

# Terms of Reference (TOR)

## 1. Background

The Health Engineering Department (HED) under the Ministry of Health and Family Welfare plays a critical role in strengthening Bangladesh's healthcare system by planning, developing, and maintaining health infrastructure. HED ensures that healthcare facilities are equipped with modern infrastructure, medical equipment, and technical resources to deliver efficient and sustainable health services nationwide. To further digital transformation, HED intends to develop and deploy the following integrated digital system:

- 1. Infrastructure Monitoring & Management System (IMMS)** - This system will be a large-scale system that integrates with existing Contractor/License Management System, and newly developed Contract Management System (CMS) also for managing infrastructure repair and maintenance information's along with the various types of assets, monitoring dashboards, GIS-Portal, and GIS-based mapping, dynamic reporting, dynamic dashboards, mobile apps (iOS and Android), and analytics. The large-scale data integration and data entry work, for the types of assets will need to be ongoing for a longer period of time, and the software will require special security features to protect data, firewalls, application/system security and prevent hacking.
- 2. Contract Management System (CMS)** - This system shall have key features such as workflow automation, contract management lifecycle, supervision and real-time tracking of all maintenance work, document digitization and real-time monitoring and tracking, mobile apps (iOS and Android), and analytics. This module will integrate with the existing Contractor/License Management System module, and newly developed Infrastructure Monitoring & Management System (IMMS) module also for real-time monitoring and tracking, and the software will require special security features to protect data, firewalls, application/system security and prevent hacking.

These systems will provide a unified digital ecosystem to streamline infrastructure repair & maintenance work monitoring and contract lifecycle oversight. Together, the integrated system will enhance efficiency, transparency, accountability, and data-driven decision-making in HED's operations.

## 2. Objectives

The objective of this project is to design, develop, implement and maintain a robust, secure, and scalable web & apps based integrated core system for HED:

- **Infrastructure Monitoring & Management System (IMMS):** To monitor, track, and manage HED's nationwide health infrastructure projects repair & maintenance related information along with GIS Mapping.
- **Contract Management System (CMS):** To automate and track contract creation, approval, execution, payments, and dispute resolution.

Together, the integrated system will ensure future planning, transparency, timely project delivery, cost efficiency, and improved service delivery.

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### 3. Scope of Services

#### 3.1 Scope of work

The repair and maintenance work of more than 20,415 infrastructures, including about 16,278 under the Health Services Division of the Ministry of Health and Family Welfare and about 4,137 under the Medical Education and Family Welfare Division, is carried out by the Health Engineering Department (HED). Although the necessary construction, renovation, upgradation of all types of health infrastructure (excluding those under the Public Works Department) across the country and to keep them functional by regular maintenance works of all these infrastructures is implemented every year, various construction, reconstruction, upgrading, repair and renovation works are implemented under DPP and OP with the financial assistance of the government's development budget and donor agencies. The Health Engineering Department implements a budget of about 1500-2000 crore taka under the Annual Development Program every year, but no database related to the existing infrastructures, existing and ongoing contracts, or a database of repair and maintenance information has been prepared till date. As a result, complications are being created in formulating plans for the implementation of the necessary repair and renovation work of the existing infrastructures.

Therefore, an initiative has been taken to digitally store and use all the necessary information related to the buildings constructed by the Health Engineering Department, repair & maintenance of the buildings and all the information related to the existing & ongoing infrastructure in regular repair and renovation activities through the development of Infrastructure Monitoring and Management System (IMMS) and Contract Management System (CMS) software.

The selected vendor will be responsible for design, development, deployment, training, and maintenance of this integrated system. The scope includes but is not limited to:

- Development of web and mobile apps-based database management software (Infrastructure Monitoring & Management System) and store the collected data including the drawings and all the asset/equipment related data to each of the facilities, along with a database of all kinds of past and ongoing contracts (contract management system).
- Prepare an electronic geographical mapping of the health facilities using open-source based Geographical Information System (GIS) software.
- Prepare report on facilities repair and maintenance frequency of the infrastructure, asset/equipment's, repair and maintenance related alert or notifications based on those report recommendations through web & apps (both).
- Integration with HED's main website and other government internal and external systems (e.g., existing Contractor/License Management System, NID, payment gateways, etc.).
- Deployment in a secure government-approved hosting environment.
- Legacy data migration where applicable.
- Training and knowledge transfer to HED staff.
- Post-deployment support and maintenance support services for next two (02) years.

