Annex 2

Qualification Requirement
EOI for Provision of Advanced Facility Management System with Integrated Building Information Modelling (BIM) Data for New Acute Hospital Kowloon Central Cluster, Hospital Authority
Hospital Authority

General Rules and Observations

Unless otherwise stated, each item offered shall incorporate the following components / requirements / features. The specification only outlines the minimum requirements for the product. Suppliers / Tenderers must indicate below, point by point, whether their offered product complies fully with the tender specification. In addition to indicating 'Yes' or 'No' against each item, suppliers / tenderers must provide details / data / documentary support if necessary.

(Please tick "√" where appropriate)

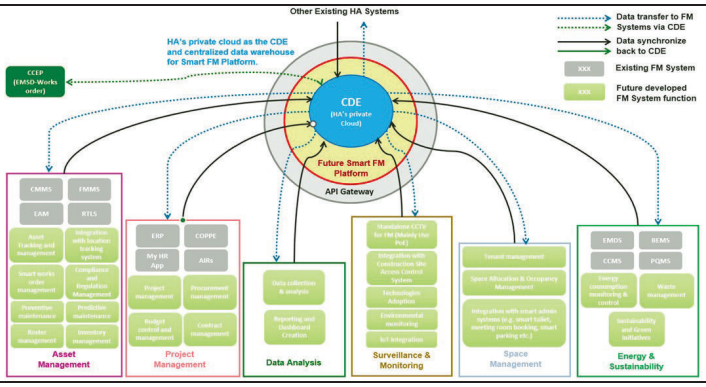
The product/service offered shall incorporate the following components, requirements & features. Mandatory Requirement – (M) Desirable Requirement – (D) Optional Requirement – (O)	Sellers must indicate below, point by point whether their offered equipment/service complies fully with the quotation specification. Details must be given should the offered product/service differ from the specification. **(Please tick as appropriate)**

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
1	**Introduction**			
1.1	This tender calls for a Smart FM System development service for the Building Information Modelling (BIM) and Facility Management Systems integration at Site A and B of the New Acute Hospital (NAH) at Kai Tak Development Area.	(M)		
1.1.1	The project shall be divided into two main stages with tentative indicative timeline for completion in **Appendix 1**. The Tenderer shall provide the details of implementation plan with proposed timeline in Schedule 2.	(M)		
2	**General Requirements**			
2.1	**NAH Site A & B Smart FM System Development**			
2.1.1	The Tenderer shall collect the user requirement from the Employer before any works begin.	(M)		
2.1.2	Detailed Work Plan: The Tenderer shall develop a thorough work plan that outline the scope, schedule, and sequence of activities required to achieve the project deliverables.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.1.3	The Tenderer shall submit the detailed reports that analyze system performance and usage quarterly. These reports will include but not limited to the analytics on system utilization, areas for improvement, and actionable recommendations for system optimization. ➢ Performance Report	(M)		
2.1.4	The Tenderer shall submit periodic progress reports throughout the project lifecycle, offering transparency on project milestones, current status, challenges encountered, and strategies employed to address them. ➢ Progress Report	(M)		
2.1.5	The Tenderer shall define the overall systems development and integration methodology and approach, including ➢ Data integration ➢ Systems development strategy ➢ Software, hardware, communication and user interfaces ➢ System Architecture ➢ Quality Assurance ➢ Project Management	(M)		
2.1.6	The Tenderer shall develop a BIM-FM system with functionalities customized to NAH's specific operational requirements, including but not limited to following modules: ➢ Asset Management ➢ Project Management ➢ Data Analysis ➢ Surveillance & Monitoring ➢ Space Management ➢ Energy & Sustainability	(M)		
2.1.7	The Tenderer shall perform existing FM / Corporate systems integration with NAH's existing IT infrastructure, including but not limited to: ➢ Computerized Order Processing and Project Execution System (COPPE) ➢ Computerized Maintenance Management System (CMMS) ➢ Facility Improvement and Maintenance Works Order Management System (FMMS) ➢ Enterprise Resource Planning (ERP) ➢ Central Control and Monitoring System (CCMS) ➢ Power Quality Monitoring System (PQMS) ➢ Building Energy Management System (BEMS) Data will be synchronized with Common Data Environment (CDE) bi-directionally to-and-from new systems, and synchronize back to existing FM systems.	(M)		
2.1.8	The Tenderer shall ensure the system adheres to industry-standards interoperability protocols to facilitate data exchange and system integration.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.1.9	Data Management and Analytics: ➢ Initial Data Collection and Baseline Establishment: In the absence of existing data, the Tenderer shall establish a process for initial data collection to set a baseline for analysis. ➢ Analytics Capabilities: The Tenderer shall implement advanced data analytics for operational insights. This includes developing capabilities for AI-driven predictions and optimizations. ➢ Progressive Learning and Model Refinement: The Tenderer shall develop machine learning models that able to adapt and refine their predictive capabilities as they receive more data over time. Sensor Data Integration: The Tenderer shall manage and integrate data from various sensors throughout NAH, ensuring accurate and real-time data collection.	(M)		
2.1.10	Security, Compliance, and Access Control: ➢ Security Protocols: The Tenderer shall develop robust cybersecurity measures, including data encryption and secure access protocols. Regulatory Compliance: The Tenderer shall ensure compliance with healthcare regulations and data privacy laws of Hong Kong.	(M)		
2.1.11	Scalability, Performance, and Reliability: ➢ Scalable Architecture: The Tenderer shall design the system to be scalable to accommodate future expansions or modifications. ➢ Performance Benchmarks: The Tenderer shall ensure the system meets specified performance benchmarks, such as response times and data processing speeds.	(M)		
2.1.12	User Training and System Implementation: The Tenderer shall provide at least three user training program and materials for various user groups of the Hospital, including Employer's IT staff, hospital administrators, and maintenance personnel. ➢ Performance Report Progress Report	(M)		
2.1.13	Deployment Phases: The Contractor shall implement the system in phases, with clear milestones and timelines for each stage listed in Schedule 2 under clause 1.1.2.	(M)		
2.2	**Design Criteria**			
2.2.1	The Smart FM System shall fulfill the following criteria: a) **User-Friendly System Design**: The system is required to be user-friendly, ensuring all system software is field proven for reliability. It must be operable on current versions of Microsoft Windows, Linux, and Apple OSX operating systems, allowing concurrent running of multiple programs. The web-based Graphical User Interface (GUI) should utilize graphics mode as the foundation of its design, incorporating advanced techniques for straightforward learning, familiarization, and	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	operation, including dynamic and animated graphical displays. b) **Web-Based Accessibility**: The system must provide web-enabled access, negating the necessity for installing specific applications or software. This requirement ensures accessibility through standard web browsers, enhancing user convenience and system accessibility. c) **Efficient and Scalable System**: The system is expected to offer different levels of priority settings and user-defined alarm report destinations. It should be capable of initiating automatic SMS messaging for specific alarms and support an unrestricted number of user logins for the web-based GUI. d) **Compatibility with Multiple Vendors**: The system is required to be a proven integration solution compatible across multiple vendors. This aspect is crucial for ensuring flexibility and scalability in various operational settings. e) **Comprehensive Connectivity Standards**: Compliance with international standards for network integration is mandatory. The system should support commonly adopted platforms, such as Windows 10, and employ standard data link methods including DDE, OLE, OPC API, REST API. It should also be compatible with standard database formats such as DB4 and SQL. f) **Adaptable Deployment Options**: The system should primarily support on-premises deployment, meeting the The Hospital's IT requirements. Additionally, it should offer the capability to be deployed locally on-site or provided as a hosted service (private cloud) with data connectivity and security requirements also aligning with The Hospital's standards. Deployment on public cloud platforms is not permitted.			
2.3	**<u>System Architecture</u>**			
2.3.1	The proposed architecture for the Future Smart FM Platform is built around the HA's private cloud infrastructure, which functions as the Common Data Environment (CDE) *. This environment is pivotal for integrating various data streams and systems necessary for comprehensive facilities management. *["CDE" stated in this document is equivalent to Common Data Collection Platform for BIM(BIM CDCP)]	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
				
