as assumptions and clarifications.

4. Downstream work always operates on the standardized representation, never on the customer's native format.

Result: regardless of customer format variation, downstream pipeline stays deterministic.

Where mechanical automation ends and judgment begins

We're conservative about what we automate

Mechanical (Python helpers)

Pure data aggregators on standardized YAML — no customer-document interpretation:

- BOQ aggregator
- RFQ packager
- Excel exporters
- PDF / DOCX rendering
- Presentation builders

Why safe:

- No customer-document interpretation
- Input/output formats are fixed
- Every quantity is sourced from agent-prepared data

Agent-driven (sub-routines / instructions)

Adaptive instructions in the playbook — sub-routines the agent follows:

- Customer document extraction protocol
- Project classification (triangulation)
- Required-doc checklist comparison
- WBS scope decomposition
- Working-document applicability matrix
- Working-document content (e.g., interpreting a points list into an I/O list)
- Module instance parameter selection
- Assumption rationale and impact assessment
- Customer clarification framing

When format/scope is genuinely unique, the agent writes a project-specific helper script.

Principle F — Transparency & auditability layer

Some auto-generated quantities are inherently soft. We don't pretend; we make them visible and editable.

The honest framing

The named weakest spot: cable lengths.

Today the agent uses assumption A-001 — 30 m average panel-to-device run, 80 m trunk per floor — because we don't always have scaled drawings or a site walkthrough yet.

Field-verified lengths typically vary ±20% per cable. If we hide that, the BOQ looks more confident than it is.

The fix is a transparency layer that makes weak spots obvious and editable — not buried in a YAML footnote.

The mechanism (Principle F)

How it works:

1. Every team-verifiable working doc (A1, A2, A3, A4, A6, B4, D1) supports a verification: overlay block per row — status / corrected_<field> / verified_by / drawing_ref / notes.

2. Mechanical helpers respect the corrected value when present — corrections flow into B4 manhours, BOQ, and final deliverables automatically.

3. A sibling Excel audit workbook is generated alongside each YAML — that's the team's review surface.

4. Audit workbook is regenerable; canonical YAML is the single source of truth.

The audit workbook — what the team actually opens

XLSX, multi-sheet, filterable. Built for how the proposal team works in Excel daily.

What's in the workbook

Each audit workbook contains:

• Summary — totals, status counts (colour-coded), known weak points, correction workflow

• Per-axis rollups — e.g., A3 cable schedule has By Panel / By Floor / By Cable Type

• Detail — every row with auto-filter + frozen header; status cells colour-coded (green=verified, red=needs correction, yellow=uncertain, grey=unverified)

• Verification schema — copy-pasteable YAML template + priority-ordered verification methods

How the team uses it

Workflow in practice:

• At desk: open A3-cable-schedule-AUDIT.xlsx, filter Detail by panel, cross-check totals against architectural drawings.

• On site: print or open on tablet, walk the building, mark up.

• Back at desk: edit A3-cable-schedule.yaml — add a verification: block with corrected_length_m, status, drawing_ref.

• Re-run the deliverables generator — corrections propagate.

Where this is going — the proposal cockpit (v1+)

v0 surfaces ask the user to think like the agent. The cockpit inverts that.

Where we are

Today (v0):

• Customer drops files in a folder
• Agent runs in a terminal
• Outputs land as XLSX / PDF / DOCX
• Verification = open Excel + edit YAML

Honest, but technical. The user has to think in our shapes.

Where we're going

Tomorrow (v1+ journey-style UX):

1. Drop-zone intake — drag-and-drop with auto-classified document tiles.

2. One 'Generate proposal' button — live phase-by-phase progress.

3. Tier walk — visual timeline Tier 0 → Tier 8, click any node to inspect lineage.

4. Audit cockpit — split-pane: drawing on left ~70%, filterable row list on right ~30%; click a row, drawing pans to the grid reference; inline-edit writes back to YAML.

