

PREFACE

This Technical Proposal outlines Afaqy's comprehensive plan for designing, developing, and deploying the Smart Landfill and Transfer Station Monitoring and Management System (SLMMS) for Be'ah. It is intended to provide Be'ah's stakeholders with a clear understanding of the project scope, objectives, solution architecture, and implementation approach. The proposal draws on Be'ah's specified requirements and our extensive experience in delivering enterprise-grade, IoT-enabled platforms to offer a turnkey, self-hosted solution that meets both current needs and future growth. Detailed sections cover functional capabilities, technical design, project governance, and support deliverables, serving as the primary reference for successful execution, governance, and long-term operations of SLMMS.

Abbreviations and Definitions

The following table shows definitions for abbreviations and terminologies used in this document.

Abbreviation/Terminology	Definition
SLMMS	Smart Landfill and Transfer Station Monitoring and Management System
RBAC	Role-Based Access Control
MFA	Multi Factor Authentication
LPR	License-Plate Recognition
RFID	Radio-Frequency Identification
API	Application Programming Interface
UAT	User Acceptance Testing
KPI	Key Performance Indicator
CI/CD	Continuous Integration / Continuous Deployment

EXECUTIVE SUMMARY

The Smart Landfill and Transfer Station Monitoring and Management System (SLMMS), powered by AFAQY's Mardam platform, represents a groundbreaking digital transformation initiative for Be'ah's landfill operations. Designed to enhance environmental sustainability, operational control, and compliance, SLMMS leverages cutting-edge IoT infrastructure, AI-powered video analytics, and integrated automation to provide real-time visibility across the entire landfill lifecycle.

This solution eliminates manual inefficiencies and unauthorized dumping by integrating smart gate barriers with ANPR technology, IVMS-based route validation, AI-monitored dumping zones, and fully integrated weighbridge systems. Each vehicle's movement, load type, and dumping activity is tracked, validated, and logged into a central command dashboard—delivering full traceability and actionable insights.

SLMMS enhances data-driven governance, ensures compliance with environmental KPIs, and enables secure, role-based access to customized dashboards and reports for all stakeholders. Scalable and modular, the system is future-ready—supporting additional features like drone surveillance, smart bin integration, and IoT-based environmental sensors for complete landfill intelligence.

With this initiative, Be'ah reinforces its leadership in sustainable waste management and positions Oman as a regional pioneer in smart landfill technology. The proposed solution will provide a unified, intelligent platform capable of:

- Centralizing all landfill and transfer station operations under one integrated control system.
- Automating vehicle registration and verification through digital forms with seamless integration to LPR and RFID technologies.
- Direct integration with weighbridge systems to accurately capture weight data at entry and exit points and automatically compute net weight differences.
- Tracking vehicle movements end-to-end from collection and transfer to final landfill dumping ensuring full operational visibility and traceability.
- Streamline and manage contractors' interactions to allow self-service registration, digital approval workflows, and automated permit issuance through a centralized online portal.

- Integrating AI-driven analytics to monitor dumping activities, detect violations, and measure environmental and HSE compliance.
- Secure and precise user management with multi-level roles and permissions, along with complete tracking of all user activities.
- Interactive dashboards and exportable periodic reports presenting key performance indicators such as daily trips and waste volumes.

This project is designed as a full-fledged digital transformation initiative for Be'ah's landfill operations. It leverages modern IoT infrastructure, video analytics, and AI-powered automation to ensure efficient, secure, and environmentally sustainable landfill management. The system enables visibility, control, and accountability over every stage of the waste disposal lifecycle, making Oman a leader in waste governance.

We look forward with confidence to delivering tangible and sustainable value through this integrated smart system that will advance waste management operations to a new level of accuracy, efficiency, and digital maturity.

KEY OBJECTIVES

The main objective of the proposed system is to **digitize and automate the entire landfill management lifecycle**, transforming Be'ah's operations into a unified, intelligent, and data-driven ecosystem.

Specifically, the system aims to:

- **Enable real-time vehicle tracking and monitoring** across all collection, transfer, and landfill sites.
- **Automate landfill operations and workflows**, minimizing manual intervention and human error.
- **Ensure zone-specific waste management and route compliance** through integrated GPS, RFID, and AI validation.
- **Prevent unauthorized dumping and misuse** by enforcing access control and automated verification at all entry and dumping points.
- **Provide full historical traceability** of every truck's journey — from waste collection to final disposal.
- **Generate actionable insights and performance analytics** on waste flows, zone utilization, and environmental KPIs.
- **Enhance operational efficiency and sustainability** By digitizing the landfill operation, the system helps Be'ah minimize environmental risks, improve resource efficiency, and advance Oman's sustainability goals. The solution ensures proper segregation and routing of recyclable waste, reduces the carbon footprint by optimizing routes, and prevents unauthorized dumping that could harm the ecosystem.

SOLUTION BLUEPRINT

- Business Solution
- High-level Process
- Automated Landfill Operations

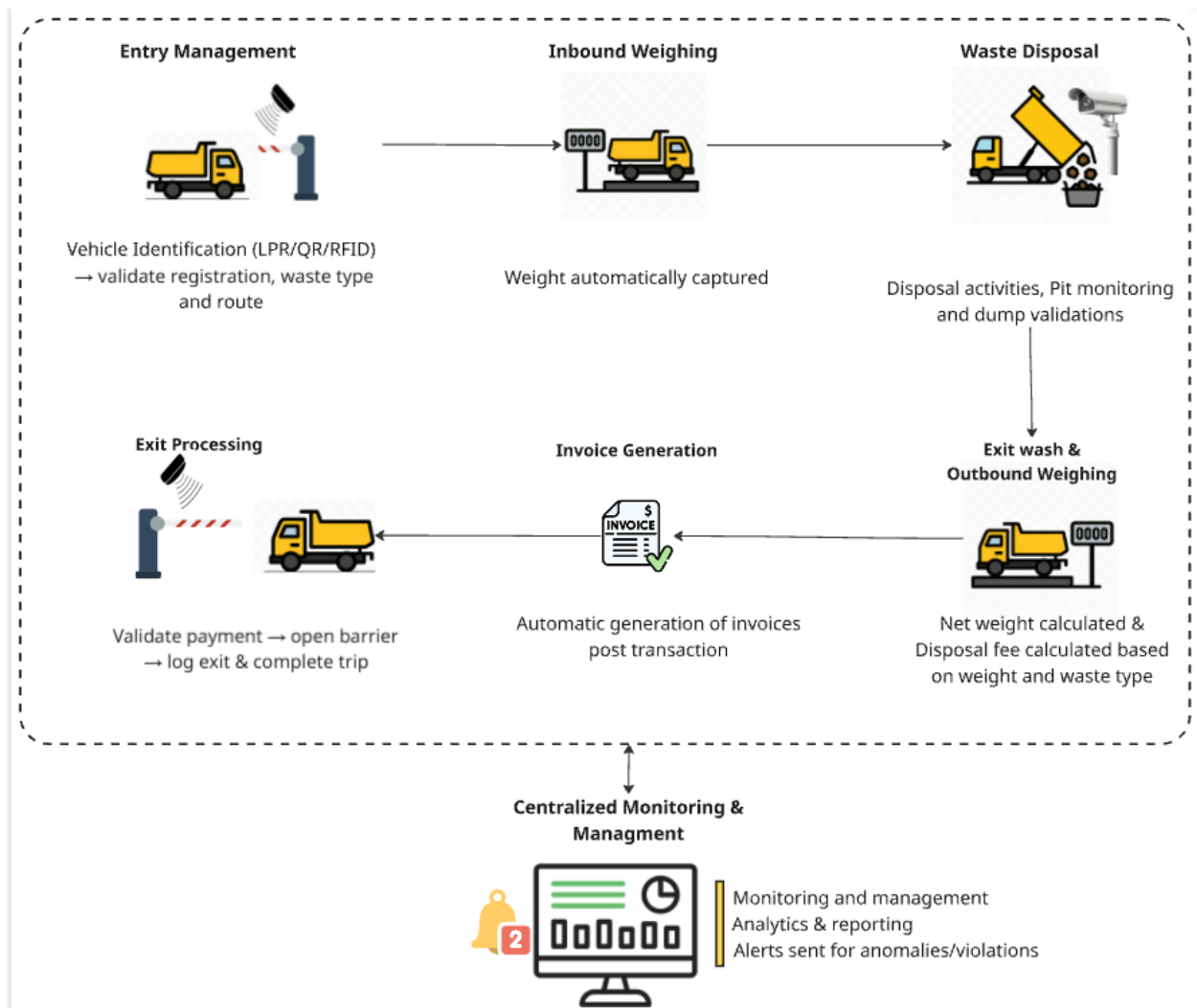


Diagram 1. High-Level Process Flow: Automated Landfill Operations

The system integrates various checkpoints and technological nodes that interact in real-time, providing a seamless and intelligent operational flow. Entry management is initiated via smart gate barriers that authenticate vehicles using Automatic Number Plate Recognition (ANPR) technology. Vehicles are validated against their IVMS-tagged route numbers and waste types, ensuring that only approved loads are permitted. Weighbridge integration ensures all waste quantities are measured before and after unloading. High-mounted mobile cameras monitor actual dump activity by zone, and smart dashboards log every detail from entry to exit.

Transfer Station and Landfill Operational Coverage

Overview:

The proposed Smart Landfill Management and Monitoring System (SLMMS) will cover a total of 48 sites across Oman, comprising both Transfer Stations (TS) and Landfills (LF). The system digitizes all waste movement between transfer and disposal points, ensuring complete visibility, traceability, and compliance.

Transfer Stations Operations

At transfer stations, SLMMS manages truck validation, waste weighing, transfer activities, and AI-based monitoring.

Workflow:

- Truck Entry: Smart gate barriers and ANPR cameras validate truck entry using route ID and waste type.
- Weighing: Incoming vehicles are weighed using an integrated weighbridge system.
- Transfer Process: Trucks unload waste into trailers at transfer hills. RFID readers capture both truck and trailer IDs for traceability.

- Audit & Validation: AI cameras monitor unloading activities, classify waste, and log volume data with full audit trails.

Key Functionalities:

- Job & Route Number Management (via API from SWMP)
- Truck-to-Trailer Mapping using UHF RFID tags
- Smart Gate and Weighbridge Integration
- AI Video Evidence linked to job and route IDs

Landfill Operations

When trailers reach landfills, the platform validates each delivery and ensures correct dumping and record closure.

Key Functionalities:

- Incoming Trailer Validation (via ANPR and RFID)
- Zone Allocation based on waste type and geo-fenced pits
- AI-assisted Dumping Verification and Safety Monitoring
- Final Weight Recording and Log Closure (syncd to SWMP)

Connectivity Status	No. of Sites	Connectivity Type	Notes
Internet-Connected	24	Fiber / 4G / Existing Infrastructure	Ready for full platform deployment
Pending Connectivity	24	4G / Fiber / Starlink (based on survey)	Will require site-level setup

Key Modules and main features

Waste Management Workflow

- Automatic vehicle identification via LPR, RFID, or QR scanning.
- Smart gate control with real-time event logs and automated barrier operation.
- Digital Waste Tracking automatically generated per job, including Job ID, Vehicle ID, Trailer ID, Waste Type, Contractor, Source Zone, Timestamp, and Quantity, with a secure QR code for verification at landfill.
- Overweight/underweight anomaly detection through weighbridge integration.
- Truck-to-Trailer Mapping at transfer stations using RFID readers and tags to track specific trucks and trailers.
- AI cameras for dumping validation, unauthorized access detection, and HSE monitoring.

Contractor and Permit Management

- Contractor registration and approval management through a self-service portal.
- Dynamic booking and waybill generation with single, monthly, and annual pass options.
- Booking Slot and Capacity Management where Contractors select available time slots for waste delivery based on landfill or transfer station capacity, ensuring balanced site utilization and avoiding congestion.
- Administrative review and digital pass issuance linked to vehicles and waste categories.
- Real-time gate authorization based on route, waste category, and booking validation.
- Secure role-based access and compliance tracking for Be'ah administrators and contractors.

Billing and Invoicing

- Job-Based Billing that automatically calculates billing based on job type, vehicle category, distance, waste type, and actual weights from transfer station or landfill weighbridges.
- Invoices are generated supporting VAT calculations, penalties, and bonuses, and are exportable in PDF, Excel, or XML formats.
- Ad-hoc Transporter Management that allows temporary or emergency transporters to receive job assignments, upload required documents, and maintain compliance through a dedicated portal.
- Digital Delivery Order (DO) Sign-Off, Upon waste offloading, operators or supervisors digitally sign the DO using tablets or terminals

- Each billing event is logged with a full digital audit trail to ensure financial accuracy and operational accountability.

AI-Powered Surveillance & HSE Monitoring

- AI cameras for unauthorized dumping detection, safety violations, and restricted-area breaches.
- Thermal and motion analytics for fire hazard detection and off-hours monitoring.
- Real-time HSE KPI tracking for environmental and safety compliance.
- Event tagging to route/job ID for historical playback and auditing.
- Integration with Digital Twin platform for zone-level visualization.

Analytics Dashboards

- Unified dashboard for all 48 sites (landfills and transfer stations).
- Real-time operational monitoring with entry/exit logs and visual alerts.
- KPI dashboards covering contractor performance, vehicle turnaround, and site utilization.
- Heatmaps for dumping frequency, route optimization, and zone activity.

System Reporting

- Automated reporting (daily, weekly, and monthly) for compliance and management oversight.
- Data export available in multiple formats (CSV, PDF, XML).
- Comprehensive reporting coverage across operational and compliance dimensions, example:
- Trip history for stakeholders (per vehicle/contractor) with weights and timestamps.
- Hourly waste throughput per site (tons) with vehicle count.
- Weekly weight trend (tons) by day.
- Total waste received at landfill for the selected period (tons).
- Waste weights by contractor (tons).
- Waste weights by waste type (tons).
- Registered vehicles (plate, code, contractor).
- Violations summary (by date, type, contractor, vehicle).

Integration & Interoperability

- Integration with Smart Waste Management Platform (SWMP).
- Integration with IVMS systems for location and speed tracking.
- External system integration for Be'ah, governmental, and environmental reporting platforms, ensuring compliance and unified data visibility.

Technical Solution

Smart Landfill and Transfer Station Monitoring and Management System (SLMMS) is designed as a hybrid, microservices-based platform that ensures operational continuity at each site while providing centralized visibility, control, and reporting for Be'ah.

System Architecture

Microservices Architecture: Modular services developed in .NET Core for backend, deployed in Docker containers orchestrated by Kubernetes (Azure AKS for central services, on-prem clusters for site automation).

Hybrid Deployment Model:

- Centralized Components (Azure): Operator Portal (Angular), Stakeholder Portal (Next.js), API Gateway, Reporting & Analytics, Financial Engine.
- On-Site Components: Standalone automation servers integrating with weighbridges, LPR cameras, UHF RFID, QR scanners, and barrier controls — capable of full operation even without internet connectivity.

Databases:

- PostgreSQL for transactional data.
- MongoDB for IoT/time-series and unstructured sensor data.

Integration Approach

- Hardware Integration: Native drivers and standard protocols for LPR, RFID, weighbridge, and barrier systems.
- External API Integration: REST/JSON APIs for Be'ah.
- Security Layer: API Gateway for authentication, rate-limiting, and access control.

Operational Continuity

- On-site automation servers operate independently during internet outages.
- Automatic data synchronization to central cloud once connectivity is restored.
- Local caching for hardware events to prevent data loss.

Technology Stack

Layer	Technology
Frontend (Web)	Angular (Operator), Next.js (Stakeholder)
Mobile Apps	React Native (iOS & Android)
Backend	.NET Core Microservices
Databases	PostgreSQL, MongoDB
Containerization	Docker
Orchestration	Kubernetes (AKS + On-Prem Clusters)
CI/CD	GitHub Actions, Terraform
Monitoring	Prometheus, Grafana, ELK Stack
Security	Azure Key Vault, TLS 1.3, RBAC

Cloud & On-Prem Deployment Options

Centralized Portals on Azure Cloud

The Operator Portal (Angular) and Stakeholder Self-Service Portal (Next.js) will be hosted on Microsoft Azure within BE'AH's cloud subscription.

This ensures high availability, scalability, and global accessibility for administrative and stakeholder functions. Centralized hosting also facilitates real-time monitoring, consolidated reporting, and unified security controls across all BE'AH sites.

Standalone Site Automation Deployments

Each operational site will have an on-premises deployment of the Site Automation Module, including integration with LPR cameras, UHF RFID readers, weighbridge indicators, and barrier control systems. Local deployments will operate independently in the event of internet or central system outages, ensuring zero operational downtime.

This approach maintains fast, low-latency hardware interactions essential for weighing, vehicle validation, and trip state management.

- **Continuous Synchronization**

When connectivity is available, site systems will synchronize automatically with the central Azure platform, updating trip records, weight data, financial transactions, and audit logs.

Synchronization uses secure, encrypted channels to protect data integrity.

- **Benefits of the Hybrid Model**

- **Operational Continuity:** No interruptions in site operations during network failures.
- **Performance Optimization:** Local processing reduces latency for mission-critical functions.
- **Central Oversight:** Unified dashboards and analytics remain available for management and stakeholders.
- **Future Scalability:** New sites can be added with minimal configuration, leveraging the same hybrid framework.