2.3.2	**Common Data Environment (CDE):** The CDE, centrally located within Employer's private cloud, is the centralised database of the system, facilitating robust data exchange and synchronization. It acts as the primary repository and processing hub for the As-built BIM Model data and various existing and future FM system functions. The contractor shall define a staging area for information exchange and workflow between the CDE and various FM systems.	(M)		
2.3.3	**Data Flow and Integration:** The architecture is designed to maintain a 'single source of truth' through a centralized data management approach. Data exchange between the systems—both existing systems and future enhancements—occurs exclusively via the CDE. This design principle ensures that all data transactions, whether for input or retrieval, pass through the CDE, thereby eliminating direct data exchanges between individual systems and reinforcing data integrity.	(M)		
2.3.4	a) **Data Acquisition for Future Smart FM Platform**: The Future Smart FM Platform will acquire essential operational data from two primary sources: existing FM systems and a network of sensors deployed throughout the facility. Data from existing FM systems, as well as real-time data captured by sensors, is routed through the CDE. This dual-sourced data approach ensures that the platform operates based on comprehensive, current, and accurate information, encompassing asset management, space utilization, energy monitoring, and other crucial FM functionalities.	(M)		
2.3.5	b) **Data Synchronization Back to CDE**: The data generated or processed by the Future Smart FM Platform is synchronized back to the CDE. The CDE thereby maintains its status as the centralized repository, ensuring that all subsequent data transactions across the FM ecosystem are derived from a single source of truth.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.3.6	c) **Data Distribution from CDE:** If there is a need for updates or data sharing, the CDE will distribute this consolidated data back to the existing FM systems. This centralized approach to data handling ensures that any updates are consistently propagated across all systems, maintaining data coherence and reliability.	(M)		
2.3.7	The structured data flow is meticulously designed to ensure that the CDE is the only platform component where data exchange occurs. This methodology prevents any potential data silos and reinforces the CDE as the authoritative data hub. The specific data transfer requirements for each module—whether part of the existing systems or the future FM platform—will be detailed in subsequent sections of the specification.	(M)		
2.3.8	The Tenderer shall be responsible for the connection between the system provided by the Contractor and the other systems.	(M)		
2.3.9	The Tenderer is required to ensure that the BIM-FM system is designed for potential future integration with other digital platforms. This includes providing necessary provisions within the digital platform to facilitate such connections. These provisions should encompass, but are not limited to, compatible file formats, established communication protocols, and accessible APIs to enable seamless future integrations.	(M)		
2.3.10	The Level of Information Need (LOIN) of the BIM model is LOD-G 400, LOD-I 500 and DOC-500. The Tenderer shall be responsible to convert the BIM model fit for the future smart FM platform.	(M)		
2.3.11	The platform shall be deployed locally on-site meeting the Hospital/EMSD IT requirements (on-premises).	(M)		
2.4	**Digital Twin**			
2.4.1	a) The Digital Twin Platform shall be able to integrate the Building information Model of the development. It shall support revit and IFC4 file input for development. b) The Digital Twin Platform shall couple with real-time and replication of the actual building and landscape areas, if applicable, the platform shall be able to present 3D model in a well-defined hierarchy. c) The Digital Twin Platform shall allow users to import and consolidate drawings / models developed for assets and facilities, in all native BIM formats commonly seen in the market, into the Digital Twin platform for the purpose of developing, rendering, and updating the Digital Twin 2D and 3D models.	(M)		
2.4.2	Asset Management: a) **Asset Management Interface**: The Digital Twin shall provide an asset management feature allowing users to import, edit, and export asset data registered on the system.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	b) **Real-Time Data Display**: Integration of real-time data feeds for each asset, enabling dynamic monitoring and management. c) **Workflow Integration**: Define a clear workflow that outlines how the Digital Twin and Smart FM system Asset Management Module interact, including basic datasets needed for efficient operation and maintenance management.			
2.4.3	Interactive Device Location and Visualization: a) **Automated Navigation**: ● Support navigation and allow zooming into different areas / sections/ zones for more details. A single floor / cross-sectional view shall also be available for monitoring. Relevant information shall be shown upon cursor hover action on the 3D model. ● A structured index menu listing floors, areas, and component types with a searching function shall be equipped for the digital twins to help user quickly retrieve desired information. b) **Data Visualization**: Customizable widget for dashboard - various types of customized widget shall be provided based on the data collected from different systems and other external links.	(M)		
2.4.4	Status Visualization of Assets and Devices: a) **Color-Coded Status Indicators**: Implement multiple color indications on the Digital Twin to depict the status of registered assets and devices (e.g., Normal, Fault, Offline). b) **Real-Time Status Monitoring**: Ensure real-time monitoring of all assets and devices (including CCTV, water leakage sensors etc.), with instant visual feedback on their operational status.	(M)		
2.4.5	Integrated Workflow and Data Management: a) **Data Synchronization and Management**: Ensure seamless synchronization of data across the Digital Twin and Smart FM System, enabling efficient and correct data management and accessibility.	(M)		
2.4.6	User Accessibility and Training: a) **User-Friendly Interface**: The platform should be intuitive and easy to navigate for all levels of users, from operational staff to management.	(M)		
2.4.7	Development and Implementation: The Tenderer shall provide the development and implementation work including but not limited to the following: a) Adopt open-source tools to implement the data platform and analytic modules which shall provide the flexibility including but not limited to configurable, scalable, and easy to carry out performance tuning.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	b) The Tenderer shall support the deployment of the platform on-premises or on their private cloud infrastructure. c) Customize system front-end design, dashboard UI/UX that shall be tailor-made for this project in accordance with the theme of the building and shall submit for approval before production. d) Provide methodology, verified procedure and operating manual for how to be importing data from BIM before PC.			
2.4.8	**Frequency of BIM model Updates:** During the Defects Liability Period (DLP), the BIM model will require regular updates to ensure it accurately reflects the current state of the building and its systems. The Tenderer is expected to provide updates to the BIM model at least once every month if required. These updates shall include any changes in the building layout, modifications in system configurations, and updates based on maintenance activities. The Tenderer must also outline a process for collecting, processing, and integrating this information into the BIM model.	(M)		
2.4.9	Shall there be any updated BIM model received from the Hospital within Defects Liability Period (DLP), the Tenderer should conduct As-built BIM Models auditing and update BIM data to the system.	(M)		
2.4.10	**BIM Model Audit:** Audits of the BIM model before any data integration are crucial to maintain its accuracy and relevance. The Tenderer shall provide the process of BIM model audits. The audits should assess the model's accuracy, completeness, and compliance with the AIR and latest building and system data. The Tenderer must provide audit reports outlining findings and any necessary corrective actions. These audits are critical for ensuring the long-term utility and integrity of the BIM model.	(M)		
2.4.11	The Tenderer shall define the BIM Auditing Methodology and conduct audits according to CIC Building Information Modelling Standards – General, Version 2.1-2023 (with Hong Kong Annex of ISO 19650-2 2018) – "Annex 2 BIM Audit Checklist" before BIM data integration. ➢ Audit report	(M)		
2.5	**<u>Mobile Application Support</u>**			
2.5.1	The Tenderer shall develop a mobile application that seamlessly integrates with the Smart FM system to streamline facilities management operations, ensuring real-time communication and workflow efficiency.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.5.2	a) Function Requirements The requirements shall include but are not limited to the following: a. Staff Interaction I Empower staff to report problems via the app, with options to scan RFID code for targeted reports or lodge general maintenance requests. II Allow for diverse request types, including regular maintenance or specific issues, with the ability to attach illustrative photos or documents. b. FM Team Capabilities I The FM team should be able to review reported issues, assign work orders, and monitor progress through the mobile application. II The application must provide a feature for scanning asset codes to access detailed asset information, including status, maintenance history etc. III The app should enable the FM team to manage technician rosters and track the distribution and status of work orders. c. Technician Utilities I Technicians must be able to receive and manage work orders, with options to shift orders as necessary. II The application should allow technicians to update the status of tasks, report on progress, and document completion of work orders. Technicians should have the ability to review the maintenance history for assets directly through the mobile app.	(M)		
2.5.3	b) Other Requirements a. User Interface: The mobile application should have an intuitive and user-friendly interface, suitable for staff, FM team members, and technicians. b. Data Integration: The app must integrate seamlessly with the smart FM system for real-time data exchange and updates. Connecting with existing FM systems using the Hospital's API Gateway. c. Security: The application must ensure data security and protect sensitive information in compliance with The Hospital's policy. d. Accessibility: The app should be accessible across various mobile devices and platforms, ensuring wide usability. e. Future Integration: The Tenderer shall develop an API for connection and data exchange with the app. The data to be exchanged shall be decided by the Hospital or the Hospital's representatives.	(M)		
2.6	**Delivery and Installation of Smart CCTV for FM**			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.6.1	The Tenderer shall provide installation of 30 sets Standalone Smart CCTV at the plantrooms (The actual location of delivery and installation is subject to the final confirmation by the Hospital). The Smart CCTV shall comply with the following integration requirement: ➢ Connection with As-Built BIM: Shall integration with As-Built BIM to visualize camera's location. ➢ Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. ➢ Device Types: CCTV cameras capable of wired/wireless connectivity, with Power over Ethernet (PoE) support. ➢ Data Capture: Video footage and motion detection alerts. ➢ Data Transmission Method: Support for both wired and wireless (PoE) transmission to ensure flexible and reliable connectivity.	(M)		
2.6.2	The Tenderer shall be responsible for supply and install the cable containment from the CCTV location inside the plant rooms to the designated trunking nearby, and the associated wiring/cabling and connection works from signal transmission to the ELV rooms on the floor.	(M)		
2.6.3	The Tenderer shall liaise closely with the Hospital for the arrangements for site access, safety, security, materials delivery, installation, waste disposal etc. and comply with any directions as may reasonably be given by the Hospital accordingly.	(M)		
2.6.4	The Tenderer shall submit all installation details to the Hospital for approval prior to installation work on site.	(M)		
2.6.5	The Tenderer shall be responsible for sealing and make good works to all wall, ceiling and/ or floor openings due to their installation after the installation of equipment.	(M)		
2.6.6	The Tenderer shall be responsible for ensuring that their installation shall comply with relevant regulations, guidelines, standards, etc.	(M)		
2.6.7	The Tenderer should strictly follow the house rules for delivery and installation arrangement issued by the Hospital for works within site boundary carried out by the successful tenderer or their contractors. Please refer to **Appendix 2** for the details of the house rules.	(M)		
2.6.8	The Tenderer shall follow the prevailing guidelines and policies of Kowloon Central Cluster (KCC) and New Acute Hospital (NAH) including but not limited to: ➢ Security control ➢ Occupational safety and health ➢ Infection control ➢ The aforementioned guidelines and policies will be provided to the successful tenderer upon the award of this contract.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.6.9	The Tenderer are strongly advised, prior to the submission of tender, to acquaint themselves with the condition of the site, equipment delivery route, site boundary, etc.	(M)		
2.6.10	The Tenderer shall submit the installation works plan detailing the expected period of installation and the stage of progress.	(M)		
2.6.11	The Successful Tenderer shall work out a mutually agreed schedule with the hospital for the delivery and installation of the equipment.	(M)		
2.6.12	The Successful Tenderer shall arrange insurance coverage they think right and appropriate to cover damages to the equipment during the period of delivery, storage, installation, testing and commissioning.	(M)		
2.6.13	The Successful Tenderer shall be responsible to clear away all packing materials, demolished and unused structural materials to a legal place after delivery / installation of the equipment at his own cost.	(M)		
2.6.14	The Successful Tenderer should note that they will be held responsible for any damage to hospital property as may be caused during equipment transportation and installation. All due measures should be taken by the successful Tenderer to protect such property.	(M)		
2.6.15	Should any temporary alterations or modifications of the Hospital Authority properties be required to facilitate the delivery, prior approval from the Hospital should be sought. It is the successful Tenderers' responsibility to restore all altered or modified structures to their original stages. These works shall be deemed to have been included and allowed for by the successful Tenderer in his returned tender sum.	(M)		
2.6.16	If due to tight schedule or other reasons that the hospital requires the Successful Tenderer to work at night time or some other specified time, the Successful Tenderer shall be prepared to do so at no additional cost.	(M)		
2.6.17	Work hours will be by the arrangement with the Hospital but it must be understood that noisy, excessive dirty work and inconvenience to the building users should be reduced to minimum. When dirty work is carried out the entire area adjacent to the site shall be left clean and suitable for hospital work. Utility services in the building shall not be interrupted.	(M)		
2.6.18	The Successful Tenderer shall submit detailed design requirements with shop drawings to the Hospital for the equipment installation.	(M)		
2.6.19	All building services works including conduits, junction boxes, cables and pipe works, etc. shall be concealed and no surface mounting will be permitted unless otherwise so agreed. These works shall be deemed to have been included and allowed for by the tenderer in the returned tender sum.	(M)		