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## 3.2 Methodology

- HED official will provide all the list of infrastructure and its asset/equipment's repair & maintenance related information for Ward, Union, Upazila, District, and Division level of Bangladesh.
- HED official will provide relevant reports, documents and as-built-drawings, CAD file and others in software supported format like pdf, doc, image etc.
- Selected vendor will responsible to upload and mapping all the provided data with geographic maps (open-source).
- Selected vendor will responsible for design and develop overall system structure of GIS and MIS Database (for IMMS and CMS, both) with considering Coding/ID structure of administrative units, medical facilities, quarters, logistics, assets, equipment's etc.
- Selected vendor will responsible for design and integrate with existing contractor/license management system, NID Portal, Payment Gateways, main website and others for real-time tracking, monitoring, transparency, and reporting.

## 4. System Features and Modules

### 4.1 Infrastructure Monitoring & Management System (IMMS)

#### Administrative Core Modules and Features:

- (a) Central Assets Registry with Geolocation
- Asset Category Management (Buildings, Lifts, Sub-Stations, Generators, Medical Gas, Pump, Other Equipment, etc.)
  - Asset Profile (ID, Type, Location, Ownership, Condition)
  - GIS Coordinates Linking (Buildings)
  - Asset Lifecycle Tracking of Lifts, Sub-Stations, Generators, Pump, Other Equipment, etc. (Commissioning-Retirement)
  - Barcode/QR Code Tagging
- (b) Interactive GIS Mapping (Open-Source GIS)
- Layer-based Mapping (Buildings, Lifts, Sub-Stations, Generators, Pump, Other Equipment, etc.)
  - Zoom & Pan Features
  - Real-time Asset Status Visualization (Color-coded)
  - Overlay of Project Progress & Maintenance Activities
  - Search & Filter by Asset Type/Location
- (c) Real-time Project Monitoring (Gantt View)
- Project Plan Upload & Synchronization
  - Task Scheduling & Dependencies
  - Resource Allocation Tracking
  - Milestone & Deadline Alerts
  - Percentage Completion Indicators
- (d) Budget vs. Actual Cost Tracker
- Planned vs. Actual Cost Entry
  - Expenditure Categorization (Labor, Materials, Equipment)
  - Graphical Charts for Cost Comparison
  - Forecasting & Variance Analysis
  - Budget Overrun Alerts

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- (e) Document & Drawing Repository
  - Upload/Download (PDF, DWG, DOCX, XLSX)
  - Version Control & Revision History
  - Tagging & Categorization (Project, Asset, Contractor)
  - Access Control & Permission Settings

- (f) Automated Progress Alerts
  - Email/SMS Notifications for Deadlines
  - Project Delay Alerts
  - Contractual Obligation Reminders
  - Budget Overrun Warnings

- (g) Maintenance History Tracking
  - Preventive & Corrective Maintenance Logs
  - Technician Assignment
  - Spare Parts Usage Tracking
  - Maintenance Scheduling & Reminders
  - Cost & Duration Analysis

#### UI Core Modules and Features:

- (h) Asset Entry & View Page
  - Form-based Asset Entry (Type, Location, ID, Condition, Ownership, etc.)
  - Bulk Upload via Excel/CSV
  - Asset Search & Filter
  - QR/Barcode Association
  - Detailed Asset View with Lifecycle Status

- (i) GIS Map Interface
  - Interactive Map with Zoom & Pan
  - Filter by Asset Type, Status, Region
  - Click-to-View Asset Details

- (j) Project Monitoring Dashboard
  - Real-time Gantt Chart with Tasks & Dependencies
  - Progress Indicators (% completion)
  - Project KPIs (Cost, Time, Resources)
  - Milestone Alerts & Notifications
  - Comparison: Planned vs. Actual Timeline

- (k) Budget/Cost Comparison View
  - Graphical Cost Breakdown (Labor, Materials, Equipment)
  - Budget Variance Indicators
  - Drill-down into Expense Categories
  - Forecasting Graphs
  - Overrun Alerts Display

- (l) Document Repository Panel
  - Drag-and-Drop Upload
  - File Preview (PDF, Images)
  - Search by Tag/Category
  - Version Control with History
  - Role-based Access Permissions