Hardware Integration Workflow

Integrated Components

The following table outlines the core components integrated into the SLMMS environment:

1. Smart Gate Barrier with ANPR System

Component	Specification (ideally)
Gate Barrier Unit	Heavy-duty boom barrier, IP65-rated, arm length up to 6m, 3–5 sec opening time
ANPR Camera	5MP+ IR camera with OCR support for Arabic and English plates, recognition rate >95%, IP67
Loop Detector	Dual-channel magnetic loop sensor for accurate vehicle detection
RFID Readers	Long-range, passive RFID identification of vehicles for enhanced authentication and redundancy in access control.
LED Display Panel	Outdoor LED (P10), shows instructions, access status, and permit info
Control Box	Integrated controller with 4G/Ethernet/Wi-Fi, RS-485/Modbus, edge computing enabled

This unit provides the first checkpoint of control, ensuring only approved vehicles gain access to landfill sites.

2. Weighbridge System

Component	Specification (ideally)
Platform	18–24m steel/concrete platform, load cell based, 100-ton capacity
Indicator	Digital weight indicator with RS232/Modbus/Ethernet support
SW Integration	Real-time sync with Mardam backend & permit system

It ensures full traceability and reconciliation of waste deposited by each transporter.

3. AI Camera Monitoring Poles

Component	Specification (ideally)
Camera	AI-powered PTZ cameras with thermal and motion detection
Mount	Adjustable, IP67-rated poles for mobility
Camera Resolution	4K with auto-focus, night vision, and movement tracking
Data Integration	Real-time video feed integration with Mardam platform

These cameras monitor every stage of the dump process, ensuring full visibility into where and when each truck dumps its waste.

Integration Workflow & Data Flow Architecture

The proposed SLMMS follows a secure, event-driven integration model ensuring seamless communication between on-site automation systems, centralized portals, hardware devices, and external platforms such as Be'ah.

Workflow Overview

Vehicle Identification

Entry/exit points detect vehicles using LPR cameras, UHF RFID readers, or QR code scanners. Identification data is sent to the On-Site Automation Server.

Trip Validation & Hardware Control

The on-site system validates the vehicle against centralized rules (locally cached to allow offline operation). If valid, barrier control commands are triggered, and weighbridge readings are taken automatically.

Weight & Transaction Capture

Tare and gross weights are recorded from the weighbridge indicator.

Local Processing & Sync

All operational data (trip states, weight logs, images, transactions) are stored in the local PostgreSQL & MongoDB instances.

A synchronization service periodically uploads data to the central Azure platform when connectivity is available.

Centralized Data Aggregation

The Azure-based backend consolidates data from all sites for reporting, analytics, and monitoring. Immutable audit logs are maintained for compliance.

RESTful API Integrations

SWMP (Smart Waste Management Platform)

External Government platforms (e.g., Be'ah)

Third-party apps that Be'ah deals with

Data Flow Architecture

Data Sources

Hardware devices (LPR, RFID, weighbridge, barrier controls).

Web portals (operator & contractor transactions).

Processing Layers

On-Site Processing Layer: Handles all device integrations and local decision-making.

Central Application Layer (Azure): Consolidates, analyzes, and reports on data from all sites.

AI Engine: for camera-based activity detection

Integration Layer: Secure API gateway for both internal and external integrations.

Data Storage

PostgreSQL (structured operational data).

MongoDB (raw IoT/time-series data, media storage, images, logs).

Communication Protocols

REST/JSON APIs for cloud integrations and web apps.

Serial/Modbus for weighbridge and barrier hardware.

MQTT/HTTPS for IoT device communication where applicable.

Security & Compliance

Data Security

- Encryption in Transit & At Rest: All communication between components is secured using TLS 1.3. Sensitive data in databases is encrypted using AES-256.

- Role-Based Access Control (RBAC): Granular permissions to ensure that users only access data relevant to their role.
- Secrets Management: All credentials, API keys, and certificates are stored securely in Azure Key Vault.

System Integrity & Auditability

- Immutable Audit Trails: All user actions, system events, and hardware interactions are logged in tamper-proof storage with a minimum 1-year retention policy.
- Digital Signatures: Critical transactions (e.g., weight readings, financial transactions) are digitally signed to prevent manipulation.
- Compliance Logging: Structured logs with time synchronization (NTP) for forensic analysis.

Network & Infrastructure Security

- Zero Trust Architecture: Continuous verification of users and devices before granting access to any resource.
- Segmentation: Logical separation between site automation networks, application services, and external portals.
- DDoS Protection & WAF: Azure DDoS Protection and Web Application Firewall (WAF) to safeguard against external attacks.

Deployment & Operations

Our deployment strategy ensures rapid rollout, operational continuity, and ease of maintenance, while adhering to BE'AH's hybrid architecture requirements. The approach covers initial setup, site commissioning, ongoing operations, and future scalability.

Deployment Strategy

We adopt a **phased deployment** approach to minimize operational risks and ensure readiness before go-live.

Phase 1 – Central Cloud Environment Setup (Azure)

Provision **Azure subscription** within BE'AH's account.
 Deploy **Kubernetes Cluster (AKS)** for core microservices.
 Configure **PostgreSQL** and **MongoDB** managed services.
 Deploy **Operator Portal** (Angular) and **Stakeholder Portal** (Next.js).
 Configure **API Gateway, monitoring, and logging stack**.

Phase 2 – Site Automation Setup

Install and configure **on-premises automation server** at each site.
 Connect and test **LPR cameras, RFID readers, weighbridge indicators, and barrier controls**.
 Deploy **local PostgreSQL and MongoDB instances** for offline operation.
 Implement **secure synchronization service** to central platform.

Phase 3 – System Integration & Testing

System Integrates with Be'ah, environmental compliance systems or ERP
 Conduct end-to-end workflow testing.

Phase 4 – Pilot & Rollout

Pilot deployment at one BE'AH site for full operational testing.
 Gradual rollout to all remaining sites with lessons learned applied from pilot phase.

Backup & Disaster Recovery

- **On-Site Backups:** Daily backups of operational data stored locally.
- **Cloud Backups:** Nightly snapshots of central databases stored in Azure Blob Storage with **geo-redundancy**.
- **Disaster Recovery (DR) Plan:** Full recovery process documented, with an RTO of <4 hours and RPO of <15 minutes for central services.

Scalability & Governance

Our solution is designed with **scalability and governance** embedded into its architecture, ensuring that the Smart Landfill and Transfer Station Monitoring and Management System (SLMMS) can grow seamlessly with BE'AH's operational expansion while maintaining security, compliance, and performance standards.

Scalability

Horizontal & Vertical Scaling

Horizontal Scaling: Additional sites can be onboarded quickly by replicating the on-premises automation server setup and registering the site in the central Azure platform.

Vertical Scaling: Central cloud services (Azure Kubernetes Service, PostgreSQL, MongoDB) can be upgraded in capacity without downtime.

Modular Microservices Architecture

Each functional component (e.g., trip management, reporting, analytics) operates as an independent microservice.

New modules or enhancements can be added without affecting existing operations.

Elastic Cloud Infrastructure

Azure services are configured with **auto-scaling policies** to handle seasonal peaks or unexpected load spikes. Kubernetes dynamically adjusts container replicas based on CPU/memory usage and request throughput.

Future-Ready Design

Platform supports integration with emerging IoT devices, AI-based analytics, and additional government systems without requiring a full system redesign.

Governance

Centralized Policy Enforcement

Governance policies are enforced through the **central Azure platform**, covering data access, user authentication, and security controls.

All configuration changes are tracked and auditable.

Role-Based Access Control (RBAC)

Granular user role definitions for operators, stakeholders, and administrators to ensure least-privilege access. Access rights reviewed periodically as part of governance audits.

Standards & Compliance

Compliance with **LCGPA local content requirements**, and applicable data protection regulations.

Policies aligned with **ISO 27001** for information security management.

Change Management & Release Governance

All system updates pass through **staging environments** before production deployment.

Formal change approval process with rollback plans for all releases.

PROJECT DELIVERY

Project Implementation Phases

Phase 1: MARDAM Hardware Integration

Objective

To deploy AFAQY's proven MARDAM platform for real-time, centralized monitoring and control of weighbridge operations, integrating existing on-site hardware — weighbridges, ANPR cameras, RFID readers, and gate barriers — into a cohesive, secure, and scalable system.

Background

BE'AH's current waste management infrastructure comprises multiple independent sites, each equipped with weighing scales, ANPR cameras, and physical access controls. These systems operate locally with no unified

platform for centralized oversight, resulting in siloed data, limited operational visibility, and manual processes for contractor identification and booking validation.

Scope of Integration

- Weighbridges: Connect physical weighbridge load cells and digital weight indicators to the MARDAM system via local control units.
- ANPR Cameras: Integrate Automatic Number Plate Recognition (ANPR) cameras to capture vehicle license plates at entry and exit points.
- RFID Readers: Utilize existing or new RFID reader infrastructure for driver and vehicle identification.
- Gate Barriers: Interface gate barrier controllers for automated access based on authorization from the MARDAM platform.
- Local PCs/VMs: Maintain existing local software environments as failover processing nodes during connectivity outages.

Technical Approach

1. Hardware Connectivity & Gateway Deployment

- Industrial Gateways: Deploy Teltonika industrial-grade gateways at each site to act as secure, ruggedized communication hubs.
- Peripheral Integration: Weighbridge digital outputs, ANPR camera feeds, RFID readers, and gate barrier control signals will be wired or connected via Ethernet/serial protocols to the gateway.
- Local Control Box Interface: The gateway interfaces with the existing local control box/PC to gather weighbridge and gate operation data in real-time.

2. Data Acquisition & Processing

- Weighbridge Data: Capture gross and tare weight measurements, timestamps, and operator inputs.
- ANPR Recognition: Real-time license plate capture on entry and exit, with image snapshots stored for audit and verification.
- RFID Tag Reading: Capture RFID tag IDs assigned to drivers and vehicles to enhance identification and authorization.
- Gate Control Logic: Automatic barrier opening triggered by vehicle authorization status; manual override options available for site operators.

3. Communication & Security

- Local Data Buffering: All data is cached locally in case of network downtime, ensuring zero loss of transaction records.
- Secure VPN Tunnels: Encrypted VPN connections from gateways to AFAQY's central servers to maintain confidentiality and integrity.
- Fail-Safe Operation: In absence of connectivity, local PCs maintain autonomous operation with queued data synchronization once online.

4. System Synchronization

- Central Server Integration: Gateways push collected data to the centralized MARDAM platform in near real-time.
- Data Validation: The system cross-validates vehicle identity via ANPR and RFID inputs with existing contractor databases.
- Logging and Alerts: Real-time logs are generated and monitored to detect anomalies or access violations.

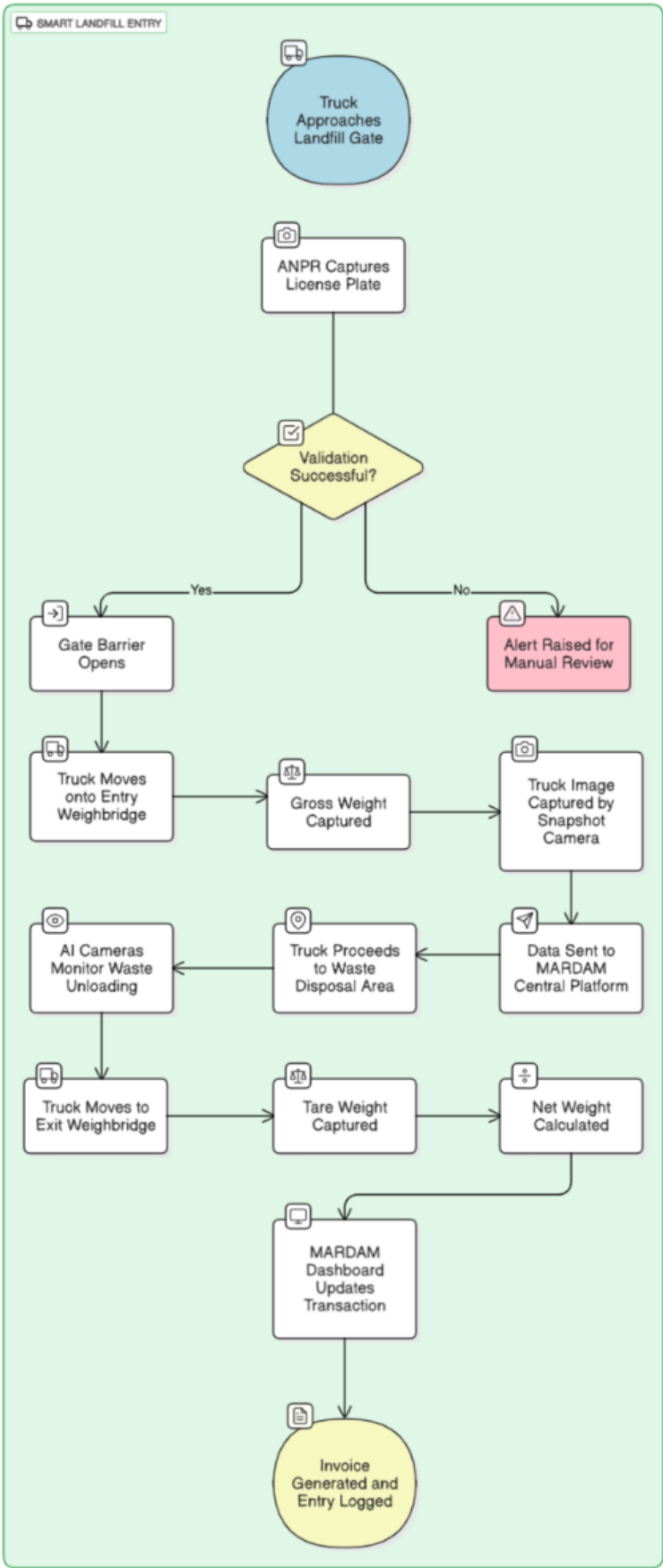
Deliverables

- Fully integrated hardware network at each BE'AH transfer station and landfill site.
- Functional MARDAM-enabled real-time weighbridge monitoring and transaction logging.
- Secure and reliable offline mode with auto-resynchronization.
- Standard operating procedures and technical documentation for on-site teams.
- Initial training and support for BE'AH operations personnel.

Benefits

- Enhanced operational visibility with centralized data aggregation.
- Automated, accurate identification and tracking of vehicles and waste categories.
- Minimized manual intervention and associated human error.
- Robust security and compliance aligned with industry best practices.
- Future-ready platform designed for phased upgrades and integrations.

PHASE 1: Process Flows for Smart Gate Entry Platform



Phase 2: Booking Platform Development & Centralization

Objective

To develop and deploy a centralized digital platform that unifies contractor management, booking workflows, invoicing, waste categorization, and analytics—enabling BE'AH to streamline operational control and enhance data-driven decision-making.

Background

While Phase 1 establishes hardware connectivity and real-time data acquisition, BE'AH's operational efficiency and transparency depends on a sophisticated software layer that manages contractor interactions, automates booking and payment processes, and aggregates comprehensive data for analysis.

Scope of Platform Development

- Contractor registration and approval management
- Dynamic booking and waybill generation with multi-tier pass options
- Seamless integration with online payment gateways and onsite POS
- Automated invoicing linked to weighbridge and ANPR data
- Centralized dashboard with live site monitoring and detailed analytics
- Secure role-based access and compliance tracking

Technical Approach

1. Contractor Registration & Approval Workflow

- Online Portal: Contractors create profiles, upload mandatory legal documents (Company License, CR, etc.), and submit vehicle details.
- Waste Categorization: Vehicles assigned fixed waste types; mixed waste bookings require separate declarations.
- Administrative Review: BE'AH admins validate contractor credentials and approve or reject registrations.
- Digital Pass Issuance: Approved contractors receive digital credentials, linked to vehicles and waste categories.

2. Waybill Booking System

- Booking Types: Options include Single Entry, Monthly, or Annual passes tailored to contractor needs.
- Site & Category Selection: Contractors select intended landfill or transfer station and specify waste types.
- Dynamic Booking IDs: Each booking generates a unique QR code or booking reference linked to vehicle and waste data.
- Booking Validations: QR codes scanned at entry points to validate authorization in real-time.

3. Payment Gateway & Invoicing Integration

- Online Payments: Support for debit/credit cards, SADAD, and other local payment methods.
- POS Integration: Onsite offices equipped with POS terminals to accept manual payments.
- Invoice Generation: Automatic generation of invoices post transaction, incorporating ANPR images, weighbridge data, and payment confirmation.
- Financial Reporting: Comprehensive reports on payments, outstanding dues, and contractor activity.

4. Gate Operation & Transaction Logging Integration

- Authorization Checks: Gate barriers open only upon successful booking and vehicle verification.
- Automated Data Capture: Each entry/exit event logs vehicle number, timestamp, weight, contractor details, and waste category.
- Photo & Video Evidence: ANPR snapshots and CCTV captures are attached to transactions for audit trails.

5. Centralized Admin Dashboard

- Live Monitoring: Real-time overview of all connected sites, with entry/exit logs and visual alerts.
- Analytics & Reporting: Waste category summaries, contractor performance metrics, and operational KPIs.
- User Management: Role-based permissions for BE'AH personnel to control access levels and actions.

- Data Export & Backup: Tools for exporting data in standard formats and integration with BE'AH's own databases.