<table>
<tr><th>Clause</th><th>Specification</th><th>M/D</th><th>Yes</th><th>No
(provide details)</th></tr>
<tr><td></td><td></td><td></td><td colspan="2">(Please tick as appropriate)</td></tr>
<tr><td>2.6.20</td><td>All materials and workmanship shall comply with latest editions of General Specification of Electrical Installation in Government Building of HKSAR, other relevant General Specification by Building Services Branch of Architectural Services Department (ArchSD), Code of Practice for Electricity (Wiring) Regulations by the Electrical & Mechanical Services Department and Supply Rules of the Electrical Supply Authority as relevant, and shall be approved by the Hospital prior to the installation.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>2.6.21</td><td>All builder’s works carried out by the Successful Tenderer and/ or its contractor shall meet the minimum standards set out in “General Specification for Building 2022 Edition” issued by ArchSD.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>2.6.22</td><td>All works shall comply with Building Ordinance Cap.123, Occupational Safety and Health Ordinance Cap.509 of Hong Kong Law and other related Legislations.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>2.6.23</td><td>The Hospital Authority has drawn up an infection control compliance checklist as a risk management programme for the Contractor to safeguard the safety and health of the Contractor. The Tenderer shall indicate in Schedule F their compliance of the infection control measures in this quotation.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>2.7</td><td><u>Modules and Functions</u></td><td></td><td></td><td></td></tr>
<tr><td>2.7.1</td><td>For the development and implementation of the system's modules and functions, the prioritization shall adhere to the structured sequence outlined in the table below.
<table>
<tr><th>Item</th><th>Name</th><th>Priority</th></tr>
<tr><td>1</td><td>Asset Management Module</td><td></td></tr>
<tr><td>1.1</td><td>Asset Tracking and Management</td><td>High</td></tr>
<tr><td>1.2</td><td>Smart Works Order Management</td><td>High</td></tr>
<tr><td>1.3</td><td>Inventory Management</td><td>High</td></tr>
<tr><td>1.4</td><td>Preventive Maintenance</td><td>High</td></tr>
<tr><td>1.5</td><td>Predictive Maintenance</td><td>High</td></tr>
<tr><td>1.6</td><td>Roster Management</td><td>Medium</td></tr>
<tr><td>1.7</td><td>Compliance and Regulation Management</td><td>Medium</td></tr>
<tr><td>2</td><td>Project Management Module</td><td></td></tr>
<tr><td>2.1</td><td>Project Management</td><td>Medium</td></tr>
<tr><td>2.2</td><td>Procurement Management</td><td>Medium</td></tr>
<tr><td>2.3</td><td>Budget Control and Management</td><td>Medium</td></tr>
<tr><td>2.4</td><td>Contract Management</td><td>Medium</td></tr>
<tr><td>3</td><td>Surveillance & Monitor Module</td><td></td></tr>
<tr><td>3.1</td><td>Standalone CCTV for FM</td><td>High</td></tr>
<tr><td>3.2</td><td>Integration with Construction Site Access Control</td><td>Mediu</td></tr>
</table></td><td>(M)</td><td></td><td></td></tr>
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<table>
<tr><th>Clause</th><th>Specification</th><th>M/D</th><th>Yes</th><th>No
(provide details)</th></tr>
<tr><td></td><td></td><td></td><td colspan="2">(Please tick as appropriate)</td></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>System</td><td>m</td></tr>
<tr><td>3.3</td><td>Technologies Adoption</td><td>Medium</td></tr>
<tr><td>3.4</td><td>Environmental Monitoring</td><td>High</td></tr>
<tr><td>4</td><td colspan="2">Energy & Sustainability Module</td></tr>
<tr><td>4.1</td><td>Energy Consumption Monitoring and Control</td><td>Medium</td></tr>
<tr><td>4.2</td><td>Sustainability and Green Initiatives</td><td>Medium</td></tr>
<tr><td>4.3</td><td>Waste Management</td><td>Medium</td></tr>
<tr><td>5</td><td colspan="2">Space Management Module</td></tr>
<tr><td>5.1</td><td>Tenant Management</td><td>Medium</td></tr>
<tr><td>5.2</td><td>Space Allocation & Occupancy Management</td><td>High</td></tr>
<tr><td>5.3</td><td>Smart System Integration</td><td>Medium</td></tr>
<tr><td>6</td><td colspan="2">Data Analysis Module</td></tr>
<tr><td>6.1</td><td>Data Collection and Analysis</td><td>High</td></tr>
<tr><td>6.2</td><td>Reporting and Dashboard Creation</td><td>High</td></tr>
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This table delineates the order in which each module and function will be developed, ensuring a systematic and efficient approach to deployment.
</td><td></td><td></td><td></td></tr>
<tr><td>2.7.2</td><td><u>Asset Management</u>
The Asset Management module offers robust tracking and management of assets. It integrates with BIM for spatial visualization and includes real-time tracking of movable assets, comprehensive lifecycle management, and detailed asset information management. This module streamlines maintenance processes and enhances overall asset utilization efficiency.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>2.7.3</td><td>a) Asset Tracking and Management
a. Integration Requirement
I Connection with As-Built BIM: Mandatory for facilitating asset tracking and enhancing spatial awareness within the BIM-FM system. BIM data should be in IFC format, and the equipment and asset data should include make, model, serial number, warranty information, maintenance records.
II Communication with legacy systems via CDE:
- CCMS: System to retrieve specific equipment data, including location, status, alerts, and signals.
- RTLS: Real-time tracking of movable assets, such as medical equipment, using QR codes or RFID tags.
III IoT Integration</td><td>(M)</td><td></td><td></td></tr>
</table>