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- (m) Maintenance Logs View
  - Chronological Maintenance Records
  - Search by Asset/Technician
  - Filter by Preventive/Corrective Maintenance
  - Associated Cost & Parts Used
  - Export Maintenance Log to Excel/PDF

**Reports Core Modules and Features:**

- (n) Asset Inventory Report
  - List of all assets with ID, type, location, ownership, and status
  - Condition-based categorization (Good, Requires Maintenance, Critical)
  - Filtering by asset type, location, department, or condition
  - Exportable formats (Excel, PDF, CSV)
  - Graphical summaries (Pie chart of asset distribution, Bar chart by condition)
  
- (o) Project Progress Reports
  - Daily, weekly, and monthly project progress summaries
  - Milestone completion tracking with delays highlighted
  - Planned vs. Actual timeline comparisons
  - Contractor-wise performance details
  - Exportable project status dashboards (Excel/PDF with visuals)
  
- (p) Budget Utilization Summary
  - Planned vs. Actual expenditure breakdown
  - Expense categorization (Labor, Materials, Equipment, Miscellaneous)
  - Variance analysis (positive/negative deviations)
  - Forecasted vs. real-time spending projections
  - Overrun alert highlights within report tables
  
- (q) Maintenance History Report
  - Preventive and corrective maintenance history by asset
  - Technician-wise maintenance logs
  - Spare parts usage with cost impact
  - Asset downtime tracking with duration analysis
  - Exportable logs for audits (Excel/PDF)

**4.2 Contract Management System (CMS)**

**Administrative Core Modules Features:**

- (a) Work Log Mapping (Property/Building)
  - Project/Building Selection
  - Daily Work Log Entry
  - Resource & Manpower Allocation
  - Progress Photos Upload
  - Work Progress/Completion Status
  
- (b) Tender Management and Direct Contract Assignments
  - Tendering (Bid Submission list upload, Evaluation status upload)
  - Direct Contract Assignment (Shortlisting Upload, Approval Upload)
  - Tender Evaluation Result Upload
  - Contract Signing (NOA/Agreement Upload)

- (c) Work Orders & Contract Documents
  - Work Order Templates
  - Upload Contract Fields (Contractor, Project, Timeline)
  - Download & Print Options
- (d) Visual Progress Tracker with Milestones
  - Timeline View of Contract Milestones
  - Progress Indicators (% completion)
  - Delay Highlighting
  - Comparison of Planned vs. Actual Progress
- (e) Role-based Payment Approval Workflow
  - Payment Request Submission by Contractor
  - Multi-level Approval (Engineer-Accounts-Admin)
  - Partial/Final Payment Release
  - Audit Log of Payment Approvals
- (f) Contract Expiry Alerts & Renewals
  - Contract Expiry Tracking
  - Automated Renewal Reminders
  - Renewal Approval Workflow
  - Archived Expired Contracts
- (g) Dispute & Penalty Tracker
  - Dispute Logging (Issue, Date, Evidence)
  - Penalty Assignment (Financial, Performance-based)
  - Dispute Resolution Tracking
  - Blacklist Flagging if Necessary

**UI Core Modules and Features:**

- (i) Contractor Assignment Interface
  - Search & Select Contractor by Criteria
  - View Contractor Profile & Past Performance (upon integration with CMS)
  - Assign Contractor to Project/Work
  - Approval Workflow for Assignment
  - Assignment Notification to Contractor
- (j) Work Order Generation Page
  - Auto-fill Contract Details (Contractor, Project, Dates)
  - Download & Print Options
  - Work Order Status Tracking
  - Amendment & Revision History
- (k) Progress Tracker Dashboard
  - Milestone Completion Indicators
  - Visual Timeline with Status Bars
  - Delay & Overdue Highlighting
  - Photo/Video Progress Uploads
  - Comparison of Planned vs. Actual Progress
- (l) Payment Approval Panel
  - Contractor Payment Request Submission
  - Role-based Approval Chain (Engineer-Finance-Admin)
  - Partial & Final Payment Release
  - Automated Invoice Generation
  - Audit Log of All Approvals

TOR-Final - 15.12.2025 Latest 15.12.25 6 15.12.25

- (m) Contract Expiry Notifications
- List of Contracts Nearing Expiry
  - Renewal Reminder Alerts
  - Renewal Request Submission
  - Auto-archiving of Expired Contracts
  - Export Contract Expiry Data