6. Data Storage & Security

- Centralized Database: Securely stores all transaction records, images, invoices, and user data.
- Data Encryption: Both at rest and in transit, following industry standards.
- Audit Trails: Complete history of all data edits, bookings, and system access.

7. Integration

Enable BE'AH to access and store transaction records and attachments on their own backup systems.

Deliverables

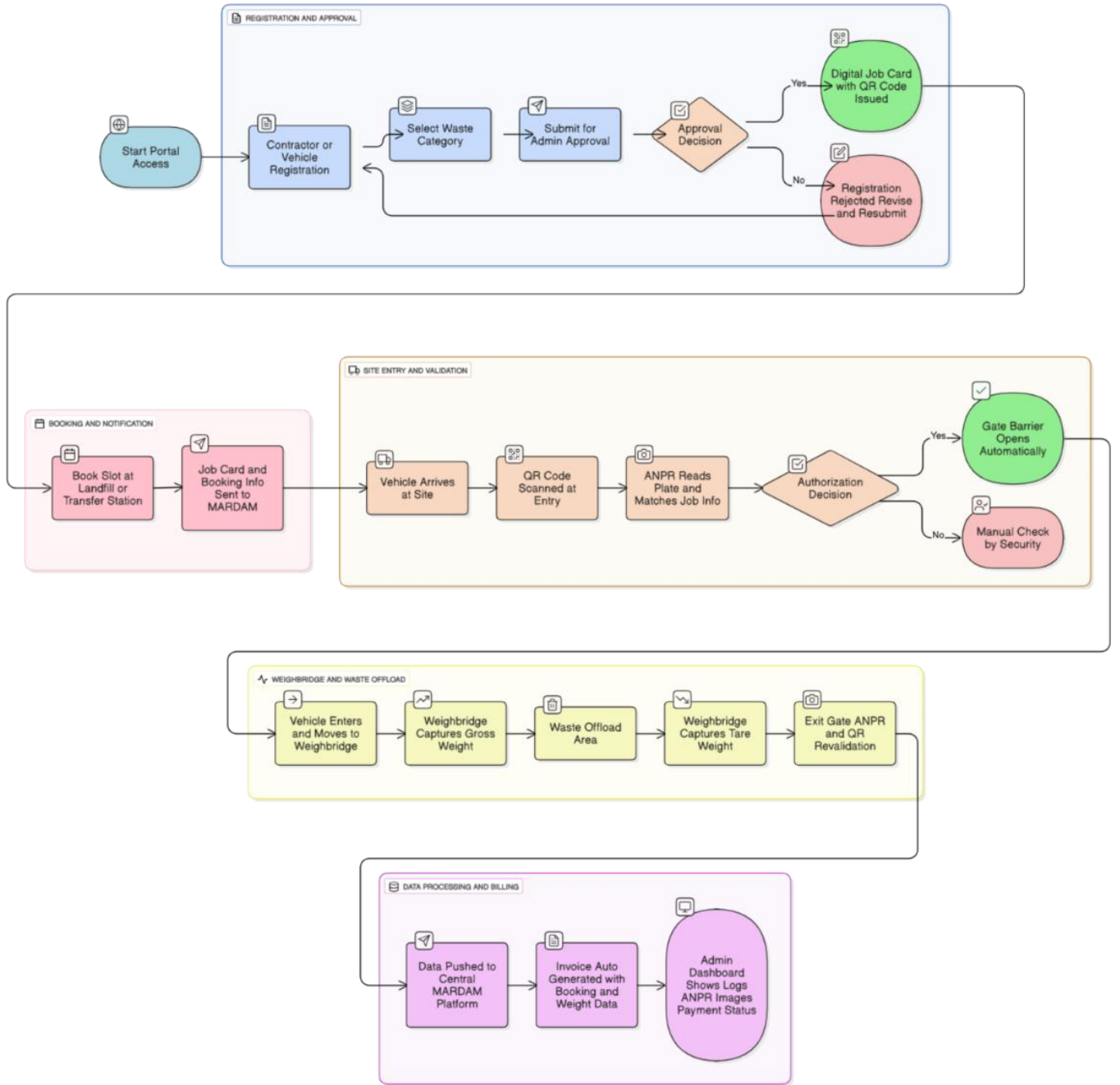
- Fully functional web-based platform accessible by contractors and BE'AH admins.
- Integration with existing payment systems and onsite POS.
- Comprehensive training for BE'AH staff on system administration and monitoring.
- Detailed user manuals and technical documentation.
- Ongoing support and maintenance plan.
- BE'AH team can fetch data via URL.
- APIs are documented and secured.
- Option for scheduled JSON push to BE'AH server.

Benefits

- Streamlined contractor onboarding and compliance verification.
- Automated booking and payment processes reduce operational bottlenecks.
- Real-time validation at entry gates enhances security and control.
- Data-driven insights support policy decisions and resource planning.
- Scalable platform designed for future modules and integrations.

Security & Offline Contingency

- All gateways will use encrypted connections.
- Data stored locally on PC in case of internet failure.
- Auto-sync to the central server once online.
- Role-based access for all modules.



Phase 3: Advanced Integration & Intelligent Monitoring Powered by AI for Zone & HSE Monitoring along with Readers & Tags

Objective

To augment BE'AH's waste management ecosystem with AI-powered landfill monitoring, enhanced vehicle tagging at transfer stations, and full integration with IVMS and smart waste platforms—delivering real-time environmental compliance, operational transparency, and optimized route/job tracking.

Background

With Phase 1 and 2 delivering foundational connectivity and centralized management, Phase 3 leverages emerging technologies to elevate waste handling efficiency, environmental safety, and traceability. This phase transforms data into actionable insights while integrating multi-modal vehicle tracking and smart waste workflows.

Scope of Advanced Integration

- AI-powered landfill zone monitoring for HSE KPIs and dumping frequency
- RFID/QR-based vehicle tagging and reader systems at transfer stations
- Integration with IVMS (In-Vehicle Monitoring Systems) for fleet telemetry and job matching
- Smart waste system synchronization linking collection jobs, transfer points, and landfill dumps

Technical Approach

1. AI-Powered Landfill Zone Monitoring

- Zone Segmentation: Landfill divided into monitoring zones equipped with AI-enabled cameras.
- HSE KPI Tracking: Continuous surveillance tracks compliance with health, safety, and environmental standards—spotting unsafe practices, unauthorized dumping, and equipment operation anomalies.
- Dumping Frequency Analytics: Automated detection of dumping events per zone, quantifying waste inflow and ensuring timely waste processing.
- Alerting System: Real-time notifications for abnormal activity or threshold breaches, enabling rapid response.

2. Transfer Station Vehicle Tagging & Smart Waste Integration

- RFID/QR Tag Deployment: Vehicles, including small dumpers, rear-end compactors, and side-loading compactors, are tagged with unique RFID or QR codes.
- Transfer Station Workflow: Waste is transferred from smaller vehicles to larger trailer compactors (the core function of a transfer station).
- Tag & Reader Coordination: RFID readers positioned at designated transfer pits capture tag data from both the smaller vehicles and trailers during waste offloading.
- Traceability: Each waste load is linked from origin vehicle to trailer, enabling precise tracking of waste flow through the system.
- Waste Category & Dump Zone Linkage: Tags are associated with specific waste categories and dumping zones, harmonized with AI surveillance zones for comprehensive tracking.

3. Integration with IVMS and Smart Waste Systems

- Fleet Telemetry Sync: IVMS devices provide vehicle location, route, speed, and operational status.
- Job Assignment Matching: Each vehicle's trip is matched with scheduled collection jobs and transfer station dumps.
- Data Fusion: Integration of IVMS data with weighbridge, AI monitoring, and RFID tagging creates an end-to-end view of waste logistics.
- Real-Time Dashboards: Operations teams monitor vehicle movement, job completion, and compliance metrics in real time.
- Route Optimization: Insights support dynamic scheduling and route adjustments to maximize efficiency and reduce environmental impact.

Deliverables

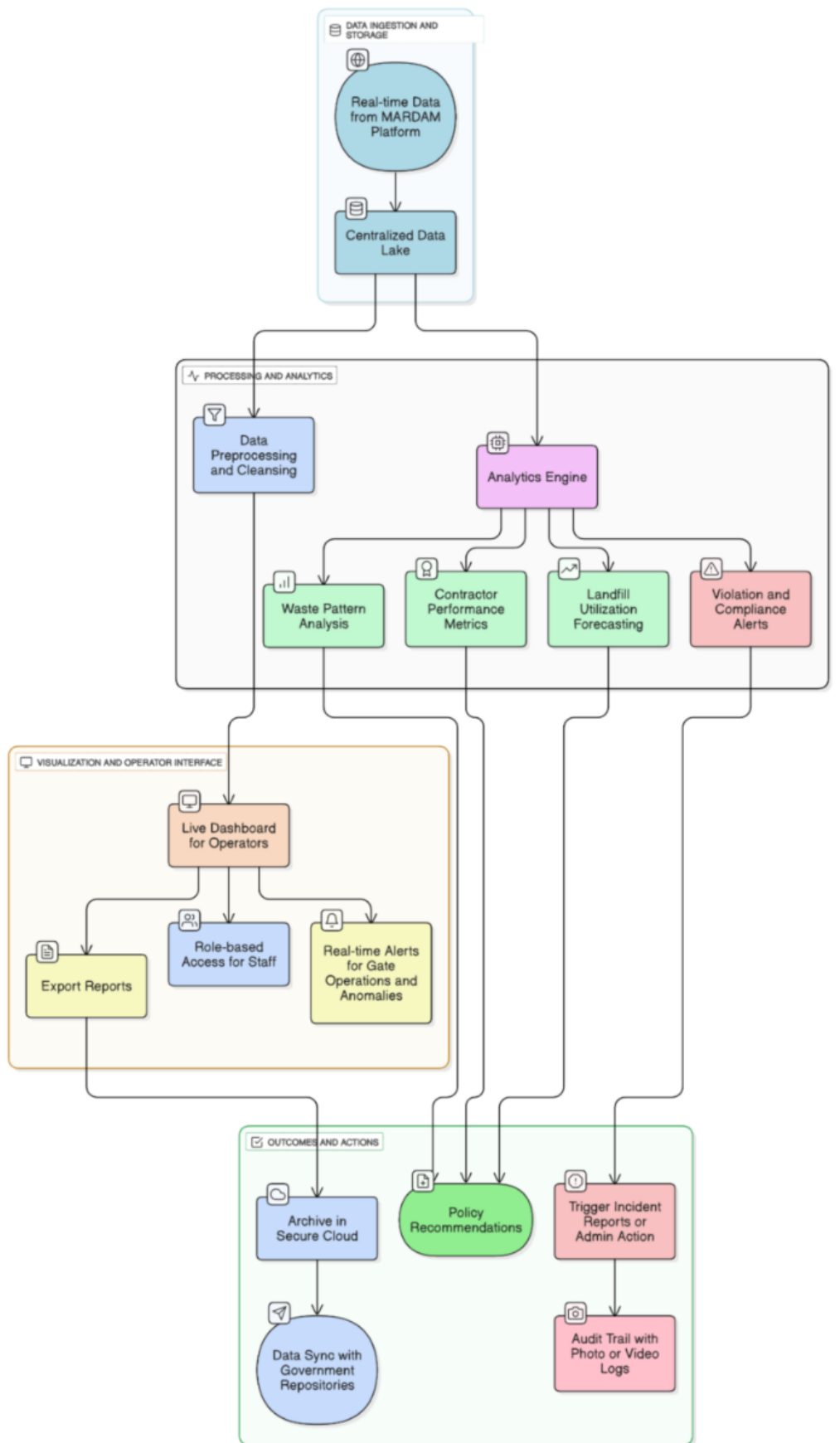
- Installation and calibration of AI cameras and RFID readers at landfill zones and transfer stations.
- Deployment of RFID/QR tags for all relevant vehicles.
- Integration modules linking AI monitoring, IVMS telemetry, smart waste management, and weighbridge platforms.

- Enhanced central dashboard with AI analytics and vehicle tracking overlays.
- Training and operational handover for BE'AH's monitoring and logistics teams.
- Comprehensive technical and user documentation.

Benefits

- Heightened environmental and operational safety through AI-powered HSE monitoring.
- Transparent, accountable waste flow tracking via RFID-enabled vehicle tagging.
- Integrated fleet and job management increase logistical accuracy and reduce waste leakage.
- Proactive detection of irregularities minimizes risk and ensures regulatory compliance.
- Data-driven insights pave the way for continual process improvements and sustainability initiatives.

PHASE 3: Systematic Process Flows for Centralized Dashboard



Project Timeline

1. The project will be executed in **phases** to ensure a controlled rollout, efficient resource allocation, and full alignment with BE'AH's operational needs.
2. The overall project duration will be **12 Month**
3. The project will be executed in three phases: Phase I (3 months), Phase II (5 months), and Phase III (3 months), followed by 1 month dedicated to training and project closure.

Phase I	Activity / Deliverable	Week From	Week To
Initiation & Cloud Environment Setup	Kick-off meeting with BE'AH project stakeholders.	1	2
	Provisioning of Azure subscription within BE'AH's account.		
	Deployment of Azure Kubernetes Service (AKS) cluster.		
	Setup of development tools, repositories, and CI/CD pipelines.		
	Delivery of high-performance development laptop.		
Core Infrastructure & Site Setup	Configuration of PostgreSQL and MongoDB managed databases.	3	8
	Deployment of Prometheus, Grafana, and ELK monitoring/logging stack.		
	Installation of on-site automation server hardware at pilot site.		
	Integration with LPR cameras, RFID readers, weighbridge indicators, and barrier controls.		
	Provision of Raspberry Pi 5 devices and 5G industrial routers.		
Application Development & Integration	Development of Operator Portal (Angular) and Stakeholder Portal (Next.js).	6	10
	Implementation of backend microservices (.NET Core) .		
Testing & Documentation	System integration testing (SIT) and user acceptance testing (UAT)	10	12
Production & Validation	Deploy to production environment	12	12
	System Validation		
Phase II	Activity / Deliverable	Week From	Week To
Application Development & Integration	Develop Contractor Registration and Approval Workflow	13	28
	Implement Booking System		
	Enable Invoice Generation functionality		
	Payment Gateway Integration		
Testing & Documentation	System integration testing (SIT) and user acceptance testing (UAT).	28	32
Production & Validation	Deploy to production environment	32	32
	Validation and handover to BE'AH operations team.		
Phase III & Project Closure	Activity / Deliverable	Week From	Week To
Application Development & Integration	Integration with Smart Waste Management	32	44
	Integration with AVL		
	Truck-to-Trailer Mapping		
	Third parties integration		
Training, Handover & Closure	System integration testing (SIT) and user acceptance testing (UAT) at pilot site	44	48
	Knowledge transfer sessions for BE'AH technical staff		
	Preparation of system architecture documentation (DFD Level 0-2, ERD, API docs)		
	User manuals, operator training materials		
	Operational Handover		
Post Go-Live Support	Support and incident management	Month(1)	Month(12)
	Preventive maintenance and system updates		
	Continuous monitoring and reporting of SLA compliance		

Implementation Approach

Agile lifecycle

Afaqy delivers through a lean, agile lifecycle—ensuring rapid iteration, predictable releases, and continuous alignment with objectives.

Phase	Key Activities & Ceremonies
1. Design & Prototyping	• Requirement gathering & backlog grooming • UI/UX wireframes & data-flow prototypes • Weekly product planning & review
2. Development (Scrum Sprints)	• 2–3-week sprint cycles • Sprint planning, daily stand-ups, backlog refinement • Change requests via Jira Service Management
3. Testing (Automated & Manual QA)	• CI/CD pipelines run unit, integration, and security tests • Manual QA & defect triage • UAT cycles with product owners & sign-off
4. Deployment (CI/CD Pipelines)	• Staging deployment & internal QA • Production release with release notes • Formal handover and Confluence-driven knowledge transfer
5. Monitoring & Support	• Post-release monitoring & real-time alerts • Feedback loop and quarterly patch releases • SLA-backed helpdesk and capacity planning

Delivery & Release Milestones

- Sprint Planning & Commitments
- UAT Completion & Sign-off
- Staging Deployment & Internal QA
- Production Release with Release Notes
- Post-Release Monitoring & Feedback Loop

This streamlined approach guarantees high-quality, customer-focused releases and full transparency at every checkpoint.

SUPPORT & MAINTAINENCE

System Support Deliverables

In full adherence to the Request for Proposal (RFP) specifications, our proposed solution will include a comprehensive and well-documented set of deliverables that ensure successful implementation, knowledge transfer, and long-term maintainability of the Smart Landfill and Transfer Station Monitoring and Management System (SLMMS).

User Documentation

We will provide complete user-facing manuals tailored to various user roles (e.g., Admins, Operators, Auditors), including:

- Step-by-step instructions for all system functionalities
- Visual guides for web interface operations
- Error-handling procedures and frequently asked questions (FAQs)
- Illustrated examples of workflows such as vehicle registration, weight capture, and reporting

Developer Documentation

Our developer documentation will include:

- System Architecture Document
- Installation guides for setting up system on supported Linux/Windows environments
- Configuration references for integrations with LPR, RFID, and weighbridge hardware
- API documentation (REST endpoints, authentication, expected payloads)
- Build and deployment scripts to reproduce environments confidently and reliably
- *Data Flow Diagrams (DFDs)*

- DFD Levels 0 to 2 To ensure full visibility into system operations, delivering structured DFDs:
- High-level system components and external entities (Level 0)
- Intermediate processes, data stores, and system interactions (Level 1)
- Detailed breakdowns of key subprocesses and data exchanges (Level 2)
- *Entity-Relationship Diagrams (ERDs)*

We will also provide complete ERDs and data dictionaries where to serve as an essential reference for database management and troubleshooting.