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Device Types: Use of QR codes/tags for asset tracking, integrated with RTLS for location tracking and management. - Data Transmission: Real-time transmission of data via secured wireless networks to maintain current asset statuses. b. Asset Information Management This function enables real-time monitoring of asset data, management of specifications, records, and documents, and allows authorized users to modify asset details and generate reports. It also associates historical work orders with assets and creates unique QR codes for each major asset for easy onsite identification. I Use Cases - User shall be able to check the following information on the system or scan the RFID code of an asset (The proposed RFID setup from the Main Contractor shall refer to EMSD BIM-AM Standards and Guidelines Version 3.0): • Real-time data such as temperature, water air flow rate etc; • Specifications, manufacturer details, warranty information; • Maintenance record; • Attachments. - Authorized User shall be able to add / revise / delete asset by setting rules (which shall be configurable) • Asset shall be added by a form on the web portal, user will be able to input/select basic information of an asset, such as category, asset name, location, code ID, image, etc.; • Ability to import the technical specification, the information will be able to add or drop through editing function on the web portal or through excel form; • Enable to upload documents in .pdf /.doc / .docx / .xls / .xlsx / .jpg / .png format for as built 2D Layout Drawings, as-built 2D installation Drawings, Installation Tenderer Contact Information, Vendor Contact information, Product Catalogue /. Technical Specification, Final System Design Document, Configuration Manual, O&M manual, T&C Report, Other Certificates / Permits etc; • User shall be able to view, download, or update the attachments as necessary.			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- User shall be able to generate reports of existing list or based on asset information, such as a list of assets with upcoming warranty expirations or assets requiring maintenance. - Record the historical work orders that are generated in the Smart Work Order management functions and associated with the asset as the maintenance record of the asset. II Interface - The system displays a user-friendly interface with options to search and retrieve asset information. User shall be able to check the asset in the 3D model, or in a categorized list. - The system provide interactive dashboard, showing key asset metrics like total assets, asset conditions, and upcoming maintenance schedules. - Provide graph to display the selected assets performance, maintenance costs, and lifecycle analysis etc. for flexible analysis - Provide Alerts or notification panel for critical issues like asset failures or warranty expirations. c. Alerts and Notifications This function enables send alerts for potential issues, enabling proactive maintenance. I Use Cases - Generate alerts and notifications upon detecting early signs of equipment failure (configurable), to minimize breakdowns and downtime. Sensors installed on machinery shall continuously monitor performance, sending alerts when they detect potential issues (Issue specific type of work order) such as overheating or unusual vibrations. • This feature shall integrate with sensor, capture the required asset information. - Generate alerts for deviations in critical environmental conditions when monitoring. - Generate alerts when inventory levels of key items are low(configurable). - Generate alerts on abnormal energy usage for early intervention. d. Automated Work Order Registration Automatically generate work orders, notifying FM team			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	promptly. I Use Cases - Automate the scheduling of regular maintenance tasks and register maintenance-type work orders. E.g. The system automatically generates a monthly work order for HVAC system filters replacement in an office building. - Quickly address issues to minimize operational disruptions. E.g. An automated work order is generated immediately after a key piece of production machinery shows early signs of wear, ensuring rapid response and minimal production interruption. • Require transfer data to Smart Work Order Management Module, shall include 1.1 Equipment Identity 1.2. Location 1.3. Condition status (temperature too high) 1.4. Alert type 1.5. Time stamp			
2.7.4	b) Smart Work Order Management a. Integration Requirement I Communication with legacy systems via CDE: - Work orders shall be issued on the Smart FM platform, and after data synchronization to CDE, it is further synchronized to FMMS and CMMS. - EMSD's Work Order is issued from smart FM system than synchronize to CDE, then go to the EMSD through CCEP. - Transfer back to the FMMS and CMMS should include the following data: Manhour, b. Interface I Shall display the details of works order, including the following information: - Works order title - Works order description - Associated assets to the selected order - Time stamp - Location - Works order handling status - Assignees, Assigners II A dashboard view including the number of works order under different categories such as locations, systems, handling statuses or customized tags according to a configurable period of time. c. Work Order Registration This feature allows staff to submit maintenance requests	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	directly into the BIM-FM system. Users shall be able to detail the nature of the issue, specify the location, attach relevant images or documents, and assign a priority level. The system logs each request with a unique identifier for easy tracking and reference. I Use Cases - User shall be able to scan a RFID code of an asset to request a work order. - User shall be able to directly select the location, category, the malfunctioning asset in the system to report. - User shall be able to provide detailed descriptions of the issue, attach relevant images or files, and set a priority level (e.g., high priority for critical patient areas). - Automatic generation of a unique work order ID. d. Assignment This feature involves the allocation of work orders to the appropriate technicians. The system shall be configured to automatically assign tasks based on predefined criteria like skillset, availability, roster and location, or allow for manual assignment by facility managers. I Use Cases - Auto-assigning tasks based on predefined rules (location, roster etc.). - Manual assignment option for facility managers. - Alert technicians of new assignments. E.g. Send immediate notifications to technicians' mobile devices or workstations when they are assigned a new maintenance task, detailing the task, location, and expected completion time. - Integration with technicians' profiles detailing skills and current workload. e. Status Tracking This function provides real-time updates on the progress of each work order. It allows FM staff who reported the issue to track the work order's status as it moves from 'Assigned' to 'In Progress', and finally to 'Completed'. I Use Cases - Real-time status update capabilities. - Visibility of work order progress. - Automated notifications for status changes. - Record material cost, man hour, label hour. • Transfer material cost, man hour, label hour to FMMS before completion f. Communication			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	This feature facilitates direct communication between FM staff and the technicians. I Use Cases - In-built messaging platform within the BIM-FM system. - Alert system for notifying changes in work order status or scheduling. - Communication logs g. Feedback This feature offers an option for the users to provide feedback on the service received after work order completed. This feedback is valuable for continuous improvement of the maintenance services and for acknowledging the work of the technician. I Use Cases - FM staff shall be able to fill in a simple form with rating options or more detailed comments of the technicians and the works quality, attach files (MS office format / PDF) and photos. - Compile the feedback data to generate analytical reports(configurable) periodically. These reports shall be able to provide insights into service quality, technician performance, and areas for improvement.			
2.7.5	c) Inventory Management a. Stock Control This feature is to maintain optimal levels of various items, such as consumables (e.g., lightbulb, oven, fan etc.) I Use Cases - Continuously monitor and control inventory levels of consumables and spare parts for FM equipment. II Interface - A dashboard overview that visually represents the current stock levels of various items. - Color-coded for easy status recognition. - Detailed listings provide information on each item, including quantities, location, and usage rates. - Historical data analysis shall be available through graphs and charts, aiding in trend analysis and future needs prediction. - The system shall include customizable alerts for low stock levels, notifying relevant personnel through push notifications or emails.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	b. Reordering This function automates the replenishment of inventory by triggering orders in ERP when stock levels fall below predefined thresholds. I Integration Requirement - Integrate with ERP II Use Cases - Implement an automated reordering workflow that triggers procurement processes when inventory levels of critical items drop below predefined thresholds. III Interface - The interface shall allow setting and adjusting automated reordering thresholds, with options to define preferred vendors and quantities (depends on what will transfer to ERP). It shall offer a comprehensive view of all orders, including their statuses from ordering to receipt. - Show the historical data in list.			
2.7.6	d) Preventive Maintenance a. Scheduled Maintenance Planning This feature allows for the scheduling of regular maintenance activities based on time intervals or usage metrics (Configurable). It ensures that all critical systems and equipment receive timely attention, reducing the likelihood of breakdowns. I Use Cases - Auto-assigning tasks (Issue the specific type of work order) based on predefined rules. - Continuously monitor and update maintenance schedules for HVAC systems, electrical systems, and other critical infrastructure to ensure timely maintenance. II Interface - A clean, intuitive dashboard that provides a quick overview of ongoing, upcoming, and completed maintenance tasks. - Visualization tools like charts and graphs to represent data on maintenance schedules, technician workloads, and system performance. b. Routine Inspections This feature conducts regular inspections of the hospital's critical systems to identify potential issues before they lead to problems. I Use Cases	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Schedule and track regular inspections (Issue the specific type of work order) of building infrastructure such as plumbing and fire safety systems to ensure they meet safety and operational standards. c. Replacement of Parts This feature systematically notifies about the need for part replacements in the heating, ventilation, and air conditioning (HVAC) systems, ensuring the maintenance of optimal air quality and energy efficiency. I Use Cases - Track and manage the lifecycle of replaceable parts (Issue the specific type of work order) in critical systems, automatically scheduling replacement tasks before potential breakdowns. d. Record Keeping This feature aims to maintain detailed and auditable records of all FM-related maintenance activities, to ensure regulatory compliance and facilitate efficient operations. I Use Cases - Maintain detailed digital logs of all maintenance activities, including date, nature of the task, duration, personnel involved, and materials used, for compliance and operational analysis. II Interface - Comprehensive record-keeping capabilities for all maintenance activities. - Customizable reporting tools to generate reports for performance tracking, regulatory compliance, and audit purposes. e. Customized Maintenance Schedules I Use Cases - Create dynamic maintenance schedules that adapt to the actual condition and usage patterns of equipment, moving beyond fixed-interval maintenance. f. Alerts and Notifications This feature allows for sending alerts for potential issues, enabling proactive maintenance. I Use Cases - Automate the scheduling of regular maintenance tasks and register maintenance-type work orders. g. Automated Work Order Registration This feature allows for automatically generating work orders, notifying FM team promptly. I Use Cases			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Generating specific type of work orders for maintenance.			
2.7.7	e) Predictive Maintenance a. Data Analytics & AI Prediction This function predicts potential asset failures using historical and real-time data. It is crucial for anticipating maintenance needs. I Use Cases - Utilize AI algorithms and data analytics to analyze historical and real-time data, predicting potential asset failures before they occur. - Generate alerts and recommendations for preemptive maintenance actions based on predictive analysis. II Interface - A sophisticated analytics dashboard that displays predictive insights, trends, and potential failure points derived from AI algorithms. - Customizable data visualization tools for easy interpretation of complex datasets. - Advanced reporting tools to generate detailed reports on predictive maintenance activities, asset health, and performance trends. - Export options for reports to facilitate sharing and analysis. b. Conditional Monitoring This feature employs IoT sensors and devices to continuously track the health and performance of essential equipment. I Use Cases - Implement IoT sensors and devices to continuously monitor the condition of critical assets like HVAC systems, elevators, and electrical infrastructure. - Collect and analyze data on asset performance, wear and tear, and operational anomalies for early detection of issues. II Interface - A dedicated section for monitoring the real-time status of critical assets through IoT sensor data. - Visual indicators for asset health, including temperature, vibration, and other key performance metrics. c. Customized Maintenance Schedules I Use Cases	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Create dynamic maintenance schedules that adapt to the actual condition and usage patterns of equipment, moving beyond fixed-interval maintenance. d. Alerts and Notifications This feature allows for sending alerts for potential issues, enabling proactive maintenance. I Use Cases - Automate the scheduling of predictive maintenance tasks and register maintenance-type work orders. e. Automated Work Order Registration This feature allows for automatically generating work orders, notifying FM team promptly. I Use Cases - Generating specific type of work orders for maintenance. f) Roster Management a. Automated Shift Scheduling This feature automates the creation of shift schedules, considering technician's availability, qualifications, and workload to ensure fair and efficient allocation of shifts. I Use Cases - Automatically generate shift schedules based on technicians' availability, qualifications, and workload balance to ensure continuous coverage and operational efficiency. - Integrates technicians' rosters with the maintenance task schedule, ensuring that maintenance activities are planned in accordance with technicians' availability. II Interface - A user-friendly interface for creating and viewing shift schedules, with drag-and-drop functionality and easy editing features. b. Employee Availability Tracking This feature maintains a live record of staff availability, tracking various time-off requests to facilitate precise scheduling. I Use Cases - Tracks and records technicians' availability, including leave days, sick leaves, and other time-off requests, ensuring accurate and up-to-date scheduling. II Interface - Comprehensive technician profiles showing qualifications, availability, and historical scheduling data for informed decision-			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	making. c. Skill-Based Task Assignment This feature assigns tasks to technicians by matching job requirements with their verified skills and qualifications for efficient job allocation. I Use Cases - Aligns tasks with the appropriate technicians based on their specific skills, certifications, and experience, optimizing task execution and workforce utilization. d. Shift Swap and Adjustment This feature empowers technician to manage their shifts with a user-friendly system for requesting swaps or adjustments, subject to approval. I Use Cases - Allows technicians to request shift changes or swaps through the system, subject to managerial approval, enhancing flexibility and employee satisfaction. II Interface - Technician shall be able to select a on duty colleague with same required qualifications in a drop menu. - Technician shall be able to check colleague's current position. e. Overtime and Compliance Monitoring This feature ensures fair labor practices and policy compliance by overseeing work hours and managing overtime. I Use Cases - Monitors technician work hours to manage overtime, ensuring adherence to labor regulations and internal hospital policies. f. Reporting and Analytics This feature provides analytics and reporting tools for a data-driven approach to managing staff workload and operational efficiency. I Use Cases - Generates insightful reports on staffing patterns, workload distribution, and compliance, aiding in strategic planning and operational improvements. II Interface - Some interactive chart or graph, shall be able to select user, time period etc. g. Reporting and Analytics This feature allows for sending alerts for potential issues. I Use Cases - In the event of abnormal work hours, dispatch alerts to the FM team member. - Generates notifications if shift changes are			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	required. II Interface - Some interactive chart or graph, cshall be able to select user, time period etc.			
2.7.8	g) Compliance and Regulation Management a. Compliance Documentation This feature automatically stores essential compliance documents, ensuring adherence to industry standards and legal requirements. I Use Cases - Automatically store compliance-related e-copy documents for various standards (like WR2, FS251, etc.). Upon uploading the e-copies, the system shall be able to extract essential information, such as dates, location. II Interface - A robust document management system to store, categorize, and access compliance documents, including the ability to handle various file formats. b. Audit Trail This feature maintains a detailed record of all maintenance activities, providing a clear, chronological history for audit purposes. I Use Cases - Create and maintain a clear, chronological audit trail of all maintenance activities, including who performed the task, when, and what actions were taken. II Interface - A clear, user-friendly interface for viewing and managing the audit trail, with features like search, filter, and sort by date, activity, or personnel. c. Alerts and Notifications This feature allows for sending alerts for potential issues. I Use Cases - Dispatch notifications for documents nearing expiration or already expired.	(M)		
2.7.9	Project Management			
2.7.10	a) Integration Requirement a. Communication with legacy systems via CDE: I COPPE - Project Overview: funding application status, expenditure projection, work order information, overall cash flow status and projection (Required data visualization,	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	hyperlink to the detail page) - Keyword search for project/work order information - Project Execution Data: Detailed steps, timelines, and progress reports of ongoing II FMMS - Order Overview: order number, order status etc. Required data visualization and hyperlink to the detail page - Project Execution Data: Detailed steps, timelines, and progress reports of ongoing III ERP - Financial Data: Budgets, cost tracking, invoicing, and payment records for projects. Required data visualization and hyperlink to the detail page			
	b) Project Information Management a. Monitor project progress and status This feature allows for real-time tracking of overall project progress against planned timelines and milestones. I Use Cases - Continuously track and update the status of various projects, from initiation to completion, ensuring adherence to timelines and objectives. II Interface - An interactive dashboard displaying real-time project status, key milestones, and performance metrics. b. Task Tracking This feature allows for monitoring the status of individual tasks, including start and end dates, responsible parties, and completion status. I Use Cases - Monitor individual tasks within a project, including tracking progress. II Interface - Tools for tracking tasks, with features to filter and sort tasks by various parameters. c. Resources Management This feature provides efficient tracking of resources like personnel, equipment, and materials across different project activities. I Use Cases - Shall be able to check the usage of the resources, including personnel, equipment, and materials, across different projects. II Interface			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- An interface for showing the resources usage. d. Document and File Management This feature provides organized storage and easy retrieval of project documents, ensuring version control and data integrity. I Use Cases - Shall be able to upload, store, and manage all project-related documents and files in a central repository for easy access and version control. II Interface - An organized system for storing and managing project documents, with search, filter, and version control capabilities. e. Risk Management This feature allows for Identifying assessing, and mitigating of potential risks that could impact the project. I Use Cases - Identify potential project risks, automatically generate alerts or notifications to alert FM team. II Interface - An interface for showing the resources usage. f. Defects Management This feature allows for logging and tracking of project defects or issues and monitoring the resolution process to ensure quality control. I Use Cases - Identify and document defects or issues arising during the project and track the progress of their resolution. II Interface - Shall be a predefined form to record the defects. - Able to categorize and track defects, with updates on resolution status and timelines. g. Feedback Collection This feature shall be provided to collect evaluation data of vendor's performance. I Use Cases - evaluate vendor after tasks / projects completed. II Interface - Shall be a form with predefined criteria.			
2.7.11	c) Procurement Management a. Monitor project progress and status This feature allows for real-time tracking of overall project progress against planned timelines and milestones.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	I Use Cases - Continuously track and update the status of various projects, from initiation to completion. II Interface - An interactive dashboard displaying real-time project status.			
2.7.12	d) Budget Control and Management a. Expenditure Monitoring This feature allows for continuously tracking and comparing actual spending against allocated budgets for maintenance and facilities management activities. I Use Cases - Tracking and monitoring expenditures. II Interface - A chart or pie show expenditure data. - Detailed breakdown of expenditures by category, project, or department. b. Budget Display This feature provides a real-time visual representation of the budget, showing current expenditures, allocations, and remaining funds on a user-friendly dashboard. I Use Cases - Tracking and monitoring budget data. II Interface - A dynamic, user-friendly dashboard displaying key budget metrics, with options to drill down into detailed views. c. Financial Analysis This feature allows for generating in-depth financial reports, offering insights into spending patterns, budget utilization, and financial performance over time. I Use Cases - Generate detailed financial reports, including expenditure breakdowns, cost comparisons, and budget trends. - Analyze financial data to identify cost-saving opportunities and areas requiring budget adjustments. II Interface - Ability to generate and customize financial reports (charts, table) based on specific criteria or timeframes. - Export options for reports in various formats (e.g., PDF, Excel) for external review or audits.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.7.13	e) Contract Management a. Documentations and Audit This feature involves the systematic storage, organization, and management of all contract-related documents in a digital format. I Use Cases - Shall be able to upload and manage all contract-related documents including agreements, amendments, and termination notices in a centralized digital repository. - Track changes and revisions to contracts, providing a clear audit trail for each document. II Interface - A user-friendly interface for uploading, organizing, and accessing various contract-related documents. - Features like search, filter, and tag options to easily locate specific documents or contracts. b. Performance Monitoring This feature focuses on the tracking and assessment of Tenderers' performance against predefined criteria such as project timelines, budget adherence, and quality standards. I Use Cases - Continuously monitor the progress and status of Tenderers, including adherence to timelines, budget constraints, and quality standards. - Automatically generates alerts and notifications for potential issues, such as near timeline etc. II Interface - Interactive dashboards that display real-time progress of Tenderers against predefined milestones c. Contract Review This feature entails a thorough evaluation of a Tenderer's performance upon the completion of a project. I Use Cases - Conduct comprehensive assessments of Tenderers' performance upon project completion, considering factors like timeliness, budget adherence, quality of work, and compliance with specifications. II Interface - Interface for entering and viewing Tenderer performance reviews, including a rating system and space for detailed feedback. - Shall be able to assess the Tenderer by	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	predefined criteria.			
2.7.14	**Surveillance & Monitor**			
2.7.15	a) Standalone CCTV for FM (Mainly use PoE) (Optional)The Tenderer shall provide installation of 30 sets Standalone Smart CCTV at the plantrooms (The actual location of delivery and installation is subject to the final confirmation by the Hospital), including installation service. (incl. cable containment from the field devices to the nearest trunking). a. Integration Requirement I Connection with As-Built BIM: Shall integration with As-Built BIM to visualize camera's location. II Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. III IoT Integration - Device Types: CCTV cameras capable of wired/wireless connectivity, with Power over Ethernet (PoE) support. - Data Capture: Video footage and motion detection alerts. - Other features (optional): temperature detection, intercom, people counting) - Data Transmission Method: Support for both wired and wireless (PoE) transmission to ensure flexible and reliable connectivity. b. Centralized Control This feature allows the FM Team to oversee and manage CCTV operations from a single, centralized location, enabling control over cameras installed in specific areas like pump rooms and switch rooms. I Use Cases - Manage and oversee standalone CCTV systems installed in critical areas such as pump rooms, switch rooms, and other sensitive locations. II Interface - A user-friendly dashboard for overseeing all CCTV feeds, with easy navigation and control features. - Options to view multiple camera feeds simultaneously and select specific cameras for detailed monitoring. c. Real-Time Monitoring This feature enables monitoring of live video feeds from CCTV cameras for continuous surveillance, enhancing security and safety across critical areas. I Use Cases	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Enable continuous surveillance through CCTV cameras to monitor the safety and security of the facility. II Interface - Features for zoom, tilt, and pan controls to examine specific areas closely. d. Incident Response This feature allows for quickly respond to safety or security incidents identified through CCTV footage, facilitating immediate action. I Use Cases - Rapid response capabilities in case of safety incidents detected by the CCTV system. II Interface - Interface for logging incidents detected by CCTV, with details like time, location, and nature of the incident. e. Alerts and Notifications This feature supports receiving automated alerts for unusual activities or potential maintenance issues detected by the CCTV system. I Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues detected by the CCTV cameras. - Customizable alert thresholds based on different criteria (e.g., motion detection in restricted areas). II Interface - Customizable settings for alerts based on different parameters like motion detection, unauthorized access, etc. f. Automated Work Order Registration This feature enables the generation of work orders automatically when maintenance needs are identified by the CCTV system. I Use Cases - Automatically generate work orders when the system detects maintenance needs. II Data Transfer - Transfer data to Smart Work Order Management Module, should include 1.1 Equipment Identity 1.2. Location 1.3. Condition status (temperature too high) 1.4. Alert type 1.5. Time stamp			
2.7.16	b) Integration with Construction Site Access Control System a. Integration Requirement I Connection with As-Built BIM: Shall integration with As-Built BIM to allocate and visualize	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	location. II Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. III System Integration - Data Capture: 1. Entry and Exit Timestamps 2.Personnel Identification 3.Personnel Count 4.Working Hours 5.Access Patterns 6.Historical Access Data 7.Alerts and Notifications c. Personnel Tracking This feature enables the real-time monitoring of individuals entering and exiting the construction site, providing an accurate count of people present at any given time for safety and regulatory compliance. I Use Cases - Accurately monitor the entry and exit of workers and visitors to maintain a real-time count of individuals on the construction site. II Interface - A comprehensive dashboard displaying real-time data on personnel movements, working hours, and other relevant metrics. - Visualization tools like graphs or heat maps for easy understanding of data patterns. d. Working Hours Monitoring This feature automatically records the time each worker spends on-site, using their access control data. It's essential for calculating working hours and managing worker fatigue. I Use Cases - Automatically record and calculate the working hours of each worker based on their access control data. - Utilize this information for payroll processing and monitoring worker fatigue levels. e. Data Analytics for Workforce Management This feature utilizes access control data to conduct advanced analytics, helping in optimizing workforce allocation, predicting staffing needs, and enhancing overall operational efficiency. I Use Cases - Analyze access control data to optimize workforce allocation and scheduling. - Use analytics to forecast staffing needs and improve overall efficiency on the construction site. II Interface - Advanced analytics capabilities to process			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	and interpret large volumes of access control data. - Features to generate insights on workforce efficiency and site utilization based on historical data. f. Alerts and Notifications This feature captures and customizes alerts and notifications based on specific site requirements. This feature is vital for immediate response to security breaches, unusual access patterns, or compliance issues. I Use Cases - Generate automatic alerts for unusual access patterns or security breaches.			
2.7.17	c) Technologies Adoption c. Integration Requirement I System Integration: - The specification acknowledges the potential future integration of robotic technology as an optional enhancement. - The Tenderer is encouraged to keep the system adaptable and scalable to accommodate such future integrations.	(M)		
2.7.18	d) Environmental Monitoring a. Integration Requirement I Connection with Sensors: Shall integration with sensors to monitor and record environmental conditions like temperature, humidity, air quality etc. II Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. b. Temperature and Humidity Control This feature enables the real-time monitoring of temperature and humidity levels in sensitive areas like ICUs and labs to ensure patient comfort and protect equipment. I Use Cases - Automatically monitor and maintain optimal temperature and humidity levels in critical areas such as operating rooms, ICUs, and laboratories. - Implement adjustments in real-time to ensure a stable environment, critical for patient care and sensitive equipment operation. II Interface - Display real-time data on temperature, humidity, and air quality across required zones. - Utilize interactive charts and graphs for easy interpretation of environmental trends and	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	anomalies. c. Air Quality Tracking This feature enables the real-time monitoring of key air quality indicators such as CO2 levels and particulates, particularly in critical zones, to ensure a healthy indoor environment. I Use Cases - Continuously monitor indoor air quality parameters, including CO2 levels, particulate matter, and humidity, in various hospital zones. d. Alerts and Notifications This feature supports receiving automated alerts for unusual activities or potential maintenance issues detected by the system, enabling proactive measures. I Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues detected. - Customizable alert thresholds based on different criteria. II Interface - Customizable settings for alerts based on different parameters like motion detection, unauthorized access, etc. e. Automated Work Order Registration This feature allows for automatically generating work orders when the system identifies maintenance needs, notifying FM team promptly. I Use Cases - Automatically generate work orders when the system detects maintenance needs.			
2.7.19	**<u>Energy & Sustainability</u>**			
2.7.20	a) Energy Consumption Monitoring and Control a. Integration Requirement I Connection with existing legacy systems: Shall integration with BEMS, PQMS, EMDS, CCMS to track the energy usage through API. II Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. III IoT integration - Device Types: Sound pressure level meter, Vibration transducer, Differential pressure range, Lighting intensity (lux) meter, Flood/water detection sensor, IAQ senor (Temperature, RH, pm2.5, CO2, VOC, etc.), Motion detection sensor, smoke detector.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Data Transmission: Real-time transmission of data via secured wireless networks to monitor current energy statuses. b. Real-Time Monitoring This feature enables FM team to continuously track energy usage, providing immediate visibility into current consumption levels. I Use Cases - Continuously tracks and collects data on energy usage. II Interface - A dynamic, user-friendly dashboard displaying real-time energy usage, historical data, and trends. - Customizable widgets and graphs for different energy parameters and hospital sections. c. Efficiency Analysis This feature supports utilizing artificial intelligence to evaluate energy consumption patterns, identifying inefficiencies and suggesting optimization strategies. I Use Cases - Leverage AI algorithms to analyze complex energy usage patterns, identifying inefficiencies and areas for improvement. II Interface - A section dedicated to AI-driven efficiency analysis, showcasing insights, suggestions, and energy-saving opportunities. d. Alerts and Notifications This feature supports receiving automated alerts for unusual activities or potential maintenance issues detected by the system, enabling proactive measures. I Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues detected. - Customizable alert thresholds based on different criteria. II Interface - Customizable settings for alerts based on different parameters. e. Automated Work Order Registration This feature allows for automatically generating work orders when the system identifies maintenance needs, notifying FM team promptly. I Use Cases - Automatically generate work orders when the system detects maintenance needs.			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
2.7.21	b) Sustainability and Green Initiatives a. Sustainability Strategies This feature will gather and store data on resource usage (water, electricity, gas, paper) to inform and optimize sustainability efforts. I Use Cases - Systematically gather and store data on consumption of resources like water, electricity, gas, and paper within the hospital premises. - Use AI algorithms to analyze this data and provide optimized strategies for reducing consumption and waste. II Interface - A comprehensive dashboard displaying real-time data on resource consumption (water, electricity, gas, paper, etc.). - Visualization tools, such as graphs and charts, to illustrate trends and identify areas for improvement. - AI-powered tools for analyzing consumption data and suggesting strategies for resource optimization. - Ability to simulate the impact of potential sustainability strategies on resource usage and costs. b. Carbon Footprint Monitor This feature will track and analyze the hospital's carbon emissions, supports setting and tracking reduction targets in line with annual audit requirements. I Use Cases - Track the hospital's carbon footprint by monitoring emissions associated with energy consumption, waste production, and other relevant activities. Specifically for annual audit purposes, adhering to the Hospital Authority's (The Hospital) existing template and standards. II Interface - Generates automated reports for internal and audit purposes based on The Hospital's template.	(M)		
	c) Waste Management This feature will capture the required data from other supporting teams. I Use Cases			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Manual input required data, track the waste information. II Interface - Manual input data to a predefined template. - Generates automated reports for internal and audit purposes.			
2.7.22	**Space Management**			
2.7.23	a) Tenant Management a. Integration Requirement I BIM-based Visualization: The system will utilize BIM to provide detailed and accurate representations of the hospital space, including floor plans and 3D models. II Data Integration: Spatial data derived from BIM will be fully integrated into the Smart FM system via CDE, ensuring that all spatial information is up-to-date, centralized, and consistent. b. Tenant Management This feature enables FM team to manage tenants space utilization, focusing mainly on energy billing. I Use Cases - Monitor and manage energy consumption for tenant spaces, facilitating accurate billing. II Interface - A dedicated section for managing tenant space utilization. - A chart/ form display tenant energy usage.	(M)		
2.7.24	b) Space Allocation & Occupancy Management a. Space Allocation & Occupancy monitoring This feature enables FM team to manage and assign various areas, ensuring optimal use of spaces. I Use Cases - Visualize space occupancy condition with IoT integration such as motion detection sensor - Dynamically reassign and reconfigure spaces in response to changing hospital needs, such as expanding departments or temporary closures. II Interface - An intuitive, graphical interface for allocating and space.	(M)		
2.7.25	c) Smart Systems Integration a. Meeting / Quarter Room Booking System I Integration Requirement i. Connection with F&E system: Shall integration with F&E system through API, capture the data include but not limited to: - Room Usage Data	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Capacity and Attendance Information - Alerts and Notifications ii. Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. iii. Use Cases - Check the occupancy, booking status on a floor plan. - Check the rooms booking schedule on calendar. II Alerts and Notifications This feature enables FM team to receive automated alerts for unusual activities or potential maintenance issues sent by the system, enabling proactive measures. i. Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues detected. - Customizable alert thresholds based on different criteria (e.g., motion detection in restricted areas). III Automated Work Order Registration This feature allows for automatically generating work orders when the system identifies maintenance needs, notifying FM team promptly. i. Use Cases - Automatically generate work orders when the system detects maintenance needs(configurable). b. Smart Toilet Monitoring I Integration Requirement i. Connection with F&E system: Shall integration with F&E system through API, capture the data include but not limited to: - Occupancy status - Sensor data - Alerts and signals data ii. Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. iii. Use Cases - Check the real-time occupancy, sensor data. II Alerts and Notifications This feature enables FM team to receive automated alerts for unusual activities or potential maintenance issues sent by the system, enabling proactive measures. i. Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues detected.			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Customizable alert thresholds based on different criteria (e.g., motion detection in restricted areas). III Automated Work Order Registration This feature allows for automatically generating work orders when the system identifies maintenance needs, notifying FM team promptly. i. Use Cases - Automatically generate work orders when the system detects maintenance needs(configurable). c. Smart Parking I Integration Requirement i. Connection with systems: Shall integration with parking system and EV charging system through APIs, capture the data include but not limited to: - Occupancy status - Utilization - Alerts and signals data ii. Communication with BIM-FM systems via CDE: Communication with BIM-FM system through (CDE) for data consolidation. iii. Use Cases - Capture and show the real-time data. iv. Interface - An interactive map interface showing the layout of the parking area, including designated EV charging spots, with real-time status updates. II EV Charging Management and Monitoring This feature enables FM team to gather and analyze data on electricity consumption from EV charging stations to understand usage patterns and identify efficiency opportunities. i. Use Cases - Analyze power consumption data from EV charging stations to identify usage patterns, peak demand periods, and opportunities for energy optimization. ii. Interface - Tools to analyze power consumption, generate usage reports, and provide insights for decision-making and compliance reporting. III Alerts and Notifications This feature enables FM team to receive automated alerts for unusual activities or potential maintenance issues sent by the system, enabling proactive measures. i. Use Cases - Send automated alerts to the FM team in case of unusual activities or potential issues			