- (n) Dispute Tracker Dashboard
- Log New Dispute with Evidence Upload
  - Dispute Category (Financial, Quality, Delay)
  - Resolution Progress Tracking
  - Penalty Assignment & Monitoring
  - Blacklist Recommendation Trigger

### Reports Core Modules and Features:

- (o) Work Order Summary
- List of all work orders with ID, contractor, and project details
  - Status tracking (Active, Completed, Cancelled)
  - Work order revision and amendment logs
  - Exportable summary (Excel/PDF)
  - Graphical breakdown by project type or contractor
- (p) Progress Milestone Reports
- Milestone completion status (On-time, Delayed, Pending)
  - Planned vs. Achieved comparison with variance indicators
  - Contractor-wise milestone completion rates
  - Exportable stakeholder reports (Excel/PDF with charts)
  - Timeline view of milestones
- (q) Pending Payments Report
- List of all pending payment requests
  - Contractor-wise payment amounts and timelines
  - Workflow status (Requested, Approved, Pending Approval, Released)
  - Overdue payment alerts and highlighting
  - Exportable PDF/Excel reports for finance teams
- (r) Dispute & Penalty Report
- Active and closed disputes with contractor and project details
  - Penalty types (Financial, Performance-based, Time delay)
  - Resolution status and timeline tracking
  - Exportable dispute summaries for audits
  - Graphical analysis of disputes by type/reason

## 5. Functional and Non-Functional Requirements

The integrated system must cover functional requirements such as registration, monitoring, contract tracking, document management, reporting, alerts, and notifications. Non-functional requirements include system scalability, 99.5% uptime, strong data security, mobile responsiveness, user-friendly UI/UX, compliance with data protection laws, and support for multi-language (including Bangla).

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## 6. Security, Integration & Hosting Requirements

- Integration with NID database for verification and with existing contractor/license management system for real-time tracking, monitoring, transparency, SMS/Email gateway for OTP and notifications, and Payment Gateway for fees.
- Secure hosting at National Data Center (BDC/approved).
- Compliance with GoB security, privacy, and IT audit standards.
- Strong encryption, role-based access control, and audit trail logging.

## 7. Deliverables & Timeline

Key Deliverables:

- Project Inception Report
- System Requirement Specification (SRS)
- System Design & Documents (SDD)
- Development & Testing Reports
- Training & Documentation
- Deployment & Go-Live
- Maintenance & Support

Tentative Timeline: 28 months (4 months development + 24 months support & maintenance).

## 8. Business Continuity Plan

The firm should submit a business continuity plan for the system. It should cover functions of the business, identify which systems and processes must be sustained, and details how to maintain them. It should consider any possible business disruption, cyberattacks, pandemics, natural disasters and human error.

## 9. Documentation Plan

The firm needs to submit a proper documentation (Both Technical and operational) plan when handing over the system. The technical and user manuals must be added in the plan in details.

## 10. Standard, tools and Technologies to be used

All the standard technology automation tools such as IDE, version control, project management, DevOps, and CI/CD tools should be used in the project development. Recommended tools

Purpose	Used Technology/Tools	Justification for use
Front End & Technologies	HTML, CSS, AJAX, JavaScript, Angular 15, Bootstrap, Leaflet.js, Chart.js, GeoServer, Mapbox, OSM tiles	Standard technology which is fit for this project
Backend	Java	Widely used Scripting language which is fit for Knowledge and learning platform development
Database	Oracle/Mysql/PostgreSQL / PostGIS/ MongoDB	Relational database management system
Mobile Apps	Flutter	Cross Platform support
Framework	Spring Boot	Spring Boot is an open-source Java-based

		framework used to create a micro-Service.
Production Server OS	Linux	Open-Source operating system
Version Control	Github	Git is widely used for version controlling
UI Design	Figma, Draw io	Up to date UI modern design tool
System Requirement Specification	MS Visio, UML, MS Office	To draw Use case, business flow and UI prototype diagrams
System Design	MS Visio, UML	To draw different UML, workflow and Architectural diagrams
Browser	Safari, Mozilla, Chrome etc.	Based on system preference for better uses experience
API/Web Services	Rest API, JSON	To communicate between Presentation and Service layer and with external APIs/Application
Documentation	MS Word, PowerPoint	Widely used
Helpdesk/Support	Teams, Email, Phone	Widely used
Reporting	Html and Charts, Jasper Reports	Free and Open Source
Communication	Email, Teams, WhatsApp	Widely used