5. Regen loop — one button refreshes downstream artifacts; diffs are visible per phase.

Quality and Trust

Why this approach delivers a defensible, auditable proposal

- ✓ Every quantity is traceable — each BOQ line cites its working doc; each working doc cites the customer's source document
- ✓ Assumptions are explicit — 19 stated assumptions in the proposal, each with cost-impact-if-wrong
- ✓ The basis is reproducible — re-run the aggregators and the same input produces the same output
- ✓ No hidden magic in labor / rates — pricing defaults are a peer-reviewable rate library
- ✓ Customer questions have documented answers — each clarification has a default assumed and a rationale
- ✓ Audit trail — every change committed with a 'why' message
- ✓ Deliverables are internally consistent — the BOQ in the PDF equals the BOQ in the Excel equals the BOQ in the proposal narrative

Time Savings: before vs. after

What used to take 2–3 weeks now takes 5–7 working days

Phase	Before (hand-rolled)	After (this framework)
Phases 1–4: Intake → WBS	2–3 days, often inconsistent	1 day with structured walkthrough
Phase 5a: Working docs	5–7 days hand-typing	2–3 days (about half are auto-aggregated)
Phase 5b: Module instantiation	Skipped or hand-built	0.5 day (templates)
Phase 6: BOQ	2–3 days hand-Excel	Hours (one command)
Phases 7–8: Assumptions + RFI	Often missed, ad-hoc	Hours (auto-organized)
Phase 9: RFQ to suppliers	Manual emails per category	Hours (12 docs auto-categorized)
Phase 10: Proposal narrative	3–5 days hand-write	1 day (templates + auto-populate)
Total typical	2–3 weeks	5–7 working days

Kingsford BMS Pilot — what we produced

From 5 customer documents (~165 MB) to a 13-file deliverables package

554
BMS I/O points enumerated

161
Equipment instances cataloged

8
Field panels designed

6,810 m
Cable footage estimated

4,648 hr
Project effort calculated

PHP 21.98M
Grand total proposal value

63 / 86
BOQ items / RFQ-flagged

12
Supplier RFQ docs generated

19
Customer clarifications cataloged

This is version 0. It will be the worst version of this system.

Every project from now on patches the agent instructions where edge cases surface

- What v0 IS:
  - A working end-to-end pipeline that produced the Kingsford proposal
  - A baseline of the 17 working-doc types and 11 scope modules for BMS
  - A pricing rate library that's defensible at mid-market
  - A complete deliverables package the customer can act on
- What v0 is NOT yet:
  - Calibrated against won-bid actuals (so pricing defaults will tighten)
  - Tested across customer formats beyond Megaworld's TUEC convention
  - Tracking edge cases that haven't been encountered yet
  - Handling rehab/retrofit scope (modules retired during Kingsford classification will be re-activated)
-
- Every project from here is an opportunity to improve. When an edge case surfaces, we patch the agent's instructions immediately so the next project benefits.

The vision: per-customer × per-discipline tracks

Soon the agent will recognize which 'track' a project belongs to and apply tuned defaults

Tracks the framework will support

Examples of future tracks:

• megaworld-bms
  → Tuned for TUEC points-list convention, Megaworld portfolio standardization, hotel/condotel scope patterns

• san-miguel-electrical
  → Tuned for SMC's switchgear standards, motor-control specifications, plant electrical typology

• dmci-automation
  → Tuned for DMCI's process-automation conventions, PLC + SCADA standards

Each track tunes:
  – the required-docs checklist
  – the equipment-class defaults
  – the pricing rate library
  – the module templates

How tracks emerge from real projects

How tracks emerge:

1. After 2–3 projects on the same (customer × discipline) pair, patterns become clear:
   – Which docs they always supply
   – Which they never supply
   – Their preferred brands
   – Their typical project profile
   – Their commercial term defaults

2. We capture those patterns as a track configuration in the playbook (still markdown / YAML).

3. The agent loads the track at project kickoff and starts with track-tuned defaults instead of framework-wide defaults.

4. Over time, every major customer-discipline combination has its own track, and the agent's first proposal on that pairing is already 80% calibrated.

Next Steps

What we're asking the team to do

- ☐ Review this Kingsford pilot — proposal narrative, BOQ, working documents
- ☐ Validate the pricing defaults against your last 2–3 won bids
- ☐ Provide feedback on module templates (anything missing? anything redundant?)
- ☐ Identify the next project to pilot the framework on
- ☐ Identify 2–3 estimators willing to learn the framework
- ☐ Decide on adoption pace: opt-in pilot, then mandate
- ☐ Approve the pricing rate library for inclusion in the playbook
- ☐ Schedule a follow-up review in 2 weeks after a second pilot
- ☐ Begin curating the first track — likely megaworld-bms, given Kingsford as the seed

Questions, Feedback, Discussion

Let's discuss how we make this stick — and which project to run next.