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	detected. - Customizable alert thresholds based on different criteria (e.g., motion detection in restricted areas). IV Automated Work Order Registration This feature allows for automatically generating work orders when the system identifies maintenance needs, notifying FM team promptly. ii. Use Cases - Automatically generate work orders when the system detects maintenance needs.			
2.7.26	**Data Analysis**			
2.7.27	a) Data Collection and Analysis a. Integration Requirement I Get Data From - API: Integration with existing systems, including CCMS, CMMS, FMMS , and COPPE etc. - BIM and IoT Device Integration: collect and consolidate data from Building Information Modeling (BIM) systems and a variety of Internet of Things (IoT) devices. II Data Type: shall include but not limited to - Energy usage, budget control, maintenance schedules, and more. - Detailed data on environmental parameters such as temperature, humidity, and equipment status, - … b. Real-Time Data Processing This feature is focused on analyzing data in real-time, identifying trends, anomalies, and potential issues. It is particularly crucial for monitoring and optimizing the performance of critical systems like HVAC and lighting within the hospital. I Use Cases - Process and analyze data in real-time to identify trends, detect anomalies, and pinpoint potential issues in critical hospital systems like HVAC and lighting. - Use analytics to optimize the performance and efficiency of these systems, contributing to cost savings. II Interface - A dashboard that provides real-time visualization of key data points like energy consumption, environmental conditions, and system performance.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	- Interactive tools for data analysis, such as graphs, heat maps, and trend lines. - Custom report generation tools to aid in decision-making and strategy development.			
2.7.28	b) Reporting and Dashboard Creation a. Customizable Dashboards This feature provides customizable dashboards that display key performance indicators. I Use Cases - Create and customize dashboards that display key performance indicators (KPIs) such as current energy consumption, pending maintenance tasks, completed repairs, and overall system health. II Interface - The dashboard should allow users to select, arrange, and display various data widgets and KPIs according to their specific needs. - Features to save multiple dashboard layouts for different purposes or users. b. Automated Reporting This feature supports generating automated reports that provide insights into the operational efficiency, energy consumption, and maintenance needs. I Use Cases - Automate the generation of reports, providing insights into operational efficiency, energy consumption, and maintenance needs. - Allow efficient and flexible summarizing, grouping, and reporting of data from space, building and corporate perspective. - Provide a wide range of options for users to customize their reports. The platform shall allow users to select the data they want to see and group it in a way that makes sense for their needs. Data shall be flexible to summarized for a specific space, group of space/space type, building, or corporate level, in figurative and graphical approach with self-defined period. - Default and customized template shall be allowed to facilitate future reuse of the reporting format. - Comparison of past years' performance and benchmark across different spaces, space type, building and comparison with the	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	KPI shall be allowed. - Batch PDF & Excel export shall be allowed to facilitate user official reporting. II Interface - Capability to automatically compile and generate reports at set intervals (daily, weekly, monthly) or on demand. - Option to customize the contents and format of these report.			
3	**Testing and Commissioning**			
3.1	During post-testing phase, the Tenderer shall document the testing process, user feedback, test outcomes, and any modifications made to the system following user feedback to ensure that the system meets the agreed-upon specifications. ➢ User Acceptance Test (UAT) report ➢ Stress Test ➢ Disaster Recovery Planning Test	(M)		
3.2	The Tenderer shall be responsible of all tests for installation and commissioning, and must provide the necessary personnel, equipment, and test instruments to meet tender requirements and gain approval from The Hospital and/or the Consultant.	(M)		
3.2	The Tenderer shall conduct security testing as part of the Security Risk Assess & Audit (SRAA) process, including a comprehensive remediation plan to address any identified security vulnerabilities.	(M)		
3.3	The Hospital and/or the Consultant reserve the right to inspect all works and require tests to be conducted in their presence. No covering of installations until inspection is certified as completed or permission is granted.	(M)		
3.4	The Tenderer shall inform Hospital IT via hospital department within 2 weeks after the tender awarded if network connection is required for the system implementation. This step is crucial for ensuring that the necessary network infrastructure is in place for the timely and effective installation of the system.	(M)		
3.5	The Hospital and/or the Consultant reserve the right to reject any defective or unsatisfactory material, apparatus, or equipment, requiring the Tenderer to repair, adjust, modify, or replace. Unrepairable items must be replaced at the Tenderer's expense.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
3.6	Testing and commissioning must adhere to the tender specifications and local codes of practice, authorities' requirements, and utilities' standards, unless otherwise permitted by the Hospital and/or the Consultant.	(M)		
3.7	The Tenderer must ensure sufficient time for inspection and/or testing, maintaining regular checks on equipment installed but not immediately commissioned.	(M)		
3.8	**Prototype Test** a) The Tenderer is tasked with ensuring the proposed system's viability through rigorous testing and commissioning, aiming for the The Hospital's and Consultant's satisfaction. b) Integration testing must be performed by the Tenderer to demonstrate that the installation meets all specification requirements and adheres to local statutory and safety regulations. c) The Tenderer is also required to prepare and submit test plans and schedules to the Hospital and/or the Consultant, who retain the authority to inspect the work and witness the tests. d) A testing plan and report must be provided, detailing the process and outcomes of the tests, with the the Hospital and/or the Consultant having the authority to demand repairs or replacements for any defective materials found. e) The equipment used for testing and commissioning must conform to the specifications and local standards unless an exception is granted by the Hospital and/or the Consultant.	(M)		
3.9	**Joint System Integration Test** a) Joint system integration tests must be conducted by the Tenderer to verify the compatibility of various systems. b) These integration tests should be scheduled to take place at least three months before the building's practical completion to ensure any issues can be addressed in a timely manner.	(M)		
3.10	**Testing and Commissioning Plan** a) The Tenderer must submit a comprehensive testing method and schedule for approval at least four weeks before testing commences. b) The Hospital and the Consultant should be provided the opportunity to witness all testing, with results documented as part of the formal acceptance of the system. c) Detailed testing and commissioning procedures must be outlined by the Tenderer, including a corrective plan for any failures, and all instruments used should have valid calibration certificates.	(M)		
3.11	**Test Equipment** a) The Tenderer is responsible for supplying and maintaining all instruments and equipment necessary for performance tests. b) All test instruments must be suitable for their intended purpose and accurate as per the specification requirements.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	c) A comprehensive list of all instruments and equipment intended for use, along with calibration details, must be submitted to the Hospital and/or the Consultant.			
3.12	**Personnel** a) Commissioning work must be conducted by qualified engineers, the Tenderer is responsible for submitting their CVs for approval. b) Specialized equipment commissioning shall be carried out by personnel approved by the equipment manufacturers and the Hospital. c) The Tenderer's commissioning engineer must oversee all commissioning work to ensure it meets the project's requirements.	(M)		
3.13	**Approval and Acceptance**			
3.13.1	Testing must be completed in accordance with the Specification and all relevant authorities' requirements, with the Tenderer providing proof of compliance if requested.	(M)		
3.13.2	A detailed test report, including assessments of hardware appearance and software functionality, must be provided for the Hospital's approval.	(M)		
3.13.3	Upon receiving commissioning reports, the Consultant will verify the results and authorize the Tenderer to proceed with system performance tests.	(M)		
3.13.4	The Tenderer must notify the Hospital and/or the Consultant at least seven days in advance of their intention to demonstrate and seek acceptance of any system or item.	(M)		
3.13.5	All acceptance tests must be witnessed by the the Hospital and/or the Consultant, and the Tenderer is responsible for arranging such inspections and tests with the relevant statutory authority.	(M)		
3.13.6	The Tenderer must make the necessary adjustments and preparations for the tests to be witnessed by the Hospital and/or the Consultant.	(M)		
3.14	**Test Certificates and Commissioning Records**			
3.14.1	Any issues identified during UAT or the final audit must be fully rectified by the Tenderer to the satisfaction of the Hospital.	(M)		
3.14.2	Upon completion of the Commissioning Work, the Tenderer shall submit all technical specifications, schedules, records, user manual and drawings as a complete package.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
3.14.3	A unique numbering system, agreed upon with the Hospital and/or the Consultant, must be used for all items included in the schedules.	(M)		
3.14.4	Complete data sets for all equipment and systems tested must be submitted in the agreed-upon format and paper size.	(M)		
3.14.5	After testing and commissioning, the Tenderer is required to perform system fine-tuning exercises to ensure the accuracy and reliability of the system within the Testing and Commissioning period.	(M)		
3.14.6	For the system handover, a series of final checks and adjustments are required, and all defects and outstanding items must be recorded for follow-up. Certification of practical completion shall only be granted after all system inspections, tests, and approvals have been satisfactorily completed, and all documentation has been received and approved.	(M)		
3.14.7	Following successful rectification of issues, if any, and approval of the final audit report, the Hospital and/or the Consultant will issue a formal acceptance of the system, signifying the completion of the project as per the agreed standards.	(M)		
4	**System Support and Maintenance**			
4.1	The Tenderer shall outline the maintenance schedule, including frequency and scope of routine checks and updates for the system.	(M)		
4.1.1	The Tenderer shall provide a detailed support plan with 24/7 local technical support with hotline service. Upon the notification by the Hospital of a defect (departure from performance specifications) in the operation of the system of part thereof, the Tenderer shall attend to the fault within 24 hours. This service shall include all necessary bug fixing, system repairs and adjustment to restore the system to its normal operational conditions in a time of no more than 2 calendar days. If such system maintenance is not completed at the end of normal working period, subject to the Hospital's agreement, the maintenance work will either be completed on next working day, or arrangement will be made for the Tenderer to carry on working until the maintenance task is completed.	(M)		
4.1.2	The Tenderer shall plan for periodic system upgrades to incorporate new technologies and features. The service upgrades may conduct at nighttime, or some other specified time confirmed by the Hospital, the Tenderer shall be prepared to do so at no additional cost.	(M)		
4.2	The Tenderer shall develop a Quality and Risk Management Plan detailing the approach to maintaining quality and managing potential risks throughout the project lifecycle.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
4.3	The Tenderer should provide at least one-year free warranty or Defects Liability Period (DLP) after handover of the Smart Facility Management System for both Site A and Site B of the NAH to the Hospital. In addition, the Tenderer should provide at least 1-month on-site support right after system deployment.	(M)		
5	**Post-Warranty Maintenance Services**			
5.1	The quotation also calls for the provision of 9-year post warranty maintenance services commencing from the expiry of the warranty period.	(M)		
6	**Training Requirement**			
6.1	The Tenderer is required to provide comprehensive training services, ensuring the Hospital's staff are well-versed in the System's hardware and software. Training scope and format will be solidified during the implementation phase	(M)		
6.2	All trainings, including visits to various sites, will be provided at no extra cost to the Hospital and/or the Consultant.	(M)		
6.3	**Training Program Strategy** a) A detailed training program will be supplied by the Tenderer and primarily conducted on the Hospital's premises. b) Off-site training specifics will be mutually agreed upon before implementation.	(M)		
6.4	**Resources for Training** a) The Tenderer is responsible for providing all necessary personnel, equipment, and materials for training unless otherwise directed. b) Training resources shall be available in both physical and digital formats.	(M)		
6.5	Training will be imparted to a minimum of three categories of staff for each group: IT Staff, Hospital Administrators and maintenance personnel, subject to final decision from the Hospital.	(M)		
6.6	Training sessions shall be scheduled in proximity to system commissioning and exclusively held within Hong Kong.	(M)		
6.7	**Customized Training Plan** a) A tailored training plan addressing the needs of each staff category will be developed in collaboration with the Hospital and/or the Consultant. b) Customized training will include a variety of methods such as classroom, computer-based, and video-based formats.	(M)		
6.8	The training shall cover a wide array of knowledge areas from system design to troubleshooting, ensuring trainees have an in-depth understanding of the system.	(M)		
6.9	Training facilities will be furnished by the Tenderer, encompassing standard and additional industry-specific training services.	(M)		
6.10	Trainee performance will be assessed post-training, with additional instruction provided as needed to ensure full system proficiency.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
6.11	Operational and technical training will be provided for efficient system use, covering administration, operation, and end-user interaction.	(M)		
6.12	The Tenderer shall commit to continuous enhancement and updates of training materials until project completion.	(M)		
6.13	Comprehensive training manuals and related documentation shall be provided by the Tenderer, encompassing system descriptions, operation guides, and maintenance protocols.	(M)		
6.14	All training documents shall be submitted for approval by the Hospital and/or the Consultant prior to course commencement, ensuring alignment with established manuals and operational practices.	(M)		
6.15	The Hospital shall have exclusive rights to replicate training materials for internal use, free of charge and without the need for prior authorization.	(M)		
6.16	Trainings shall be conducted in English and/or Cantonese, and materials shall be provided in the corresponding languages.	(M)		
7	**Staff Requirement**			
7.1	Team Composition: a) One (1) Project Manager: a. Must have a minimum of 15 years of experience in the AEC industry, preferably as an MEP engineer with a background in managing building operations/maintenance. b. Required to act as the main point of contact and communicate effectively at all levels in both English and Cantonese. c. The Project Manager is expected to be based in Hong Kong and will be responsible for total project management. b) One (1) System Architect: a. Should possess at least 10 years of IT experience with a proven record in designing and implementing complex IT systems. c) Senior Programmers (Minimum of 2): a. Each must have demonstrable experience in BIM and system integration, contributing to the technical execution of the project.	(M)		
7.2	One (1) BIM Team Leader: a. Minimum 5 years of experience in As-built BIM Project Management and BIM-AM system; b. Obtained CIC Certified BIM Manager (CCBM) professional qualification	(D)		
7.3	The proposed services team must include the above roles with the stipulated qualifications and experience. The team structure and individual responsibilities should be clearly outlined in an Organizational Chart (O-chart) provided by the Tenderer. This chart	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	should illustrate the hierarchy and reporting lines within the team, ensuring clarity of project management and operations.			
7.4	Tenderers are required to submit detailed information for each proposed team member, using the format specified in Schedule 6 " Experience and Qualification of Contractor Team" The submission should include relevant experience, particularly for projects of similar scope and complexity, to demonstrate the team's capability to execute the project successfully. Failure to meet these qualification and experience requirements for any proposed team member may result in the disqualification of the tender submission, as a complete and qualified services team is imperative for consideration.	(M)		
7.5	Project Manager Requirements: The Contractor shall provide a dedicated Project Manager (PM) who will be responsible for comprehensive project management services throughout the duration of the project, which include, but are not limited to, the following responsibilities: a) Serve as the single point of contact for the Hospital Authority (Employer) for all matters pertaining to the project. b) Lead coordination among diverse parties both within and external to Employer for the seamless execution of the project. c) Address and resolve project-related issues including conflict resolution, risk management, and crisis mitigation. d) Monitor the project's progress against the planned schedule and ensure compliance with all predefined requirements. e) Organize and facilitate meetings, prepare agendas, chair discussions, and document outcomes during the course of the project. f) Regularly report on project status, track and address outstanding items, propose solutions, and navigate through challenges. g) Participate in bi-weekly checkpoint reviews with the Employer representative to assess project advancement and resolve emergent issues. h) Execute any additional activities deemed necessary by Employer for the satisfactory completion of the project.	(M)		
7.6	Project Manager Approach: Tenderers are required to present a comprehensive project management strategy in Schedule 3, titled "Methodology and Technical Approach." This should encompass the project execution plan, addressing key aspects such as critical path analysis and version control. Additionally, it should detail resource contingency plans and outline provisions for rehearsal or demonstration site arrangements.	(M)		
8	**Other requirement**			
8.1	The Tenderer shall attend coordination meetings with the concerned parties relating to the project without additional charges	(M)		