Operation Dashboard

لوحة القيادة

تقرير خريطة

عدد البعثات ٤٥

عدد القوارن بالساعة ٥٢٧

عدد المركبات ٥٢٧

عدد المقاولين ٥٢٧

النوع النفايات ٦٦

الحمولة المفرغة لكل مقاول

الحمولة المفرغة بالساعة

الحمولة المفرغة خلال الاسبوع

وزن النفايات المتواجدة في الحرم ٣٤,٩٧٢

عدد القوارن المستعملة على مدار اليوم ٥٢٧

تقرير المقاولين بالمردم

تصدير ملف

أوزان النفايات لكل مقاول

المقاول	الوزن (طن)
المقاول أ	70
المقاول ب	70
المقاول ج	70
المقاول د	70
المقاول هـ	100
المقاول و	120
المقاول ز	70
المقاول ح	70
المقاول ط	70
المقاول ي	100
المقاول ق	120

مدن نظيفة	
مبادرات	
تدشين	
مركبات	
شابات	
أين	
عن نظيفة	
عشود	
مركبات	
بوابات	
ميزان	
اجهزة	
مناطق	
نصارحج	
تصريح دخول	
الموقع الجغرافي	
تقارير	
مركبات المشاغلين	
أنواع النفايات	
المشاغلين	
مركبات مخالفة للنفايات	
التدابير	
الحملة المفرقة بالنساعة	

Contractors Screen

كريم

معلومات عنا

مساعدة

تسجيل التصاريح

مدن نظيفة

إضافة مستخدم					
حذف	تصدير ملف				
رقم الهاتف	وظيفة	البريد الإلكتروني	اسم المستخدم		
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور
✕	✓	01000000000	مستخدم	menna.anwer@gmail.com	مينة الله أنور مينا أنور

Waste Types

كريم

معلومات عنا

مساعدة

تسجيل التصاريح

مدن نظيفة

1	2	3	4
إضافة نوع نفايات			
حذف	تصدير ملف		
نوع النفاية	المركبات		
✓	مركبات ٦	مركبات ٦	مركبات ٦
✕	✓	مركبات ٧	مركبات ٧
✕	✓	مركبات ٦	مركبات ٦
✕	✓	مركبات ٧	مركبات ٧
✕	✓	مركبات ٦	مركبات ٦
✕	✓	مركبات ٧	مركبات ٧
✕	✓	مركبات ٦	مركبات ٦
✕	✓	مركبات ٧	مركبات ٧

Users

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[معلومات عنا](#)
[كريم](#)

[إضافة مستخدم](#)

[تصدير ملف](#)

اسم المستخدم	البريد الإلكتروني	وظيفة	رقم الهاتف	
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐
منة الله أنور منه أنور	menna.anwer@gmail.com	مصمم	٠١٣٤٥٦٧٨٩	☐ ☐

Vehicles' report

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[تقرير لعدد المركبات بالمردم](#)

[تصدير ملف](#)

[تصفية](#)

المركبة	رقم اللوحة	المقاول	العقد	نوع المركبة	نوع النفاية	رقم التصريح	نوع التصريح	اقصى و
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن
مركبة ب	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	سحاب	منزلية	١٢٥٦٧٩	رخصة دهايات مشاريح	١٥٦٤ طن
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن
مركبة ب	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	سحاب	منزلية	١٢٥٦٧٩	رخصة دهايات مشاريح	١٥٦٤ طن
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن
مركبة ب	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	سحاب	منزلية	١٢٥٦٧٩	رخصة دهايات مشاريح	١٥٦٤ طن
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن
مركبة ب	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	سحاب	منزلية	١٢٥٦٧٩	رخصة دهايات مشاريح	١٥٦٤ طن
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن
مركبة ب	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	سحاب	منزلية	١٢٥٦٧٩	رخصة دهايات مشاريح	١٥٦٤ طن
مركبة أ	ب ط ل ١٣	مصطفى احمد Mostafa Ahmed	١٢٥٦٧٩	ضاحط	دهاز	١٢٥٦٧٩	رخصة دهايات افراد	١٥٦٤ طن

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Waste per hour report

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Entry Permits

إضافة تصريح دخول

تصدير ملف

رقم التصريح	النوع	الاسم	رقم المركبة	تاريخ البدء	تاريخ الانتهاء	
٢٥٦٩	موظف	محمد احمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٣٤٦٩	زائر	احمد محمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٥٦٩	موظف	محمد احمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٣٤٦٩	زائر	احمد محمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٥٦٩	موظف	محمد احمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٣٤٦٩	زائر	احمد محمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٥٦٩	موظف	محمد احمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	
٢٣٤٦٩	زائر	احمد محمد	ف ل ع ٤٣٢	٦/١/٢٠١٩	١٩/١/٢٠١٩	



عن التصاريح

رقم التصريح : ١٢٥٦٧٩

التاريخ : ٧/١١/٢٠١٩

الوزن : ١٢٥ طن

الشركة

الاسم : شركة س

رقم السجل التجاري : ١٢٥٦٧٩١٢٥٦٧٩١٢٥٦٧٩

اسم المفوض : محمود احمد

رقم الهوية : ١٢٥٦٧٩١٢٥٦٧٩١٢٥٦٧٩

الوزن الكلي : ٣٣٤ طن المركبات

اسم المركبة	تاريخ الدخول	الوزن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن
ف ل ع ٤٣٢	٧/١١/٢٠١٩	٣٤ طن

تم

التاريخ : ٧/١٧/٢٠١٩

رقم السجل التجاري : ٣٤٢٢٣٤٢٤

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تَمَّ



عن التصاريح

رقم التصريح : ١٢٥٦٧٩

التاريخ : ٧/١١/٢٠١٩

الوزن : ١٢٥ طن

الجهة

الاسم : جهة س

اسم المفوض : محمود احمد

رقم الهوية : ١٢٥٦٧٩١٢٥٦٧٩١٢٥٦٧٩

الوزن الكلي : ٣٣٤ طن

المركبات

الوزن	تاريخ الدخول	اسم المركبة
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤
٣٤ طن	٧/١١/٢٠١٩	ف ل ع ٣٢٤

تم

الشارع : شارع أ

رقم الناقل : ٥٦٧٩

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Municipalities' report

كريم

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معلومات عنا

مساعدة

تسجيل التصاريح

مدن نظيفة

تقرير لعدد البلديات بالمردم

لوحة القيادة

المستخدمين

الوظائف

أنواع المركبات

أنواع النفايات

البلديات

المقاولين

عقود

مركبات

روايات

ميزان

اجهزة

مناطق

تصاريح

تصدير ملف

تصفية

البلديات	النفايات المنزلية	النفايات التجارية	النفايات الزراعية وكبيرة الحجم	دهارات	إطارات	التاريخ	الوزن الكلي بالطن
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
الرياض	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
الرياض	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
الرياض	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
الرياض	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
الرياض	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩
جدة	المقاول أ	ضاغط	منزلية	طن ٨٩	طن ٨٩	٦/١/٢٠١٩	طن ٨٩

Current Component Setup at BE'AH Sites



The current infrastructure deployed across BE'AH sites by Al Hinai and MHD comprises various third-party components that collectively support site access management, monitoring, and operational control. AFAQY's **MARDAM** platform has been purposefully designed to integrate seamlessly with these existing systems through both **hardware-to-hardware** and **software-to-software** connectivity.

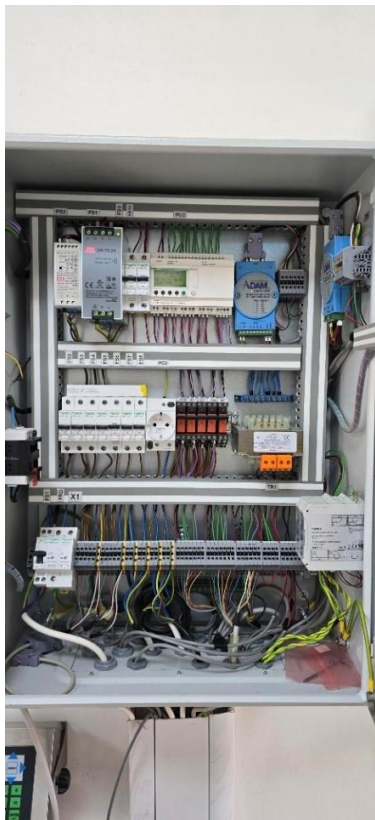
This architecture enables MARDAM to dynamically **whitelist or blacklist vehicle and personnel traffic** entering or exiting the sites, ensuring compliance with BE'AH's operational and security policies. The integration framework allows for real-time data exchange between MARDAM and third-party devices such as **ANPR cameras, gate barriers, weighbridges, and access control systems**, ensuring synchronized functionality without disrupting existing workflows.

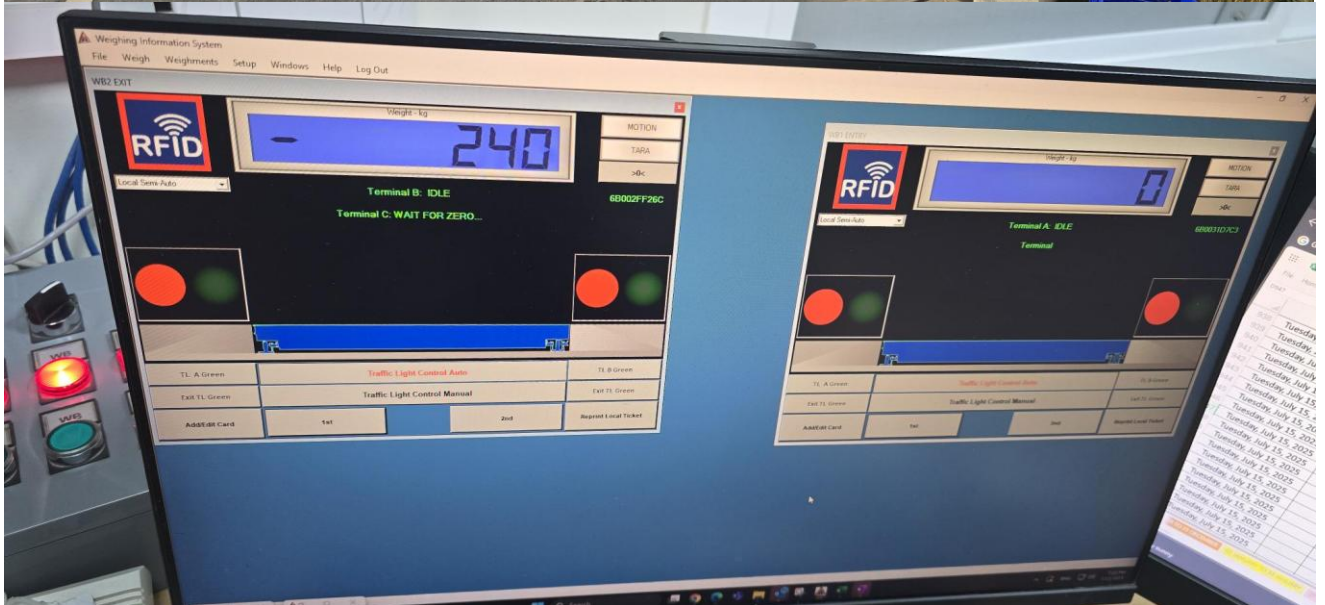
By maintaining compatibility with the current component setup, MARDAM provides a unified control layer that enhances visibility, strengthens compliance, and optimizes site operations — all while preserving the integrity of BE'AH's legacy investments.

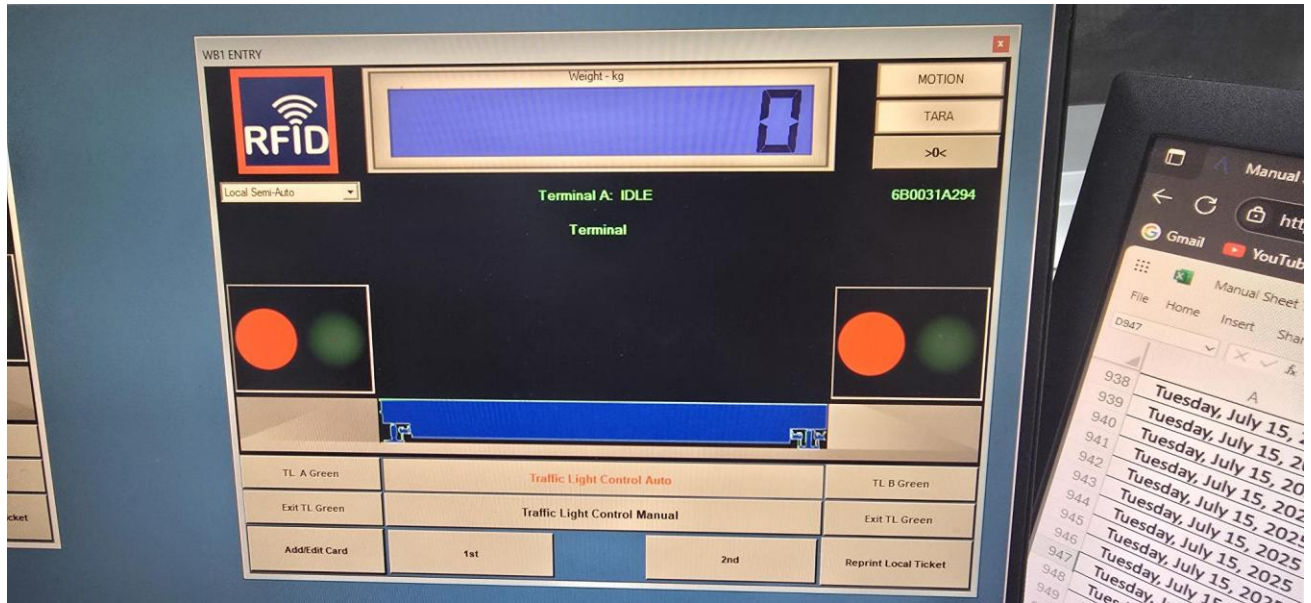
Below are several images captured from BE'AH's site infrastructure, showcasing the gate barriers and weighbridges installed by Al Hinai and AFAQY.

Through close collaboration with Al Hinai and MHD, AFAQY has further enhanced the MARDAM platform. It is now more robust, versatile, and fully optimized to integrate seamlessly with the existing site setup, ensuring smooth interoperability across all connected systems and components.









Below are the technical details of the integration framework established between AFAQY's MARDAM platform and Al Hinai's & MHD's software solution. This integration enables dynamic, real-time, and seamless data exchange between both systems, ensuring synchronized operations, enhanced visibility, and efficient control across BE'AH's site infrastructure.

System Description, Technical Details & Drawings

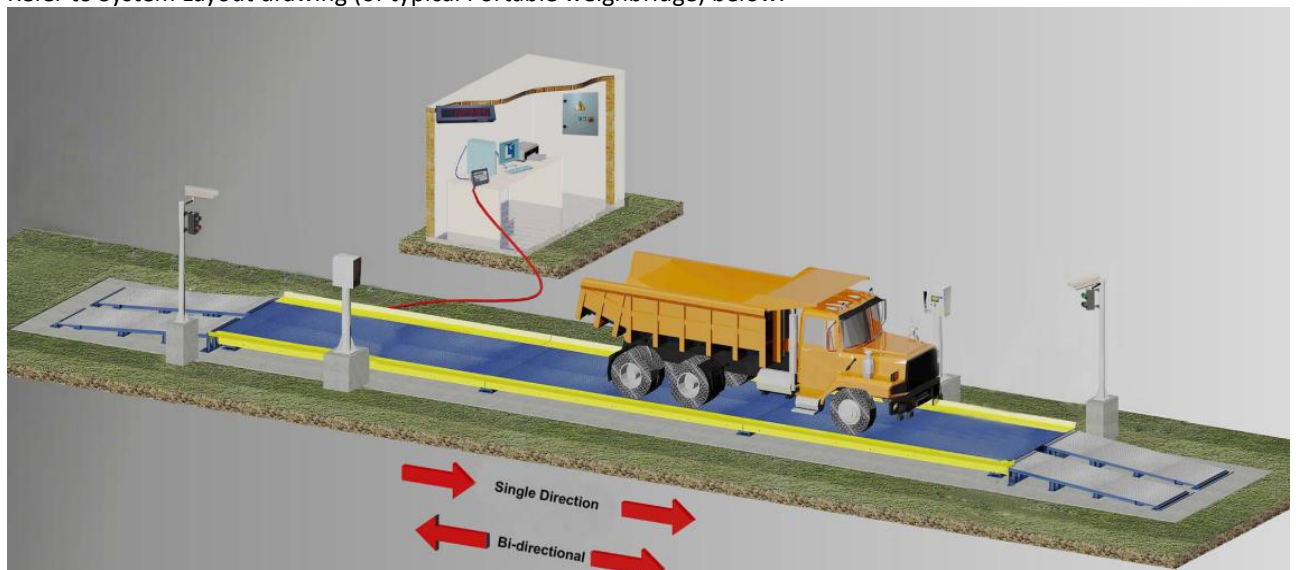
As per the statement of MHD, "Our offer is with both meeting and exceeding all of your technical requirements. These are well proven and reliable designs from our principals based in Greece and India. These have been supplied and working to the full satisfaction of our clients in the Sultanate of Oman including Be'ah."