## 11. Legacy Data Enrolment

To facilitate a seamless transition to the new Infrastructure Monitoring & Management System (IMMS) and Contract Management System (CMS), the enrollment of legacy data is a critical step. This process involves integrating existing contractor records into the IMMS and CMS database, ensuring data integrity, accuracy, and security. The legacy data enrollment includes:

- Data Migration: The systematic transfer of historical data into the IMMS and CMS.
- Data Validation: Ensuring the accuracy and consistency of imported data.
- Data Security: Implementing encryption and access control to protect sensitive information.

This process will follow a structured approach with testing and verification phases to ensure that all legacy data is accurately represented and accessible in the IMMS and CMS.

## 12. Support Service Plan

After the successful deployment of the IMMS and CMS a structured support service plan will be put in place to ensure the system's continuous smooth operation. The plan includes:

- Incident Management: A support team will be available to address any technical issues or disruptions.
- User Support: Assistance provided to end-users through a dedicated helpdesk for addressing operational questions.
- System Monitoring: Regular monitoring to detect and address potential issues proactively.

- **Scheduled Maintenance:** Routine maintenance and updates to enhance performance and security.

The vendor will provide 2 years of maintenance support, included in the proposal's pricing. This extended support includes any necessary system optimizations, troubleshooting, and enhancements as per the agreed maintenance plan.

## 13. Quality Assurance and IT audit requirement

### 13.1 Quality Assurance Requirements

The IMMS and CMS for HED requires comprehensive Quality Assurance processes to ensure that it meets functional, performance, security, and usability standards. The selected vendor must incorporate the following QA activities:

- **Quality Planning:**
  - Develop a QA management plan outlining the objectives, resources, and processes needed to ensure quality throughout the project lifecycle.
  - Define clear standards and metrics for each stage of development, including design, coding, and deployment.
- **Functional Testing:**
  - Verify that all modules (e.g., user registration, license renewal, document verification) function as specified.
  - conduct end-to-end testing of workflows from contractor registration to license renewal and blacklist management.
- **Performance Testing:**
  - Assess system performance under various loads, ensuring it can handle at least 10,000 concurrent users.
  - Load and stress testing should evaluate response times, reliability, and system scalability.
- **Security Testing:**
  - Conduct penetration testing to identify vulnerabilities, focusing on secure data handling and protection against unauthorized access.
  - Implement tests for NID and OTP integrations to prevent misuse and ensure data confidentiality.
  - Verify encryption protocols and access control mechanisms to secure user data and system transactions.
- **Usability Testing:**
  - Ensure the system is user-friendly for contractors and administrators, especially for mobile access.
  - Conduct user experience tests with potential end-users to validate ease of navigation, accessibility, and responsiveness.
- **Compatibility Testing:**
  - Verify compatibility across various devices, operating systems, and browsers.
  - Ensure that the mobile-responsive design performs well on different screen sizes.

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- **Regression Testing:**
  - After updates or fixes, ensure new code does not negatively impact existing functionalities.
  - Implement automated regression tests for continuous quality control.
- **User Acceptance Testing (UAT):**
  - Conduct UAT sessions with HED representatives to ensure that the system meets business and operational requirements.
  - Address all feedback and finalize adjustments before deployment.

## 13.2 IT Audit Requirements

To maintain system integrity and compliance with IT standards, the IMMS and CMS must undergo regular IT audits. Key audit requirements include:

- **Audit Scope:**
  - **System Functionality:** Verify that all functional requirements, including document verification and blacklisting, are implemented as per specifications.
  - **Security and Compliance:** Confirm adherence to national security policies and compliance with data privacy regulations.
  - **Data Integrity and Confidentiality:** Review data handling processes for contractor records, focusing on access control, encryption, and backup processes.
  - **System Integration:** Audit integration with external services, such as NID verification and OTP systems, to ensure secure and reliable data exchange.
- **IT Controls Assessment:**
  - **Access Control:** Review user role management, authentication, and authorization processes.
  - **Incident Management:** Ensure incident logging, monitoring, and response mechanisms are in place for security and operational incidents.
  - **Audit Trails:** Maintain logs of all system activities, including user actions, document uploads, and blacklist changes, to support traceability and accountability.
- **System Reliability and Availability:**
  - Verify high availability and backup solutions to minimize system downtime.
  - Audit disaster recovery plans, ensuring there are procedures for data recovery in case of system failures.
- **IT Documentation:**
  - Review technical documentation, including system architecture, codebase documentation, and user manuals.
  - Ensure all documentation is up-to-date and accurately reflects the current system configuration.