<table>
<tr><th rowspan="2">Clause</th><th rowspan="2">Specification</th><th rowspan="2">M/D</th><th>Yes</th><th>No (provide details)</th></tr>
<tr><th colspan="2">(Please tick as appropriate)</th></tr>
<tr><td>8.2</td><td>The frequency of such meetings shall be bi-weekly or as per actual needs and requirement according to the project progress and needs</td><td>(M)</td><td></td><td></td></tr>
<tr><td>8.3</td><td>The eligible Contractor shall be experienced in this subject works with providing at least 2 similar projects job references for the past 5 years from the date of tender closing.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>8.4</td><td>Tenderers may be invited to meet the Hospital's representatives to present their proposals to evaluate their quality of service. Tenderers shall attend the presentation upon request.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>9</td><td>Tentative Payment Schedule</td><td></td><td></td><td></td></tr>
<tr><td>9.1</td><td>The Tenderer shall quote the cost include all the above required services. It is exclusive of levy on government charges /licensing.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>9.2</td><td>The quoted price shall only be paid in Hong Kong Dollars after the successful completion of all tasks for each Stage. The Hospital reserves the right to revise the payment schedule commensurate with the change in the actual progress of the construction. The tentative payment schedule projected according to the tentative work schedule is given below for reference:
<table>
<tr><td colspan="2">Upon completion of</td><td>Percentage of Total Fee (%)</td></tr>
<tr><td colspan="2">Stage I (Site B)</td><td>40%</td></tr>
<tr><td>(a)</td><td>Phase 1</td><td>7%</td></tr>
<tr><td>(b)</td><td>Phase 2</td><td>23%</td></tr>
<tr><td>(c)</td><td>Phase 3</td><td>10%</td></tr>
<tr><td colspan="2">Stage II (Site A)</td><td>40%</td></tr>
<tr><td>(a)</td><td>Phase 1</td><td>10%</td></tr>
<tr><td>(b)</td><td>Phase 2</td><td>20%</td></tr>
<tr><td>(c)</td><td>Phase 3</td><td>10%</td></tr>
<tr><td colspan="2">Stage III</td><td>10%</td></tr>
<tr><td colspan="2">Stage IV</td><td>10%</td></tr>
</table></td><td>(M)</td><td></td><td></td></tr>
<tr><td>10</td><td>IT Requirements</td><td></td><td></td><td></td></tr>
<tr><td>10.1</td><td>The Successful Tenderer shall follow the latest HA IT Security Requirements for Quotation /Tender Procurement of “non-IT” system / equipment with details in Appendix 3 of Tender Specification and the requirement is subjected to HOIT’s update.</td><td>(M)</td><td></td><td></td></tr>
<tr><td>10.2</td><td>The Successful Tenderer shall follow the latest “IT Local Area Network (LAN) Requirement” for the network setup as stated in Appendix 4 .</td><td>(M)</td><td></td><td></td></tr>
<tr><td>10.3</td><td>All conduits, cabling, trunking, ducting, switches, hubs necessary signal repeater / booster / amplifier, selection box, power supplies, power supply sockets, interface(s) adapters for the above networking and display, output units shall be supplied and</td><td>(M)</td><td></td><td></td></tr>
</table>