Make: Weighing Engineering, Greece (manufactured in India by Precision Weighing Systems under License)

Capacity: All Steel 80T x 18m x 3m (upgradable) Weighbridge meets and exceeds Tender requirement of DIN8119:EN45501 (Meets DIN1072:EN45501)

Vehicle Identification technology offered: RFID cards
Full description follows in the sheets ahead.

Refer to System Layout drawing (of typical Portable weighbridge) below:



Make: Weighbridge Model NT-31, Weighing Engineering, Greece

Capacity: All Steel 80T x 18m x 3m (upgradable) weighbridge meets and exceeds DIN8119:EN45501 (Meets DIN1072:EN45501)

Vehicle Identification technology offered: RFID cards

The system performs legal for trade truck weighing function, controlled by a higher-level Personal Computer and a 'Stand alone' operation in case of PC maintenance.

Each Weighbridge System consists of the following main elements:

1. The Weighbridge model NT-31 in a fully electronic design supported on load cells with an intermediate load distribution and transfer system to prevent side loads. The Weighbridge operates in two directions (bi-directional).
2. The load cells are connected in parallel to an Analog Junction Box (AJB).
3. The AJB also offers corner equalization, EMC and Surge load cell protection.
4. Traffic Light Controls
5. Weighing Indicator ZM305 which in normal conditions operates as a weight transmitter to the PC and may optionally operate as Weighing Terminal (with weighing memory and ticket printing) if the PC is out of order.
6. PC as per Tender specs, running Leon Engineering Weighing & Information Software (WIS).
7. Ticket Printer.
8. RFID reader/programmer in weighbridge control room and 60 programmable cards.
9. Intercom for communication with weighbridge area/truck driver.
10. Remote Driver Terminal one each on entry and exit sides of the scale for weight indication, swiping of RFID card by Driver for automatic identification system, intercom for communication with weighbridge control room and built-in weighing ticket printer. Keypad for entering manual information is also provided.
11. LED traffic light - RED / GREEN, one set each on entry and exit
12. Remote outdoor Display for weight indication installed on weighbridge control room.
13. Surveillance/ Photo capture cameras at both sides of the weighbridge.

Operation:

The weighing is based on the 1st and 2nd weighing principle.

1st weighing is performed when the truck enters the site.

2nd weighing is performed when the truck leaves the site.

The difference of the two is the NET weight delivered.

The driver may remain in the truck during the two weighing and collect his ticket on exit either from the Remote Driver Terminal or the weighbridge control room.

The system can operate in three modes:

Automatic (Unattended):

Allows 24 hours 7 days a week weighing operations

RFID cards are issued to the pre-registered and frequently visiting vehicles.

Pre-registered trucks with fixed data are weighed with the use of a pre-programmed RFID card and RDT-18 in the Remote Driver terminal.

Truck ID and relevant data (material, customer, etc.) are pre-programmed in the system and attached to an RFID card.

When the truck enters the weighbridge the driver swipes his RFID card in front of the reader installed on the Driver Terminal. The card is recognized by the system and when the scale is stable the weight is captured and stored in the PC.

The weighing ticket may be issued in the weighbridge control room and/ or at the terminal.

The weighing is completed and the driver is prompted to leave the weighbridge. Traffic light turns Green to indicate driver to leave the weighbridge.

All operations (weighing, storing, control of traffic lights, etc.) are controlled from the PC and WIS software.

Alternately in place of RFID cards, the Driver can key in the Vehicle ID and relevant data (material, customer, etc.) using the keypad on the Remote Driver Terminal.

Photo capture cameras will photograph the front and rear part of the truck, storing the information to weighing file.

This procedure is followed for 1st and 2nd weighing.

Semi- automatic:

Operator manually keys in the truck information into the PC

Weighing performed and weighing ticket is printed on the local printer connected to the PC.

All operations (weighing, storing, control of traffic lights, etc.) are controlled from the PC and WIS software.

Manual:

This is an emergency mode.

Operator has full control of the weighing using the Weight indicator in the weighbridge control room

The weighing ticket is printed on the local printer connected to the weighing indicator.

These weighing's are stored in the indicator memory and may be transferred to the control PC when it resumes operation.

Technical Details:

NT31 heavy duty Pit-less/Pit/Portable mounted steel weighbridge

Structural Details Specifications

Parameters	Description
Weighbridge Type	Consisted of 4x modules laid on load cell Fully electronic Fully floating with special longitudinal & lateral bumper assembly Prefabricated concrete foundation
Platform Size	18 m x 3m
Minimum weighing Capacity	80 tons (upgradable)
Maximum weighing Capacity	20 tons per truck axle
Division	10kg (for EN 45501 or OIML R76: 0-60.000/ 20kg, 60.000-100.000/ 50kg)
No. of Load Cells	10
Load Cell Type / Capacity	Compression / 30t
Side Force Elimination	Especially designed for weighbridges, easy to install. Prevents unwanted forces from affecting load cell performance. Mounting fixture is available for accurate positioning and alignment of foundation plates.
Platform Type	Modular Design, Fully Floating with longitudinal & Lateral Bumper Assembly, Constrainer Less (no check rods). Top of the platform is made of teary type plate 10mm thick to avoid slippage of wheels.
Scalability	Modular Platform Design with a provision extension (may be extended in length by adding modules).
Material of Construction	First quality construction Steel ST 37, S235
Surface Treatment	One layer Primer and two layers of Epoxy (anti-corrosive) paint
Accessibility / Maintenance	Via removable covers on top of the load cells and throughout the length of the platform.

Load Cell Specifications

Parameters	Description
Model	RC3 Flintec GmbH
Type	Compression Load Cell, Analog
OIML Appoval	R60
Accuracy Class	C3, 3000 divisions

Housing Material / Mechanical Protection	Stainless Steel / IP68
Nominal Capacity	30.000kg
Operating Temperature Range	-40... + 80 °C
Compensated Temperature Range	-10... + 40 °C
Safe Overload	200% of Emax
Ultimate Load	300% of Emax
Rated Output	2mV/V
Output Resistance	1100Ω ± 2 Ω
Input Resistance	1150Ω ± 50 Ω
Load cell Cable	Anti-rodent type

Interconnecting Cables Specifications

Parameters	Description
Type	Steel Wired Armored (SWA) , 6 Core Shielded Cable
Connection	6 wire connection method

Junction Box Specifications

Parameters	Description
Protection Class	IP65 stainless steel enclosure
Electromagnetic Compatibility	EMI / RFI, Surge Protection
Cable Glands	Double Compression Type
Connection	10 Point load Cell Connection Terminal Strips

Indicator / Terminal Specifications

Parameters	Description
Model	VT300
Type	Table top/Wall mounted
Housing/ Environmental Protection	Stainless steel (IP65)
Approval	OIML R76 and EU-Type DK0199.27
Display	16 character, LCD, backlit display, 14.5mm digit height
Keyboard	Numeric/ alphanumeric membrane keyboard of 27 keys, with tactile feedback
Functions	Automatic zero tracking, no motion detection, auto-zero on power-up, zero, tare, preset tare, net mode, multiple test functions
A/D Converter Type	Sigma-Delta radiometric with analogue and digital filtering (FIR & post filtering, rolling average)
A/D Conversion Rate	3 up to 70 measurements per second (set-up selectable)
Interfaces	2 serial ports for PC/ Printer connection: COM1: standard RS232, COM2: RS232 or RS485

Operating Temperature	-10 °C to +40 °C
Storage Temperature	-10 °C to +70 °C
Humidity (%)	40- 90% RH, non condensing
Power Supply	230 Vac (100-250 Vac)
Data Management Software	Flash, tally-roll (Alibi) memory, Real-Time-Clock., Truck Weighing Memory

Printer Specifications

Parameters	Description
Model	Canon
Key Features	Canon i-SENSYS LBP226dw mono LASERJET PRINTER (UP TO 38PPM)

Weighing Computer Specifications

Parameters	Description
Model	DELL OPTIPLEX 7000 DESKTOP Intel CORE i7-12700-2.9GHz INTEL MAINBOARD 8GB DDR- 5 MEMORY 512GB NVME SSD HARDDISK INTEL HD GRAPHICS DVD+-RW LAN INTEGRATED 10/100/1000 MICRO TOWER ATX CABINET USB KEYBOARD OPTICAL MOUSE WINDOWS 10 PRO 64BIT SERIAL PORT 24" DELL MONITOR
Microprocessor	
Hard Disc	
Software	
Video Card	
RAM Memory	
Mouse and Keyboard	
Monitor	

	Local Remote Terminal Specifications
Parameters	Description
Cabinet 	Outdoor - Dipcoat-primed, powder-coated in textured RAL 7035 (light gray) (IP66) With outer Weather protection box and installation base Includes: -Weigh display -RFID reader 125kHz , Promag GP20 -printer CITIZEN PM2300 III -IO to ethernet modules Advantech Adam 6052 -Interphone
Panel / Display	Powder –coated aluminum
Interfaces	Ethernet
Operating Temperature	-20 °C to +50 °C

Storage Temperature	-20 °C to +70 °C
Humidity (%)	40- 90% RH, non-condensing
Power Supply	230 Vac / 120 Vac

Parameters	Traffic lights (Double)
	Traffic Light Specifications
Parameters	Description
Power Supply	230 Vac / 3 W
Lamp diameter	Φ140mm
Lamp Color	1 x RED, 1 x GREEN/ direction – Double sided
Led Content	25 LED / lamp
Enclosure/ Shell Material	Anodized aluminum
Protection Level	IP 65
Height Stand	3 M

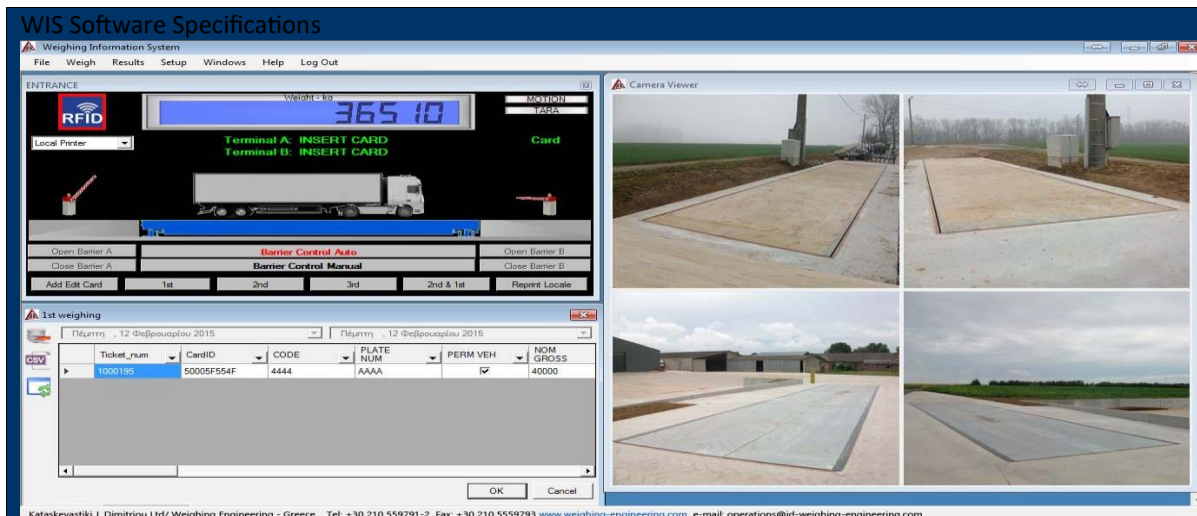
	IP Cameras Specifications	
Parameters	Description	
Type	IP Camera	
Image Sensor	Sensor	High Definition Color CMOS Sensor
	Display Resolution	1280 x 960 (1.3M Pixels)
	Min. Illumination	0 Lux (With IR Illuminator)
Lens	Lens Type	Glass Lens
	Focal length	f:4mm
	Aperture	F1.2
	Angle of View	70°
Network	Ethernet	One 10/100Mbps RJ45 port
	Wireless Standard	IEEE802.11b/g/n
	Data Rate	IEEE802.11b: 11Mbps (Max.); IEEE802.11g: 54Mbps (Max.); IEEE802.11n: 150Mbps (Max.).
	Wireless Security	WEP, WPA, WPA2

	Network Protocol	IP,TCP, UDP, HTTP, HTTPS, SMTP, FTP, DHCP, DDNS, UPnP, RTSP, ONVIF
System Requirements	Operating System	Microsoft Windows 2000/XP, Vista, 7,8; Mac OS
	Browser	Microsoft IE6 and above version or compatible browser; Mozilla Firefox; Google Chrome; Apple Safari.
Power	Power Supply	DC 12V/2.0A
	Power Consumption	7.5 Watts (Max.)
Environment	Operating Temperature	-20°C ~ 60°C (-4°F ~ 140°F)
	Operating Humidity	10% ~ 90% non-condensing
	Storage Temperature	-20°C ~ 60° (-4°F ~ 140°F)
	Storage Humidity	0% ~ 90% non-condensing
Certification	CE, FCC, RoHS	

RFID125kHz , Promag GP20		RFID Reader/Programmer Specifications
		
Parameters	Description	
Transmit Frequency	125KHz / 135,2KHz	
Read Range	0-6 cm	
Communication	Compatible with version 2.0, mini USB 5-pin connector	
Antenna	Built-in	
Operating Temperature	-20° C .. +65° C, 95% RH	
Storage Temperature	-30° C .. +85° C, 95% RH	

		Segment display
	10 mm height of digits	
Communication	Ethernet	

Software - Weighing Engineering Weighbridge Information Software (WIS)



Description

Weighing data is controlled / monitored by a PC in the Weighbridge Control Room running Weighbridge Software. All transaction data is handled/ stored in the PC.

WIS is a comprehensive and user friendly software package, developed by Weighing Engineering for weighing and vehicle flow control in weighbridge applications.

Due to its simple design and flexibility it will suit nearly any requirement to provide instantly accessible information on any load that passes over your scale, whether receiving raw materials, dispatching finished products or operating commercial weighing stations.

WIS is a standard kernel for Windows platforms, suitable for applications such as:

- Quarries / Landfills / Recycling / Mining / Waste transfer stations / Manufacturing / Transportation

The monitor displays the mimic diagram of the scale, operation details and the incomplete weighings.

The monitor screen, (refreshed at minimum 2 times/ sec), the keyboard and the mouse may be used to fully control the operation of the scales.

The software is constructed, according to modern industry standards, in such a way that it is user friendly and can be used by operators with basic knowledge of computers.

Data integrity is guaranteed against misuse by the operator or erratic functioning of the computer, while reliability is high through redundant functions.

The software is capable of producing ticketing, mini report, daily / weekly / monthly / yearly tonnages received at the facility and individual waste streams. Reports may be generated in Excel and/ or Acrobat pdf; any filter may be applied such as time interval, product, customer, truck, etc.

Transaction data is available for review immediately after the transaction is completed by the driver.

The software may be setup for:

- Separate Ticket For First and Second Weighing
- Separate Ticket For each Weighing Procedure
- Separate Ticket For each Weighing Terminal
- Ticket Printed on Network PC or Weighing Indicator
- Entry – Exit From any Weighing scale (in case of scale fault)

Tickets may be standard or customer formatted.

System Overview

It offers Advanced vehicle management:

- Vehicle Legal Gross Check

- Vehicle Nominal Tare Check
- Trucks may be grouped for Easy Management
- Different Truck types

Standard databases and report generators are connectable and the core may be extended to cover future needs.

It offers a multi-level security system:

Each user has a password and a code. For each password the access level is defined by the manager. The access level defines which part of the system is accessible.

For system file traceability every access is stored in a change file which logs:

Every Entry and Exit of the system

Any system parameters changed

Any system files changed.

PLUS edition of WIS software also covers the interchangeability of weighing data through SQL exchange tables and offers advance reporting of the data.

It accommodates connection with systems is possible by providing access to our database, so the data may be extracted at real time or vice versa. The provider of the system will provide tables with the requested data and we will upload the information (optionally at an extra cost).

Supports

IMAGE MODULE: Receives the snapshots taken from the IP cameras and stores the path together with the weight ticket.

TRAFFIC LIGHT MODULE: Controls the operation of traffic lights

We also include Beah's new requirement of various customised reports, VAT invoice and POS requirement.

Accessories:

UPS	UPS 2.2KVA Line interactive (Online UPS), Make - Eaton
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System Overview

A lightweight Windows Service is deployed at each site to:

Read weighment data from the local SQL Server.

Securely transmit data to a central system.

Receive and update contract and authorized truck data.

Key Features

Offline Capability: Buffers data and retry sync when the network is down.

Local Enforcement: Applies allow/deny rules for truck weighments using the latest central data.

Logging & Monitoring: Maintains detailed logs, audit trails, and error alerts (local + optional remote telemetry).

Health Reporting: Exposes service status for local operations.

Configuration: Encrypted settings with support for remote updates.

Data Synchronization

Outbound Sync: Periodically or immediately pushes new weighments to the central API.