### 13.3 Reporting and Compliance

- **Audit and QA Reports:** Deliver detailed reports for each QA and IT audit phase, including issues found, recommendations, and action plans for compliance.
- **Compliance Tracking:** Implement a tracking system for corrective actions from audits, ensuring timely resolution of identified issues.
- **Annual IT Audit:** Plan for annual audits to assess ongoing compliance, system integrity, and opportunities for improvement.

### 14. Critical components in delivering the services

The firm should identify the critical components in delivering the services and propose the appropriate measures on how they want to address those issues.

### 15. Development & Approach Methodology

The development of the IMMS and CMS will follow a Hybrid methodology (combining Agile and Waterfall), emphasizing iterative progress, client collaboration, and flexibility in meeting evolving requirements. This approach allows for frequent feedback loops, ensuring that each phase aligns closely with HED's specific needs.

Initially, a comprehensive Requirement Analysis will be conducted, followed by System Design to define the architecture, data flow, and integration points. During development, UI/UX Design will prioritize user accessibility, particularly for mobile users, while the Backend and Frontend Development phases will establish robust, secure workflows and a seamless user experience. Deployment will include final acceptance testing, training, and documentation for HED staff to ensure a smooth transition. This iterative, collaborative process ensures that the IMMS and CMS is tailored to HED's requirements while maintaining the flexibility to adapt as the project evolves.

#### 15.1. Development & Implementation Methodology

The Infrastructure Monitoring & Management System (IMMS) and Contract Management System (CMS) will be developed and implemented using a Hybrid methodology, which allows for flexibility, iterative improvements, and close alignment with HED's requirements. In the initial phase, a thorough requirement gathering and analysis process will be conducted, ensuring the project scope aligns with HED's goals.

#### 15.2. System Design & Development Plan

The System Design & Development Plan is structured into key phases:

1. **Requirement Analysis:** Conducting in-depth analysis sessions to document HED's needs and expectations. This phase will confirm the specifications for core functionalities, such as user registration, document verification, and the blacklist feature.
2. **System Architecture Design:** Developing a scalable architecture that accommodates HED's requirements. The architecture will be modular, with each module designed for easy integration and scalability. Security

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will be built into the design, incorporating NID verification, OTP, and encryption mechanisms.

3. **Database Design:** Establishing a secure, normalized database structure to handle large volumes of contractor data, ensuring efficient data retrieval and compliance with security protocols.
4. **UI/UX Design:** Designing a user-friendly interface that is intuitive and optimized for both contractors and administrators. Prototyping will allow early visualization and feedback on the interface.
5. **Development Phases:** Development will be divided into backend and frontend phases, with an initial focus on core functionalities. APIs will be developed for NID verification, OTP services, and integration with HED's existing contractor/license management system, along with main website. Subject to the availability of third-party APIs, the selected vendor will integrate them with the developed solution.
6. **Deployment:** Deploying the IMMS and CMS in a staging environment for testing and client reviews, followed by a production environment once UAT is completed.

### 15.3 Testing Plan

A comprehensive Testing Plan is vital to validate IMMS and CMS functionality, security, and user experience. This plan includes the following types of testing:

1. **Unit Testing:** Each module will be tested independently to ensure they work correctly in isolation. This includes testing specific functions within the registration, verification, and blacklist modules.
2. **Integration Testing:** Ensuring that all modules integrate seamlessly, especially where external and internal systems like NID verification, OTP and existing contractor/license management system are involved. APIs will be tested to confirm data flow accuracy and reliability.
3. **System Testing:** Conducted to ensure the entire IMMS and CMS functions as intended under typical user scenarios. This testing includes performance testing, especially for concurrent usage by over 10,000 users, and security testing to safeguard user data.
4. **Regression Testing:** After updates or code changes, regression testing will be carried out to ensure the system maintains its intended functionality.
5. **Usability Testing:** Evaluating the IMMS and CMS 's user interface for ease of use, particularly focusing on the mobile-friendly aspects for contractors and admin functionalities.
6. **Load Testing:** Testing the system's behavior under high user loads to ensure stability and performance meet requirements.