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	installed by the Tenderer for their proper functions.			
10.4	The supplier should contact Hospital IT via hospital department within 2 weeks after the tender awarded if network connection is required for the system implementation.	(M)		
10.5	The supplier shall submit network design on proposal of the network installation for each area used by the system as well as the network layout drawings with respect to trunking and ducting etc. for areas involved	(M)		
10.6	The supplier shall provide the necessary data ports to facilitate connections to the HA external network. The supplier shall also setup the external network for communications between components of the system if necessary.	(M)		
10.7	The supplier shall provide the information regarding the approximate number of power sockets and data ports required, with their proposed positions indicate on the floor plan for each site to support the functioning of the system.	(M)		
10.8	The device/ system should have the interfacing capability to connect and sending/receiving data with other HA or hospital's IT systems.	(M)		
10.8.1	All the data stored in the proposed system shall be owned by HA and hospital with unlimited access permission	(M)		
10.8.2	The Tenderer shall provide API for the proposed system that any connection and data transmission between the proposed system and HA or hospital systems must pass through the HA or Hospital API Gateway Server.	(M)		
10.8.3	The Tenderer shall design and develop common API call library that allows different systems with similar functions to access it. The detail design shall be discussed and agreed with HA and hospital IT.	(M)		
10.9	**Wireless Requirements**			
10.9.1	For installation of wireless devices/ system, the Successful Tenderer should follow HA MNI Wi-Fi connection as below: Terms for vendor system/ devices connecting to HA MNI Wi-Fi. 1. Devices should support IEEE802.11n (2.4GHz). 2. Devices should support IEEE802.11n/ac (5GHz) (Optional). 3. Dual-band (2.4GHz and 5GHz) IEEE 802.11a/b/g/n/ac (Optional) 4. Devices should support WPA2-PSK authentication with at least 20 characters. 5. Devices should support manual IP address input and DHCP. 6. Wi-Fi Protected Access version 2 (WPA2) with Protected Extensible Authentication Protocol (PEAP)	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	7. Automatic roaming across multiple access points without session drop for mobile devices 8. Anti-virus software with latest virus signatures installed for computing devices if applicable. 9. Data encryption software installed for storage in computer or computing devices For those proprietary devices / system which have designated protocol or hardware setup and cannot be applied to HA MNI Wi-Fi connection, the successful tenderer should follow the below Non HA MNI Wi-Fi connection guideline.			
10.9.2	Non HA MNI Wi-Fi Connection Guideline			
10.9.2.1	The service provider shall setup the Wi-Fi network in accordance with the wireless standards below: (i) IEEE802.11 g or n (2.4GHz), preferably IEEE802.11n (ii) IEEE802.11 a/n/ac (5GHz), preferably IEEE802.11ac (iii) EN60601-1-2 (optional for Access Points in non-Clinical areas)	(M)		
10.9.2.2	The service provider shall limit the radio emission power of the wireless network to the confined area only.	(M)		
10.9.2.3	The service provider shall turn on WPA2 for wireless security (optional for Public Wi-Fi networks).	(M)		
10.9.2.4	The service provider shall only use Channel 1 for IEEE 802.11g/n (2.4GHz) and Channel 165 for IEEE 802.11a/n/ac (5GHz). HA IT&HI DIV shall be contacted to discuss in details if other Channels are needed in the required area(s).	(M)		
10.9.2.5	Users of the wireless network should be reminded that they are at their own risk of protecting their data privacy and HA takes no responsibility. Once the non-corporate Wireless network is installed, kindly be reminded that the network must be registered through the Wireless Network registration form http://it.home/doc/HAHO-ITD-FM-N01-002.aspx	(M)		
10.10	**Hardware & Device Requirements**			
10.10.1	The system shall provide unique identifier for each device and asset information in digital form	(M)		
10.10.2	The console shall have mechanism to authorize and validate device integrity and status	(M)		
10.10.3	Changeable device's software configuration which is restricted to authorized entities only	(D)		
10.10.4	Support audit logging mechanism	(D)		
10.10.5	Enable idle session management	(D)		
10.10.6	Documentation for device specification and configuration	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
10.10.7	Data backup or recovery procedures	(M)		
10.10.8	Support the use of anti-malware software	(D)		
10.10.9	As the CDE will be provided by the Hospital, the hardware focus for the Tenderer shall be primarily on standalone smart CCTV as per clause 2.6 specified in this specification.	(M)		
10.10.10	The devices shall be compatible with the provided CDE	(M)		
10.10.11	Devices must meet the operational requirements of the Smart FM system, including real-time data capture and transmission capabilities	(M)		
10.10.12	Ensure that devices adhere to industry standards for connectivity, data transmission, and security	(M)		
10.10.13	Devices shall be durable, reliable, and suitable for the operational environment they will be deployed in	(M)		
10.10.14	Devices must seamlessly integrate with the overall Smart FM system, ensuring efficient data flow and system functionality.	(M)		
10.10.15	Compatibility with existing network infrastructure and software platforms is mandatory.	(M)		
10.11	**Network Security**			
10.11.1	Disable all unnecessary services and functionalities	(M)		
10.11.2	IoT network (including gateway) is assigned to an isolated network segment with restrictive access control	(M)		
10.11.3	For devices used within HA's premise, only connect to HA network via a HA managed endpoint as gateway; for vendor managed devices, only connect to External Network	(M)		
10.11.4	Support network communication technology and secure connectivity protocols according to HA standards	(M)		
10.11.5	For devices used in external site, do not require to connect to the Internet directly but via an IoT gateway	(D)		
10.11.6	Support secure device pairing mechanism and do not use non-authenticated procedures	(D)		
10.11.7	If higher security assurance of authenticity is required, the solution would validate each device with unique API token or TLS digital certificate	(D)		
10.11.8	Configure IoT devices to drop new incoming communication attempts and require them to initiate all communications	(D)		
10.11.9	Configure IoT devices, gateways, and applications to communicate with authorized service endpoints only	(D)		
10.11.10	The network must support high-speed data transfer rates, crucial for prompt alarm reporting, rapid report generation, and efficient	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	interaction between network devices.			
10.11.11	The network shall be capable of detecting and accommodating single or multiple failures in servers, network controllers, or firewalls.	(M)		
10.11.12	The network must have automatic reconfiguration capabilities to maintain operational efficiency in the event of such failures.	(M)		
10.12	**Vulnerability Management**			
10.12.1	Support software/firmware/security patch update capability	(M)		
10.12.2	Provide security patches to fix device vulnerabilities within reasonable timeframe by manufacturers	(M)		
10.12.3	There is vulnerability management and disclosure policy in place from manufacturer	(D)		
10.12.4	All software/firmware/security patch is signed or provided with checksum for validation	(D)		
10.12.5	Support mechanism to manage device firmware version and patch level, and detect non-compliance devices	(D)		
10.13	**Data Security and Privacy**			
10.13.1	Classify and document data collected, processed and stored within the system	(M)		
10.13.2	Minimize processing of confidential information at device level	(M)		
10.13.3	Minimize data retention period at device level	(M)		
10.13.4	Support encryption at rest and in transit when confidential information is involved	(M)		
10.13.5	Support data erasure when the device is factory reset or retired	(M)		
10.13.6	The system shall comply with applicable data privacy laws/regulations and collect, process, and store personally identifiable information (PII) and sensitive data only with explicit consent. User data shall be anonymized/pseudonymized when possible, and secure data sharing with third parties shall require explicit consent. All data transmitted over networks shall be encrypted using industry-standard protocols, and stored PII/sensitive data shall be encrypted at rest. Encryption keys shall be securely managed and rotated regularly.	(M)		
10.13.7	Regular automated backups shall be performed for all data, with secure off-site storage to ensure data integrity and availability. Backup procedures shall be documented and periodically tested.	(M)		
10.13.8	Access to the system and data shall be restricted based on roles/permissions, using strong authentication methods. Unauthorized access attempts shall be detected/prevented, and logs of user activities, system events, and security incidents shall be enervated/maintained. Incidents, breaches, or vulnerabilities shall be promptly reported, investigated, and remediated. Physical security measures, such as controlled access and surveillance, shall be implemented to protect system infrastructure.	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
10.14	**Authentication (Device and User Account)**			
10.14.1	Proper authentication and authorization mechanism between systems	(M)		
10.14.2	Support unique user identifier with password, device certification, etc. for basic authentication	(M)		
10.14.3	Support changing default password in initial setup	(M)		
10.14.4	On administrative console, no hardcoded account credential for support purpose	(M)		
10.14.5	For advanced authentication, support: - Unique and strong password complexity, or 2FA - Role-based access control - Account lockout or anti-brute force mechanism - Secured password recovery mechanism - Changing administrative account user name	(M)		
10.15	The proposed system shall have the workflow engine that allows department or team managers to define the sensor threshold or alert process automation workflow	(M)		
10.16	The Government Wide IoT Network (GWIN) will be provided by the hospital for the Lora WAN connection type sensors. Data retrieval from GWIN function shall be provided by the Tenderer at no additional cost	(M)		
10.17	The proposed system shall be installed on HA or cluster/hospital cloud system that is running on PaaS or IaaS, either on Red hat Openshift Kubernetes, Windows 2019 Standard or Red hat Linux 8.2. Final design approach shall be confirmed with HA and hospital IT.	(M)		
10.18	The proposed system shall have the user authentication function that shall integrate with either HA SAM3 system or Microsoft AD	(M)		
10.19	The proposed system shall have the following level of login user group permission but not limited to these, - Super administrator (full system access) - Administrator (admin functions without system configuration) - Manager (leader user functions without system administrative configuration) - Normal user (system login with assigned user functions) The final design shall be agreed with HA and hospital IT and users.	(M)		
10.20	**Software Requirement**			
10.20.1	a. Work Coordination and Approval I Pre-Work Approval: The Tenderer must obtain permission from the Hospital before initiating any work within the building. This is crucial to avoid disrupting the building's operations. II Alteration Rights: The Hospital reserves the right to modify work sequences and programs or to halt the works at any time if they are deemed to potentially interrupt building operations. b. Software and System Integration:	(M)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	I System Software Support: The software must support points/signal output from all systems within the project or as specified in the requirements. II Coordination with Other Tenderers: The Tenderer is advised to collaborate with other Tenderers to accurately verify and check the number of points for each system. This includes preparing a proposed point list for each system, revising it as necessary, and obtaining approval from the Hospital or their representatives before work begins. c. Compliance and Verification: I The number of required points is referenced in this specification for guidance only. The Tenderer is responsible for verifying the actual required number of points. II Regulatory Compliance: All works must fully comply with statutory obligations and regulations, including any amendments, as required by the authorities for safe and satisfactory standards of work.			
10.21	**System Speed and Response Time Requirement**			
10.21.1	Response time is the longest interval among the following: a. Change-of-Status Reporting: The time from an information point change-of-status in connected systems to the start of an uninterrupted report on a human-machine interface device. b. Command Execution: The time from an operator's command execution to the commencement of execution at the information point in the field. c. Event-Triggered Actions: The time from an event occurrence to the start of a pre-programmed sequence of actions (e.g. Event Response Program, generation of special reports, display of advisory text).	(D)		
10.21.2	b) System Response Time a. General Requirements: The digital platform must maintain a response time within specified limits under nominal load conditions. b. Load Capacity: Under a load of 100 messages per second across the system IIII Alarms: Response within 5.00 +/- 1 second. IVII Events: Response within 10.00 +/- 0.5 second.	(D)		
10.21.3	c) Alarm Response and Monitoring Refresh a. Alarm Display: Alarms triggered at the farthest location must be displayed on the web-based GUI within 5 seconds under normal monitoring. b. Monitoring Points Status Refresh: The time to refresh the status of all monitoring points on any system schematic display should be within 10 seconds.	(D)		
10.21.4	d) Time Performance a. Outstation Network Controllers: Response time not greater than 3 seconds, defined as the interval from requesting a graphic screen to its full display with updated parameters. b. Alarm Display Time: Actual generated alarms must be	(D)		