Inbound Sync: Retrieves contract and truck lists (full or delta) via schedule or push notification.

Architecture

Local Component: .NET Worker Service running as a Windows Service.

Central Component: REST API or messaging endpoint for data exchange.

Network: Secure HTTPS with retry/backoff; VPN optional based on central IT requirements.

Exclusions

Local Authorization Logic: Not included. Requires weighbridge software changes to evaluate truck/contract data and make allow/deny decisions.



YOUR PARTNER IN WEIGHING

Supplied by Al Hinai



Software solutions for weighing systems



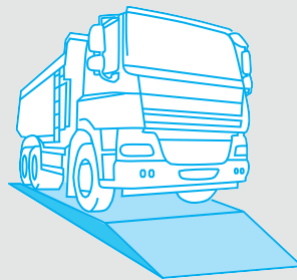
Product CatalogueGS SOFTWARE - YOUR PARTNER FOR WEIGHING SOFTWARE!

GS Software was founded in 2007. Since the very beginning we have focused on providing high quality software used in weighing processes. Currently we produce software used to handle weighing operations on truck, axis and rail scales (both static and dynamic), belt conveyor scales, palette scales, weighbridges and industrial scales. We also design and implement complete weighing systems in industry and produce electronic components used in weighing processes. The quality of our software has been recognized by leading companies in the weighing sector. Our products are sold under the brand names of several weighing companies with a global reach.



Our software!

+



Your scale!

=

100%

Stable operation!

Why choose our software?

- ✓ it is easy to use
- ✓ it operates stably for its entire life-time ✓ it can be adapted to support weighing indicators of any manufacturer
- ✓ it supports various types of weighing
- ✓ it cooperates with truck and railway scales

- ✓ the software can be adopted to meet individual requirements (e.g. integration with ERP systems)
- ✓ we guarantee free access to technical support ✓ our software is available in multiple language versions - adding new ones is a matter of weeks

GSW STANDARD - SOFTWARE FOR TRUCK AND RAIL SCALES

GSW Standard

GSW is a modern, specialized application, guaranteeing 100% stable operation.

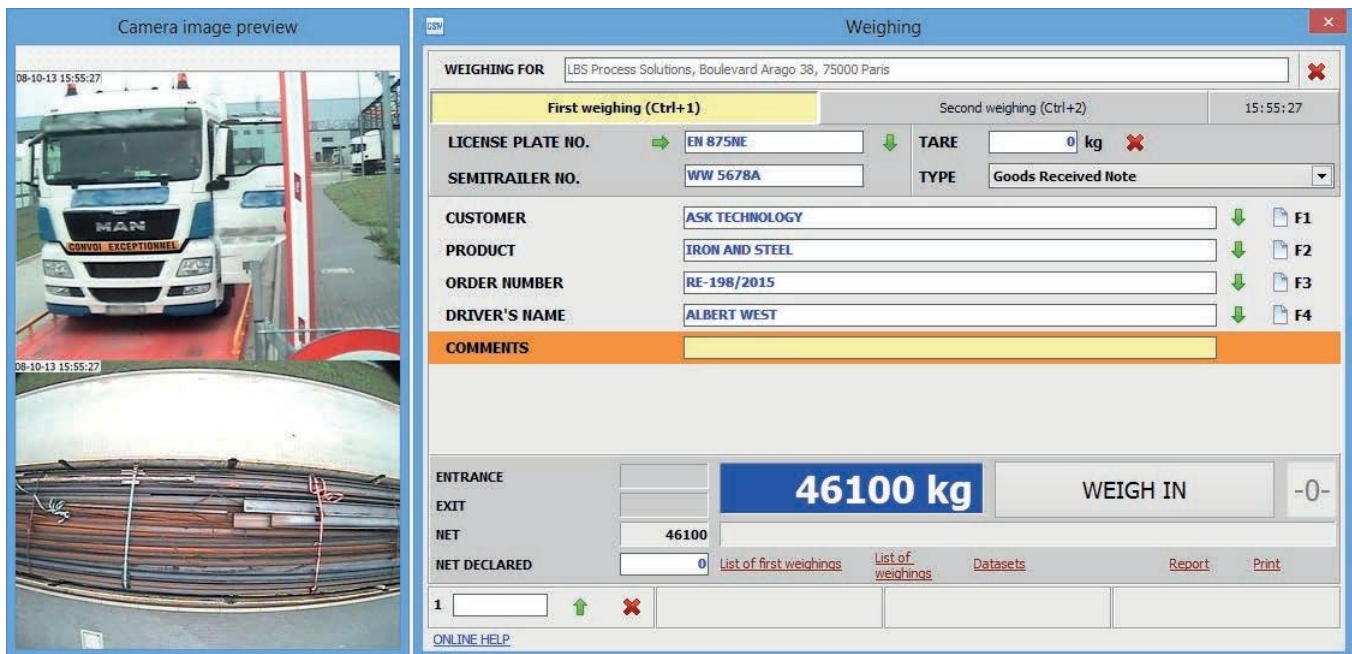


While designing GSW software, we concentrated mainly on making the software user-friendly, we strived to make the program installation, configuration and day-to-day usage as easy as possible. Based on our wide experience, we have created a clear and simple interface - especially important in the common case in which scales are operated by less tech-savvy persons.



Transparent weighing window

The GSW weighing window can be adjusted to the user needs with just several mouse-clicks. Apart from the basic information required for weighing, such as: vehicle registration number, contractor name and product name, up to 10 custom data tables and 8 information fields can be added by the user. Moreover, a live feed from the cameras monitoring the scale enables you to monitor the weighing processes continuously.



THE PROGRAM'S ADDITIONAL MODULES

The main features of the program include:

- ✓ Truck scale and rail scale operation ✓
- Simultaneous handling of 3 scales
- ✓ Possibility to activate additional modules
- ✓ Camera handling - automatic snapshots of weighings
- ✓ Handling of self-service driver terminals

Additional modules available in the program

 Vehicle location on the weighbridge control module Control of a vehicle's location on the weighbridge with infrared barriers or optical sensors allows to maintain the correct position of the vehicle during the weighing process. The mechanism verifies the vehicle's location on the weighbridge, ensuring that none of the axes is outside the weighbridge.	 Weighing with packaging/containers module This module allows you to freely determine the type of the packaging received/delivered depending on the company's business profile. They can be e.g. pallets, wooden crates, metal baskets, pallet collars, plastic packaging and containers. Specific weight may be assigned to each of the user-defined packaging.
 Traffic light and barrier control module This module allows you to control external devices, such as traffic lights or barriers, from the GSW user window, or following a predefined, automatic weighing process.	 Contamination handling module Before weighing, the user can specify the level of contamination. The contamination can be specified either in percentage or kilograms. The program then calculates the net weight automatically, which is then reduced by the contamination value.
 Weighbridge monitoring module (registering an object's presence on the weighbridge) This module continuously monitors the scales. In case a mass change greater than 400 kg is detected, and no weighing or tare weighing is performed, the event is logged, and snapshots from the cameras assigned to the scales are taken.	 Warehouse handling module In this module you can create any number of warehouses in the weighing program and perform warehouse operations, such as acceptance/external release, material movement, etc. The operations can relate to any warehouse or any product.
 Access to data via the Internet This module allows you to access the database of performed weighings and pictures via the Internet and also allows you to generate reports of the accomplished weighings. Using this module, a weighbridge owner can preview the weighing processes using a device connected to the Internet, e.g. a tablet, smartphone or a remote workstation.	 SMS sending module This module allows you to receive text messages to a predefined phone number based on predefined triggers concerning the weighbridge, e.g. when a vehicle leaves the weighbridge without a weighing being performed.

- ✓ Advanced report generator
- ✓ Graphical weighing tickets editor ✓
- Configurable database
- ✓ RFID card readers handling
- ✓ Handling of external devices, e.g. traffic lights and barriers

OPERATION OF MULTIPLE WEIGHING SCALES AND DEPARTMENTS

✓ Operation of three weighing scales

The GSW Standard solution installed on one workstation can handle up to three weighing indicators. Each of the scales can perform single, double (entry/exit) and multiple weighing, compound weighing (long vehicles on short scales), service weighing and taring weighing. It is possible to handle truck scales and rail scales from a single workstation.



✓ Networking

GSW applications can be combined into any number of workstations within a company's local network. The use of a modern, fast and highly efficient SQL server allows for smooth operation in the networked environment, as well as safe collection of vast amounts of data. The program has successfully been implemented in multi-branch corporations, handling more than 100,000 weighings a year.



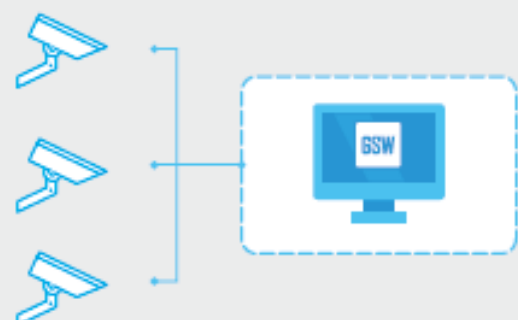
✓ Cooperation with weight indicators

GSW supports over 80 weighing indicator models from a variety of manufacturers. Supported communication modes include RS 232/RS 485 or and TCP/IP. Moreover, our support team swiftly responds to customer requests to add support for further weighing indicator models – free of additional charges. Our list of supported devices constantly keeps on growing!



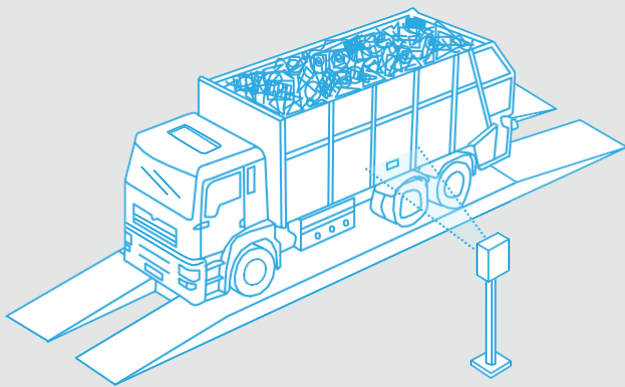
✓ Camera handling

GSW includes an advanced video engine, allowing to simultaneously connect to 12 cameras. Live feed from the cameras is visible in the weighing window, while snapshots of all weighings are saved into the database.



AUTOMATED WEIGHING SYSTEMS

GS Software is a producer of a wide range of systems, used in automated weighing processes. Bearing in mind the needs of our customers, we can supply systems for automated weighing, customized to fit individual requirements.



Our offer includes:

- ✓ Weighing systems with RFID card readers
- ✓ Weighing systems with self-service driver terminals
- ✓ Remotely operated vehicle weighing systems
- ✓ Weighing systems with barcode readers
- ✓ Weighing systems with short range and mid-range RFID tags
- ✓ Weighing systems with the weighed vehicle's number plate recognition
- ✓ Weighing systems with sea container number (SOLAS) recognition

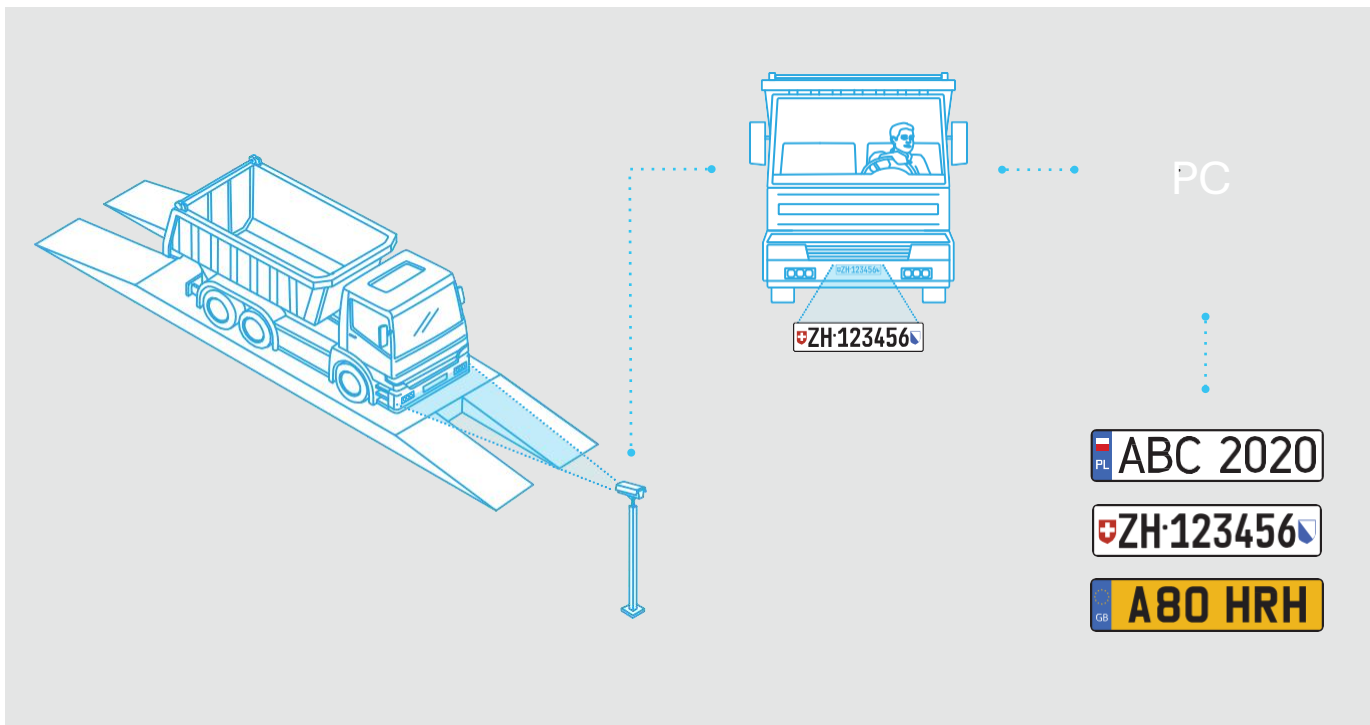
✓ Systems integration

Our company specializes in integrating weighing systems with ERP systems (e.g. SAP, Microsoft Dynamics NAV, Microsoft Dynamics AX).

Hundreds of customers have trusted our expertise, which resulted with a broad range of successful projects, and confidence in our ability to handle all sorts of challenges accompanying system integrations.

WEIGHING SYSTEMS WITH NUMBER PLATE RECOGNITION

One of our expertise areas includes the design of weighing systems with number plate recognition. For this reason, the GSW software implements a powerful mathematical engine, which recognizes number plates.



Advantages of ANPR systems:

- No human supervision required to operate the scales
- Recognition effectiveness exceeding 95%
- Increase of the scale's capacity - the entire weighing process only takes 15~20 seconds
- Increase of work safety - the driver does not need to leave the vehicle

STX-SERIES SELF-SERVICE DRIVER TERMINALS

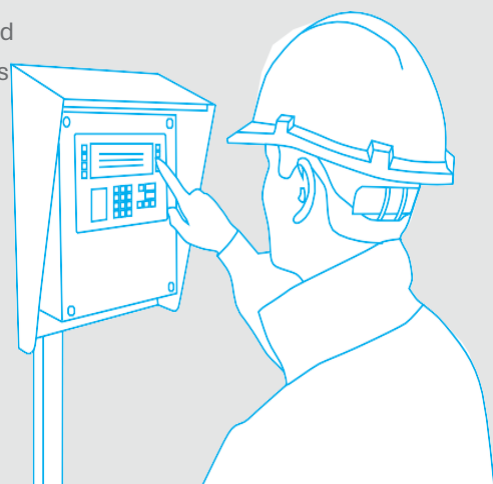
STX 5000



GS Software manufactures self-service terminals which, combined with GSW software solutions, help streamlining weighing processes on a truck scale.

Using the terminal, the driver can autonomously perform weighing by providing/selecting the required pieces of information (e.g. type of delivered product, order no.).

The terminal can be logged into by swiping a previously provided RFID card, entering a unique code assigned to each driver, or based on the license plate number of the weighted vehicle.



Self-service terminal

The STX 5000 self-service terminal can be used to create a variety of automated weighing systems. The terminal is equipped with a high-brightness, clear TFT display, enabling operation in direct sunlight. The alphanumeric keyboard mounted on the terminal is equipped with large keys for easy text entry by the user. The terminal has the ability to read RFID cards. STX 5000 can additionally be equipped with a weighing ticket printer and intercom to contact the scale operators (with HD sound quality).

STX SERIES RFID CARD READERS

TX 1000 is an uncomplicated and reliable RFID card reader. RFID card reading is confirmed by a beep, while weighing completion is confirmed with a clearly displayed "OK" sign.



Using the STX 1000 and STX 2000 readers, the GSW software can perform weighing processes with the use of RFID cards or with a designated ID codes, assigned to each driver (STX 2000).