### 15.4 User Acceptance Test (UAT)

The User Acceptance Testing (UAT) phase is the final testing stage before deployment. In this phase, representatives from HED will test the system's real-world functionality to ensure it meets their operational requirements. The UAT will involve pre-defined test cases covering critical features, including contractor registration, license renewal, NID/OTP verification, and blacklist management. Any issues encountered will be documented and resolved before final

deployment. A successful UAT will confirm that the system functions as expected in live conditions, achieving all objectives outlined by HED.

## 15.5 Risk Management Plan

A proactive Risk Management Plan is essential to anticipate, identify, and mitigate potential project risks. Key elements include:

1. **Risk Identification:** Potential risks are identified early and throughout the project lifecycle, covering technical, operational, and external factors. Examples include integration challenges, data security risks, and project delays.
2. **Risk Assessment:** Each identified risk is assessed for its probability and impact, allowing prioritization and tailored responses. Risks with high probability and impact, such as security breaches or delayed integrations, are closely monitored.
3. **Mitigation Strategies:**
  - a. **Technical Risks:** Conduct regular code reviews, employ security protocols (like encryption), and use reliable API connections for integrations.
  - b. **Operational Risks:** Maintain clear communication channels with HED for approvals and feedback to avoid project delays.
  - c. **Data Security Risks:** Implement robust authentication mechanisms, conduct regular security testing, and store sensitive information securely.
4. **Monitoring and Review:** Risks are continually monitored throughout the project, with reviews at the end of each sprint. Any emerging risks will be documented and addressed immediately to prevent escalation.
5. **Contingency Planning:** A contingency plan is in place to address critical issues, including backup and recovery solutions for data and extended timelines if significant changes are required.

## 16. Deployment and Implementation Plan

The deployment and implementation of the IMMS and CMS will be systematically executed to ensure smooth rollout, minimal downtime, and secure access for all users. The plan is divided into key stages:

### 16.1 Pre-Deployment Preparation

- **Environment Setup:** Establish staging, testing, and production environments, ensuring they mirror each other in terms of configurations and dependencies.
- **Data Migration:** If applicable, migrate existing contractor data into the new IMMS, CMS, and COMS database with accuracy checks, ensuring data integrity and compliance with security protocols.
- **Integration Testing:** Conduct final integration tests to confirm connectivity with external and internal systems (such as NID and OTP services, and contractor/license management system) and ensure seamless interactions with HED's existing website.
- **Security Configuration:** Implement security protocols, including SSL/TLS certificates, firewalls, and role-based access controls, to protect data throughout the deployment.

## 16.2 Deployment Phases

- **Initial Deployment to Staging:** Deploy the IMMS and CMS to a staging environment for final testing and quality assurance. This stage allows HED staff to review the system functionality in a near-live setting without impacting the production environment.
- **User Training and Documentation:** Conduct training sessions for HED administrators and support staff, covering system usage, data management, and troubleshooting. Provide comprehensive documentation, including user manuals and quick-reference guides.
- **User Acceptance Testing (UAT):** Run UAT in the staging environment, allowing HED representatives to verify that all functions work as expected. Feedback from UAT will be collected and applied before the live deployment.
- **Final Review and Approval:** After UAT is completed, collect final sign-offs from key stakeholders, ensuring all requirements are met.

## 16.3 Production Deployment

- **Go-Live Preparation:** Plan the go-live timing to minimize disruption, ideally during non-peak hours. Inform all stakeholders and users of the go-live date, expected downtime, and any necessary system usage instructions.
- **Production Deployment:** Deploy the IMMS and CMS to the live production environment, configuring load balancing and ensuring data backups are in place. Re-run critical tests to confirm functionality and performance.
- **Launch Verification:** Once live, verify key functionalities, including user registration, license renewal, NID/OTP verification, and blacklist management, to ensure they operate as expected.

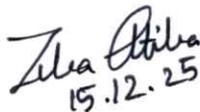
## 16.4 Post-Deployment Support

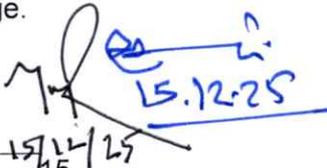
- **Monitoring:** Closely monitor the system for the first two weeks post-deployment, tracking system performance, load handling, and user interactions. Implement real-time alerts to identify and respond to potential issues.
- **Technical Support:** Provide immediate support to resolve any unexpected issues, with dedicated staff available to troubleshoot and answer user queries.