Clause	Specification	M/D	Yes	No (provide details)
			(Please tick as appropriate)	
	displayed at the central system within 2 seconds or less. c. Trends Analysis: The system should support trend analysis of 50 analog values within a 10-second sample interval for two weeks. d. Polling Interval: Each sensor's polling shall be between 500 milliseconds to 2 seconds, modifiable by operators. e. Data Update on Graphic Screens: Dynamic data on all graphic screens must be updated at least once every 10 seconds. f. Performance Calculation: The Tenderer must provide detailed calculations on system performance under worst-case conditions to demonstrate compliance with time performance requirements. This documentation is due within 6 months post-project completion.			

Appendix 1

Project Stages

Stage	Deliverables	Target completion (for reference only and subject to change)
I	**Development of Site B**	**June 2025**
	Phase 1 - User Requirements - User interviews and surveys documentation - Developed workflow based on user requirements - User needs and expectations report	Oct 2024
	Phase 2 - System Developments - Detailed system architecture and user interface design plan - Development of core system functionalities - Full-scale BIM-FM system development - Security and data protection protocols - Iterative review and feedback process	Apr 2025
	Phase 3 - UAT - UAT test cases and scenarios - UAT feedback and modification reports - System readiness confirmation	June 2025
II	**Development of Site A**	**Oct 2026**
	Phase 1 – Data Analysis & User Requirements - Data Analysis Report - User requirements session summaries - Site A-specific needs and goals documentation	Dec 2025
	Phase 2 - System Developments - Customized system design for Site A - Integration report of data analysis findings - Interoperability and update reports	Aug 2026
	Phase 3 - UAT - UAT test cases and scenarios - Final system tweaks and feedback implementation	Oct 2026
III	**Completion**	**Nov 2026**
	- Comprehensive training manuals and related documentation - Final system checks and adjustments - Operational handover documentation - Completion report and sign-off	Nov 2026
IV	**Maintenance (DLP)**	**Nov 2027**
	- Establishment of maintenance schedule and documentation of maintenance protocols - Setting up support and service agreements - Regular system updates and optimization - Responsive technical support - Periodic system performance reviews	Nov 2027