The readers are equipped with digital I/O modules enabling the control of external devices such as traffic

STX 1000
RFID card reader



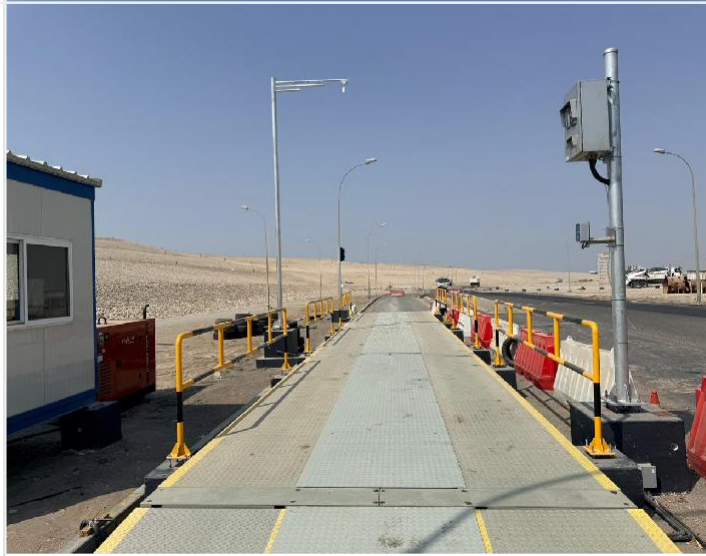
2000
STX

STX 2000
RFID card reader



STX 2000 is equipped with an OLED display, a numeric keypad, and a RFID card reader. The weighing process is initiated by placing the card in **OUR PROJECTS IN PRACTICE**

the proximity of the reader, or by entering of a PIN code. The reader also allows you to select the type of product to be weighed.





Hardware Details & Specifications

Workstation Setup

Dell OptiPlex 7010 MT Desktop Computer



- Intel Core i7-13700 Processor
- 32GB RAM DDR5
- 1TB SSD Storage
- Intel Graphics
- Windows 11 Pro
- Color: Black

Monitor Setup
Dell SE2422H



- 24 Inch FHD LED Monitor
- AMD FreeSync
- 1920x1080 Resolution
- 75Hz Refresh Rate, 5ms Response Time
- 16:9 Aspect Ratio
- VA Technology
- Anti-Glare 3H Hard Coating
- HDMI, VGA Port



FLYER // RUT956

RUT956

INDUSTRIAL CELLULAR ROUTER



RUT956 360° VIEW

// RUT956 is an industrial router that combines dual-SIM cellular 4G LTE, Wi-Fi, and wired connectivity options and additionally offers GNSS capabilities.

// Automatic WAN failover ensures solution uptime even if the primary connection is lost.

// Serial communication interfaces enable integrating more varied devices to the solution ecosystem, even legacy equipment.

// Digital and analog Inputs/Outputs with advanced RutOS software features facilitate equipment control, automation, and event notifications.

// Packed with advanced industrial software features, including Modbus, SNMP, TR-069, NTRIP, MQTT, and multiple VPNs.



CONNECTIVITY

4G LTE (Cat 4), 3G, 2G

DUAL SIM

With auto failover, backup WAN and other switching scenarios

MULTIPLE INTERFACES

Ethernet, Serial (RS232, RS485) and multiple Inputs/Outputs for any industrial connectivity use case

GNSS

Global Navigation Satellite System for location services and time synchronization



KEY FEATURES

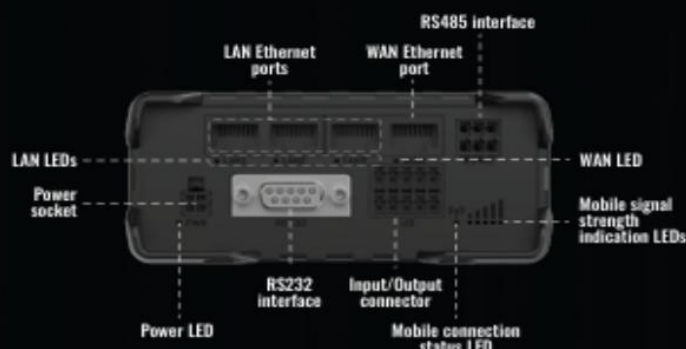
HARDWARE

Mobile	4G LTE Cat 4 up to 150 DL/50 UL Mbps; 3G up to 21 DL/5.76 UL Mbps; 2G up to 236.8 DL/236.8 UL kbps
CPU	Mediatek, 580 MHz, MIPS 24KEc
Storage	16 MB Flash
Memory	128 MB RAM
Powering option	4-pin industrial power socket, 9 ~ 30 VDC
SIM	2 x SIM slots (Mini SIM - 2FF), 1.8 V/3 V, external SIM holders, eSIM (Optional)
SD Card	Micro SD (internal)
Antenna connectors	2 x SMA for mobile, 2 x RP-SMA for Wi-Fi, 1 x SMA for GNSS
Ethernet	4 x 10/100 RJ45 ports: 1 x WAN (configurable as LAN), 3 x LAN
Wi-Fi	IEEE 802.11b/g/n, Access point (AP), Station (STA)
GNSS	GPS, GLONASS, BeiDou, Galileo, QZSS
Inputs/Outputs	On 4-pin socket: 1 x Digital input, 1 x Digital open collector output On 10-pin socket: 1 x Isolated digital input, 1 x Digital dry input, 1 x Analog input, 1 x Isolated open collector output (requires external voltage), 1 x Relay output (non-latching)
Serial	1 x RS232, 1 x RS485
Other	1 x USB host
Status LEDs	1 x Bi-Color connection type, 5 x Signal strength, 4 x Ethernet, 1 x Power
Operating temperature	-40 °C to 75 °C
Housing	Aluminium housing, plastic panels
Dimensions (W x H x D)	110 x 50 x 100 mm
Weight	287 g

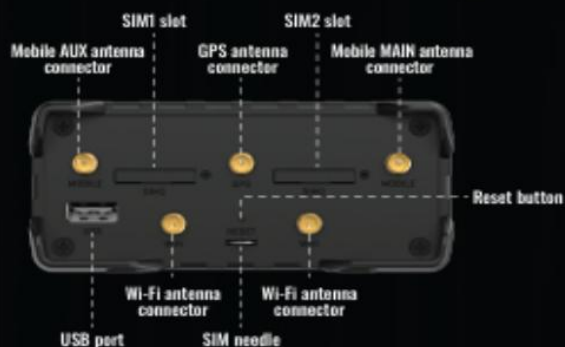
SOFTWARE

Operating system	RutOS (OpenWrt based Linux OS)
Mobile features	Auto APN, Band lock, SIM switch, Operator black/white list, Data/SMS limits
Network features	Routing, Failover, Firewall, DHCP, DDNS, QoS / SQM, Load Balancing, VoIP passthrough, Connection monitoring, SSHFS
Monitoring and Management	WEB UI, CLI, SSH, CALL, SMS, TR-069, SNMP, JSON-RPC, MQTT, MODBUS, RMS
Cloud solutions	RMS, FOTA, Azure IoT Hub, Cumulocity - Cloud of Things, ThingWorx
NTP	NTP Server, NTP Client, Sync with: External NTP server, GNSS, Mobile operator
GNSS	NMEA forwarding, AVL, Geofencing
Modbus	TCP client, TCP server, RTU master, RTU gateway, Modbus over MQTT
Serial	Console, Over IP, Modem, NTRIP, Modbus

FRONT VIEW



BACK VIEW



FIREWALL AT EVERY SITE



Available in



Appliance



Virtual



Hosted

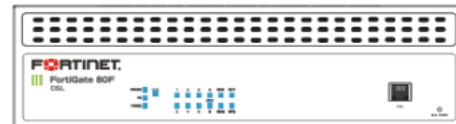


Cloud

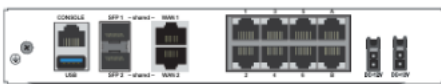


Container

SPECS

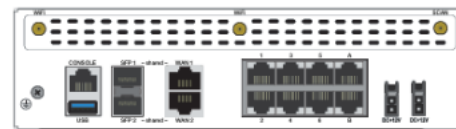


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1 2

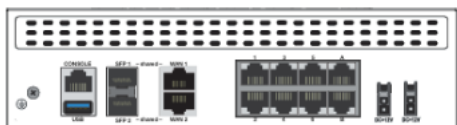
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Interfaces

1. 2 x GE RJ45/SFP Shared Media Ports
2. 2 x WAN GE RJ45 Ports, FG-80F-Bypass model only:
1x Bypass GE RJ45 Port Pair (WAN1 and Port1, default configuration)



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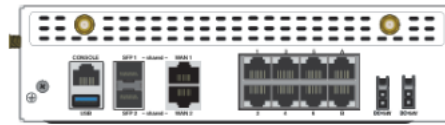
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3 4

Interfaces

1. 1 x DSL Port (RJ11)
2. 2 x GE RJ45/SFP Shared Media Ports
3. 6 x GE RJ45 Ports
4. 2 x GE RJ45 FortiLink Ports

3. 6 x GE RJ45* Ports
4. 2 x GE RJ45* FortiLink Ports
5. 1 x DSL RJ11 Port (for 80F-DSL only)



1

2 3

Interfaces

1. 2 x GE RJ45/SFP Shared Media Ports
2. 6 x GE RJ45 POE/+ Ports
3. 2 x GE RJ45 POE/+ FortiLink Ports

Hardware Features



Superior Wireless Coverage

A built-in dual-band, dual-stream access point is integrated on the FortiWiFi 80F series which provides the industry's latest high-speed WiFi-6 (802.11ax) wireless access.



Trusted Platform Module (TPM)

The FortiGate 80F Series features a dedicated module that hardens physical networking appliances by generating, storing, and authenticating cryptographic keys. Hardware-based security mechanisms protect against malicious software and phishing attacks.



Bypass WAN/LAN Mode

The FortiGate 80F Series offers a pair of bypass ports that help organizations avoid network communication interruption due to device faults and improve network reliability.



Access Layer Security

FortiLink protocol enables you to converge security and the network access by integrating the FortiSwitch into the FortiGate as a logical extension of the NGFW. These FortiLink enabled ports can be reconfigured as regular ports as needed.

Specifications

	FG-80F	FG-81F	FG-80F-BYPASS	FG-80F-POE	FG-81F-POE
Interfaces and Modules					
GE RJ45/SFP Shared Media Pairs	2	2	2	2	2
GE RJ45 Internal Ports	6	6	6	—	—
GE RJ45 FortiLink Ports (Default)	2	2	2	—	—
GE RJ45 PoE/+ Ports	—	—	—	6	6
GE RJ45 PoE/+ FortiLink Ports (Default)	—	—	—	2	2
Bypass GE RJ45 Port Pair (WAN1 & Port1, default configuration)	—	—	Yes	—	—
Wireless Interface	—	—	—	—	—
USB Ports 3.0	1	1	1	1	1
Console (RJ45)	1	1	1	1	1
Internal Storage		1× 128 GB SSD			1× 128 GB SSD
Trusted Platform Module (TPM)	Yes	Yes	Yes	Yes	Yes
Bluetooth Low Energy (BLE)	Yes	Yes	Yes	Yes	Yes
System Performance — Enterprise Traffic Mix					
IPS Throughput ²			1.4 Gbps		
NGFW Throughput ^{2,4}			1 Gbps		
Threat Protection Throughput ^{2,5}			900 Mbps		
System Performance and Capacity					
IPv4 Firewall Throughput (1518 / 512 / 64 byte, UDP)			10 / 10 / 7 Gbps		
Firewall Latency (64 byte, UDP)			3.23 μs		
Firewall Throughput (Packet per Second)			10.5 Mpps		
Concurrent Sessions (TCP)			1.5 Million		
New Sessions/Second (TCP)			45 000		
Firewall Policies			5000		
IPsec VPN Throughput (512 byte) ¹			6.5 Gbps		
Gateway-to-Gateway IPsec VPN Tunnels			200		
Client-to-Gateway IPsec VPN Tunnels			2500		
SSL-VPN Throughput			950 Mbps		
Concurrent SSL-VPN Users (Recommended Maximum, Tunnel Mode)			200		
SSL Inspection Throughput (IPS, avg HTTPS) ³			715 Mbps		
SSL Inspection CPS (IPS, avg. HTTPS) ³			700		
SSL Inspection Concurrent Session (IPS, avg HTTPS) ³			100 000		
Application Control Throughput (HTTP 64K) ²			1.8 Gbps		
CAPWAP Throughput (HTTP 64K)			9 Gbps		
Virtual Domains (Default / Maximum)			10 / 10		
Maximum Number of FortiSwitches Supported			24		
Maximum Number of FortiAPs (Total / Tunnel)			96 / 48		
Maximum Number of FortiTokens			500		
High Availability Configurations		Active-Active, Active-Passive, Clustering			

Barrier Gate with Straight Boom Pole



DS-TMG420-X series barrier gate is applicable to entrance and exit management. It is widely used in road toll stations, parking lots, communities, enterprise entrances and exits, etc. to manage the entering and exiting of vehicles and record vehicle passing times. It can be controlled automatically via parking lot management system, or via handle, remote controller, button, etc.

Adopts integrated machine core. Parallel gear decelerates linkage arm transmission to ensure stability and efficiency.

Supports convenient side installation with compact structure.

Adopts quenching process for carbon steel gear to realize wear-resistant and impact-resistant functions and extend product life.

Adopts small DC brushless motor with low noise to increase output torque and realize precise intelligent control.

Supports rebound for obstacle and opening priority.

Adopts DC variable frequency control to enable smooth operation with fast boom pole opening and slow boom pole closing.

Supports event log to enable convenient monitoring.

Supports multiple anti-fall modes such as IR, vehicle detectors, and radars.

Supports fault code detection on the nixie tube, log record, and abundant status indicating. Based on the fault code displayed on the nixie tube, you can realize quickly problems locating and maintenance.

Supports manually opening boom pole. You can turn hand wheel to keep barrier gate opening during power cutoff.

Delayed boom pole closing (10 s delay time by default). Supports 99 shifts (initial status 2 s, 2 s gap between each shift).

Supports auto boom pole opening during power cutoff. The barrier gate can open automatically to allow fire trucks in (optional components required).

Specification

Barrier Housing	
Barrier Housing Material	SGCC
Barrier Housing Thickness	1.5 mm
Barrier Housing Door Thickness	1.2 mm
Barrier Housing Color	Iron gray
Barrier Housing Door Color	Orange red
Boom Pole Installation Height	885 mm
Body Indicators	DS-TMG420, DS-TMG420-L, DS-TMG420-R: no body indicator DS-TMG420/B, DS-TMG420-L/B, DS-TMG420-R/B, DS-TMG420/A/B, DS-TMG420-L/A/B, DS-TMG420-R/A/B: with body indicator. Green: arrow indicator. Red: prohibition indicator

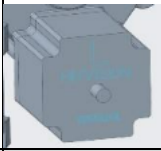
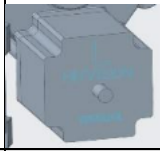
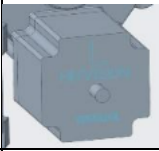
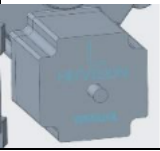
Barrier Gate General	
Rising/Falling Speed	3m octagonal pole, right by default, direction switchable Rising Speed: 1.8 S Falling Speed: 1.8 S 4m octagonal pole, right by default, direction switchable Rising Speed: 2.5 S Falling Speed: 2.5 S 6m octagonal pole, right by default, direction switchable Rising Speed: 5 S Falling Speed: 5 S 3m anti-collision round pole, right by default, direction switchable Rising Speed: 1.8 S Falling Speed: 1.8 S 4m anti-collision round pole, right by default, direction switchable Rising Speed: 2.5 S Falling Speed: 2.5 S
Boom Pole Direction	DS-TMG420, DS-TMG420/B, DS-TMG420/A/B: right by default, direction switchable DS-TMG420-L/B, DS-TMG420-L/A/B: Left DS-TMG420-R/B, DS-TMG420-R/A/B: Right
Motor Type	DC brushless motor
Matched Boom Pole Type	Cylinder boom pole: 1 to 4 m, anti-collision Octagonal boom pole: 1 to 6 m Octagonal telescopic boom pole: 4 to 6 m Boom pole $\geq$ 5 m: with spindle rod
Boom Pole Falling Delay	10 s by default (configurable), min. 2 s (every 2 s followed a gap)
Number of Cycles	5,000,000
Working Voltage	220 VAC
Consumption	DS-TMG420, DS-TMG420-L, DS-TMG420-R: Max. 125 W DS-TMG420/B, DS-TMG420-L/B, DS-TMG420-R/B: Max. 139 W DS-TMG420/A/B, DS-TMG420-L/A/B, DS-TMG420-R/A/B: Max. 155 W
Temperature and Humidity	Temperature: -30 °C to 60 °C (-22 °F to 140 °F), Humidity: $\leq$ 90%
Rising Boom Pole for Poweroff	Optional, not supported by default
Package	
Barrier Housing Dimensions (L × W × H)	1060 × 370 × 262 mm (41.73 × 14.57 × 10.31 inch)
Body Weight	43 ± 3 kg (94.8 ± 6.61 lb.)
Body Dimensions (with Package, Without Boom Pole) (L × W × H)	1266 × 504 × 626 mm (49.84 × 19.84 × 24.65 inch)
Body Weight (with Package, Without Boom Pole)	47 ± 3 kg (103.61 ± 6.61 lb.)
Barrier Gate	
Duty Cycle	100%
Interface	
RS-485	1 group
Rising to Limit	1 group
Falling to Limit	1 group
Open	1 group
Close	1 group