## 16.5 Maintenance and Ongoing Support

- **Routine Maintenance:** Schedule regular maintenance windows for updates, patches, and system optimizations, ensuring minimal impact on user operations.
- **System Updates and Enhancements:** Implement a roadmap for future updates based on user feedback and evolving needs, keeping the IMMS and CMS aligned with HED's requirements.
- **Performance Reviews:** Conduct periodic performance evaluations to ensure the IMMS and CMS remains responsive, secure, and efficient under regular and peak usage.

  
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## 17. Training and Knowledge Transfer Plan

At the end of the system development, deployment and implementation, the firms need to transfer the knowledge through training to the HED officials. The firms must propose a detailed and comprehensive plan on this matter. Training location will be at HED office, Dhaka. Module wise separate training required, necessary details are according to the followings:

### a) Training Details for IMMS and CMS Module:

Training Type	Person	Batch	Duration
End User Training	120	3	2 days (8 hours/day) per batch
Technical/System Admin Training	15	1	2 days (8 hours/day) per batch

## 18. Support & Maintenance Plan

At the completion of the system development, deployment, and implementation stage the firms need to provide support and maintenance to client for the smooth running of the operation (expected to provide support for 2 years after completion of the project). The firm must propose a detailed plan of providing support and maintenance plan for this assignment.

## 19. Resource Requirement Summary

Position	Nos
(1) Project Manager	1
(2) Deputy Project Manager	1
(3) Business Analyst	2
(4) Software Architect	2
(5) System Analyst	2
(6) Senior programmer	4
(7) programmer	8
(8) Programmer (Mobile App)	3
(9) Database Administrator (DBA)	1
(10) Cyber Security Engineer	1
(11) Quality Assurance Engineer	2
(12) Implementation Engineer	2
(13) System Administrator	1
(14) Technical Document Writer	2
(15) UX Expert	2
(16) UI Expert	2
(17) Interoperability Expert	1
(18) Deployment Expert	1
(19) Sr. GIS Expert	1
(20) GIS Expert	2
(21) Software Trainer	2

(22) Data Entry Operator	30
(23) Support and Maintenance Engineer	2

Each team member will play a crucial role in the development, deployment, and support phases of the IMMS and CMS ensuring a high-quality, secure, and user-friendly system for HED.

## 20. Expected Deliverables

The following deliverables including progress report on monthly basis must be submitted by the vendor to HED.

Item	Deliverables
1	Project Inception Report
2	System Requirement Specification (SRS)
3	System Design Documents (SDD)
4	Development and Testing Report
5	System Deployment Plan
6	Technical and User Manual
7	Training and Knowledge Transfer

## 21. Project Time Line

The project timeline for the IMMS and CMS project outlines the various phases involved, ensuring a structured and efficient workflow to meet the Health Engineering Department's (HED) objectives. The project duration is spread over approximately 28 months, encompassing the development, deployment, and maintenance phases.

Month	Phase	Task
Month 1	Project Initiation and Requirement Analysis	Project Inception Report, Requirement gathering and documentation
Month 1	SRS, SDD Preparation & Approval	System architecture, UI/UX design, database design
Month 2-3	Development Phase and Data Entry	Frontend and backend development & API development and integration along with all kinds of infrastructure and existing contractor related data entry.
Month 3-4	Testing & Deployment Phase	Functional, performance, security, and UAT Testing with Staging deployment, training, and documentation & Production deployment
Month 5-28	Maintenance Support & Services Period	2 (two) years maintenance support & services

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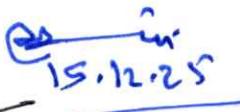
## 22. Code of Conduct

- a) All the documents and information produced by or during the consultancy services will be the sole property of the HED. No information or document is permitted to transfer or share or disseminate elsewhere without the permission of Authority.
- b) The project shall have the copy right of all documents developed under this assignment, and the contracted firm must need to handover the full workable source code as well.
- c) The Contracted firm and outsourced agents must comply the work order conditions, special instructions regarding HED & Govt. service regulations as applicable.

  
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