Stop	1 group
IR/Vehicle Detector/Radar	1 group
Traffic Signal Light	1 group, external power supply required, max. 220 VAC supported
Approval	
RF	CE-RED EN 300220-1 V3.1.1 EN 300220-2 V3.1.1 EN 301489-1 V2.2.3 EN 301489-3 V2.1.1 EN IEC 62311: 2020
EMC	CE-EMC : EN 55032: 2015/A11: 2020 + A1: 2020, EN IEC 61000-3-2: 2019/A1: 2021, EN 61000-3-3: 2013 + A1: 2019/A2: 2021, EN 50130-4: 2011 + A1: 2014
Security	CE-LVD: EN 62368-1: 2014/A11: 2017 CB: IEC 62368-1: 2014 IEC 62368-1: 2018
Environment	ROHS
Protection	IP54, IK09
Boom Pole	
Boom Pole Color	White background with red bar

Boom Pole Weight	m octagonal boom pole: 2.5 ± 0.3 kg (5.51 ± 0.66 lb.) m octagonal boom pole: 2.8 ± 0.3 kg (6.17 ± 0.66 lb.) m octagonal boom pole: 3.45 ± 0.3 kg (7.60 ± 0.66 lb.) m octagonal boom pole: 5.9 ± 0.3 kg (13.00 ± 0.66 lb.) m octagonal boom pole: 6.8 ± 0.3 kg (15.21 ± 0.66 lb.) m boom pole with LED strip light: 3.4 ± 0.3 kg (7.50 ± 0.66 lb.) m boom pole with LED strip light: 4.4 ± 0.3 kg (9.70 ± 0.66 lb.) m octagonal telescopic boom pole: 4.42 ± 0.3 kg (9.74 ± 0.66 lb.) m octagonal telescopic boom pole: 4.85 ± 0.3 kg (10.69 ± 0.66 lb.) m octagonal telescopic boom pole: 5.65 ± 0.3 kg (12.46 ± 0.66 lb.) m anti-collision round boom pole: 2.5 ± 0.3 kg (5.51 ± 0.66 lb.) m anti-collision round boom pole: 3.5 ± 0.3 kg (7.71 ± 0.66 lb.) m anti-collision round boom pole: 4.5 ± 0.3 kg (9.92 ± 0.66 lb.)
Boom Pole Dimensions (with Package)	2 m octagonal boom pole: 115 × 60 × 2020 mm (4.53 × 2.36 × 79.53 inch) 3 m octagonal boom pole: 115 × 60 × 3020 mm (4.53 × 2.36 × 118.90 inch) 4 m octagonal boom pole: 115 × 60 × 4020 mm (4.53 × 2.36 × 158.27 inch) 5 m octagonal boom pole: 140 × 65 × 5030 mm (5.51 × 2.56 × 198.03 inch) 6 m octagonal boom pole: 140 × 65 × 6030 mm (5.51 × 2.56 × 237.40 inch) m boom pole with LED strip light: 100 × 60 × 3035 mm (3.94 × 2.36 × 120.07 inch) m boom pole with LED strip light: 100 × 60 × 4035 mm (3.94 × 2.36 × 159.45 inch) m octagonal telescopic boom pole: 120 × 51 × 3100 mm (4.72 × 2.01 × 122.05 inch) m octagonal telescopic boom pole: 120 × 51 × 3500 mm (4.72 × 2.01 × 137.80 inch) m octagonal telescopic boom pole: 120 × 51 × 4005 mm (4.72 × 2.01 × 157.68 inch)

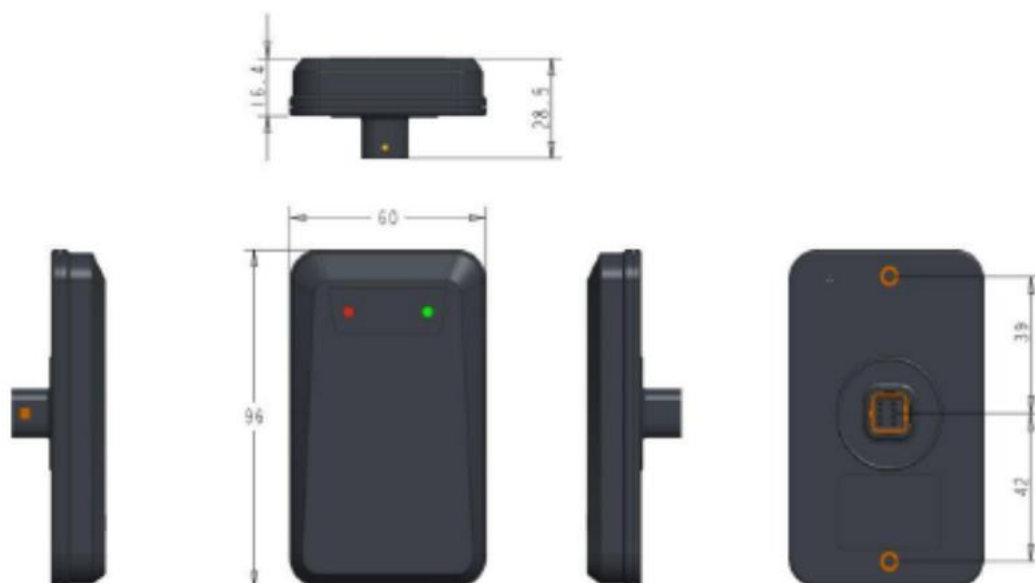
	m anti-collision round boom pole: 90 × 90 × 2030 mm (3.54 × 3.54 × 79.92 inch) m anti-collision round boom pole: 90 × 90 × 3030 mm (3.54 × 3.54 × 119.29 inch) m anti-collision round boom pole: 90 × 90 × 4030 mm (3.54 × 3.54 × 158.66 inch)
Boom Pole Weight (with Package)	m octagonal boom pole: 2.37 ± 0.3 kg (5.22 ± 0.66 lb.) m octagonal boom pole: 3.11 ± 0.3 kg (6.86 ± 0.66 lb.) m octagonal boom pole: 3.965 ± 0.3 kg (8.74 ± 0.66 lb.) m octagonal boom pole: 7.01 ± 0.3 kg (15.45 ± 0.66 lb.) m octagonal boom pole: 8.245 ± 0.3 kg (18.18 ± 0.66 lb.) m boom pole with LED strip light: 4.0 ± 0.3 kg (8.82 ± 0.66 lb.) m boom pole with LED strip light: 5.2 ± 0.3 kg (11.46 ± 0.66 lb.) m octagonal telescopic boom pole: 5.11 ± 0.3 kg (11.27 ± 0.66 lb.) m octagonal telescopic boom pole: 6.23 ± 0.3 kg (13.73 ± 0.66 lb.) m octagonal telescopic boom pole: 7.25 ± 0.3 kg (15.98 ± 0.66 lb.) m anti-collision round boom pole: 2.7 ± 0.3 kg (5.95 ± 0.66 lb.) m anti-collision round boom pole: 4.3 ± 0.3 kg (9.48 ± 0.66 lb.) m anti-collision round boom pole: 5.8 ± 0.3 kg (12.79 ± 0.66 lb.)
Color of Boom Pole with LED Strip Light	DS-TMG420, DS-TMG420-L, DS-TMG420-R, DS-TMG420/B, DS-TMG420-L/B, DS-TMG420-R/B: no boom pole with LED strip light DS-TMG420/A/B, DS-TMG420-L/A/B, DS-TMG420-R/A/B: with boom pole with LED strip light, green indicator for boom pole opening status Boom pole other status: red indicator Photometric parameters: Red: luminous flux 39.44 lm, light effect 17.86 lm/W Green: luminous flux 107.56 lm, light effect 45.65 lm/W Working life (lighting time): 5800 h
Boom Pole Dimensions	2 m octagonal boom pole: 98 × 45 × 2000 mm (3.86 × 1.77 × 78.74 inch) 3 m octagonal boom pole: 98 × 45 × 3000 mm (3.86 × 1.77 × 118.11 inch) 4 m octagonal boom pole: 98 × 45 × 4000 mm (3.86 × 1.77 × 157.48 inch) 5 m octagonal boom pole: 119 × 55 × 5000 mm (4.69 × 2.17 × 196.85 inch) 6 m octagonal boom pole: 119 × 55 × 6000 mm (4.69 × 2.17 × 236.22 inch) m boom pole with LED strip light: 95 × 49 × 3013 mm (3.74 × 1.93 × 118.62 inch) m boom pole with LED strip light: 95 × 49 × 4013 mm (3.74 × 1.93 × 157.99 inch) m octagonal telescopic boom pole: 110 × 44 × 2970 mm (4.33 × 1.73 × 116.93 inch) m octagonal telescopic boom pole: 110 × 44 × 3470 mm (4.33 × 1.73 × 136.61 inch) m octagonal telescopic boom pole: 110 × 44 × 6000 mm (4.33 × 1.73 × 236.22 inch) m anti-collision round boom pole: 80 × 80 × 2000 mm (3.15 × 3.15 × 78.74 inch) m anti-collision round boom pole: 80 × 80 × 3000 mm (3.15 × 3.15 × 118.11 inch) m anti-collision round boom pole: 80 × 80 × 4000 mm (3.15 × 3.15 × 157.48 inch)
Boom Pole Material	AL6061

Accessory

EEBracket-L800-100 0(barrier) Barrier Pole	DS-TMG001-3 Straight Pole with Light	TMG080-3 TMG080- 3	DS-TMG070/4B/42(24V) Barrier Gate Indicator	DS-TMG060-42 Barrier Gate Supercapacitor Board
				
DS-TMG050 Pull Rod Antenna Assembly	DS-TMG000-2-L(lo w speed)	DS-TMG000-2-L(hig h speed)	DS-TMG000-2-R(lo w speed)	DS-TMG000-2-R(hi gh speed)
				
DS-TMG022 Coil Vehicle Detector	DS-TMG023 Coil	DS-TVL221-1-6D Entrance & Exit Signal Light		



DS-TMG001-5 Octagonal Straight Boom Pole	DS-TMG012-5 Remote Controller
	



• Specification

General	
Package Dimensions	148 mm × 115 mm × 65 mm (5.73" × 4.53" × 2.6") (L × W × H)
With Package Weight	Approx. 373 g (0.82 lb.)
Dimensions	
Dimensions (L × W × H)	96 × 60 × 29 mm
Environment	
Working temperature	-40°C~+85°C
Power supply	
Working voltage (VDC)	9 to 12 VDC
Working current (A)	< 0.25A
Consumption (W)	< 3W
Technical parameters	
Transmitting frequency (GHz)	60/79GHz
Transmitting power (mW)	≤ 10mW
Beam width	Vertical 10°, Horizontal 38°
Response time (ms)	50ms
Trigger distance (m)	0.3 to 6 m (adjustable)
Detection area (m)	Horizontal width: 0 to 2 m (adjustable)
Detection target	Vehicle
Area vehicle following	Distinguish following distance of vehicle: 0.5 to 2 m (adjustable)
Online debugging	Serial port/Wi-Fi
Online upgrade	Serial port upgrade
Weight	
Weight	<350 g (0.80 lb)

ANPR CAMERA

iDS-2CD7A46G0/P-IZHS(Y) 4 MP ANPR IR Varifocal Bullet Network Camera

DarkFighter⁺

DeepinView^{series}



Hikvision has been dedicated to develop products with security since established. Hikvision always follows security by design principle and has adopted many methods of security technologies into our product development lifecycle, including terminal security, data security, application security, network security, and privacy protection. In the meantime, the security technologies used by Hikvision are all in compliance with local applicable laws and safety regulations. These security measures could enhance product's cyber security protection capability and protect your devices as well as your data from malicious cyber attacks.

- High quality imaging with 4 MP resolution
- Excellent low-light performance via DarkFighter technology
- Clear imaging against strong back light due to 140 dB WDR technology
- License Plate Recognition
- Efficient H.265+ compression technology to save bandwidth and storage
- 5 streams to meet a wide variety of applications
- Water and dust resistant (IP67) and vandal proof (IK10)

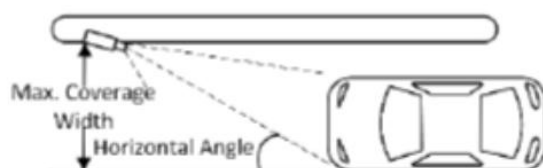
Fourth Stream	50 Hz: 25 fps (704 × 576, 640 × 480) 60 Hz: 30 fps (704 × 480, 640 × 480)
Fifth Stream	50 Hz: 25 fps (704 × 576, 640 × 480) 60 Hz: 30 fps (704 × 480, 640 × 480)
Video Compression	Main stream: H.265+/H.265/H.264+/H.264, Sub-stream: H.265/H.264/MJPEG, Third stream: H.265/H.264, Fourth stream: H.265/H.264/MJPEG, Fifth stream: H.265/H.264/MJPEG
Video Bit Rate	32 Kbps to 8 Mbps
H.264 Type	Baseline Profile, Main Profile, High Profile
H.265 Type	Main Profile
Bit Rate Control	CBR, VBR
Scalable Video Coding (SVC)	H.264 and H.265 encoding
Region of Interest (ROI)	4 fixed regions for each stream
Target Cropping	Yes
e-PTZ	Support Patrol and Auto Tracking settings
Audio	
Audio Type	Mono sound
Audio Compression	G.711/G.722.1/G.726/MP2L2/PCM/MP3/AAC-LC
Audio Bit Rate	64 Kbps (G.711ulaw/G.711alaw)/16 Kbps (G.722.1)/16 Kbps (G.726)/32 to 192 Kbps (MP2L2)/8 to 320 Kbps (MP3)/16 to 64 Kbps (AAC-LC)
Audio Sampling Rate	8 kHz/16 kHz/32 kHz/44.1 kHz/48 kHz
Environment Noise Filtering	Yes
Network	
Protocols	TCP/IP, ICMP, HTTP, HTTPS, FTP, SFTP, SRTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP, PPPoE, NTP, UPnP, SMTP, SNMP, IGMP, 802.1X, QoS, IPv4, IPv6, UDP, Bonjour, SSL/TLS, WebSocket, WebSockets
Simultaneous Live View	Up to 20 channels
API	Open Network Video Interface (Profile S, Profile G, Profile T, Profile M), ISAPI, SDK, ISUP
User/Host	Up to 32 users 3 user levels: administrator, operator, and user
Security	Password protection, complicated password, HTTPS encryption, 802.1X authentication (EAP-TLS, EAP-LEAP, EAP-MD5), watermark, IP address filter, basic and digest authentication for HTTP/HTTPS, WSSE and digest authentication for Open Network Video Interface, RTP/RTSP OVER HTTPS, Control Timeout Settings, Security Audit Log, TLS 1.2, TLS 1.3, TPM 2.0 (FIPS 140-2 level 2), AES128/256
Network Storage	NAS (NFS, SMB/CIFS), Auto Network Replenishment (ANR), Together with high-end Hikvision memory card, memory card encryption and health detection are supported.
Client	iVMS-4200, Hik-Connect, Hik-Central
Web Browser	Plug-in required live view: IE 10, IE 11, Plug-in free live view: Chrome 57.0+, Firefox 52.0+, Edge 89+, Safari 11+, Local service: Chrome 57.0+, Firefox 52.0+, Edge 89+
Image	
Image Parameters Switch	Yes

Image Settings	Rotate mode,saturation,brightness,contrast,sharpness,gain,white balance,adjustable by client software or web browser
Day/Night Switch	Day,Night,Auto,Schedule,Alarm Trigger,Video Trigger
Wide Dynamic Range (WDR)	140 dB
SNR	≥ 52 dB
Image Enhancement	BLC,HLC,3D DNR,Distortion Correction,Defog
Picture Overlay	LOGO picture can be overlaid on video with 128 × 128 24 bit bmp format.
Image Stabilization	EIS
Privacy Mask	8 programmable polygon privacy masks
Interface	
Video Output	1 Vp-p Composite Output (75 Ω/CVBS) (Only for debugging)
Ethernet Interface	1 RJ45 10 M/100 M/1000 M self-adaptive Ethernet port
On-Board Storage	Built-in memory card slot, support microSD/microSDHC/microSDXC card, up to 1 TB
Audio	With -Y: 1 input (line in), 1 output (line out), 3.5 mm connector
Alarm	2 inputs, 2 outputs (max. 24 VDC, 1 A)
RS-485	With -Y: 1 RS-485 (half duplex, HIKVISION, Pelco-P, Pelco-D, self-adaptive)
Reset Key	Yes
Power Output	With -Y: 12 VDC, max. 100 mA
Wiegand	-Y: 1 Wiegand (CardID 26bit, SHA-1 26bit, Hik 34bit, NEWG 72bit)
Event	
Basic Event	Motion detection (support alarm triggering by specified target types (human and vehicle)),video tampering alarm,exception (network disconnected, IP address conflict, illegal login, abnormal restart, HDD full, HDD error),video quality diagnosis,vibration detection
Smart Event	scene change detection,audio exception detection,defocus detection
Linkage	Upload to FTP/NAS/memory card,notify surveillance center,send email,trigger alarm output,trigger recording,trigger capture,audible warning
Deep Learning Function	
Perimeter Protection	Line crossing, intrusion, region entrance, region exiting Support alarm triggering by specified target types (human and vehicle) Support combined event alarm triggering

Entrance/Exit

Horizontal Angle

The view angle of the camera should be within 30° to the path of movement.



Vertical Angle

The angle between the lens direction and the horizontal should be less than 30° .

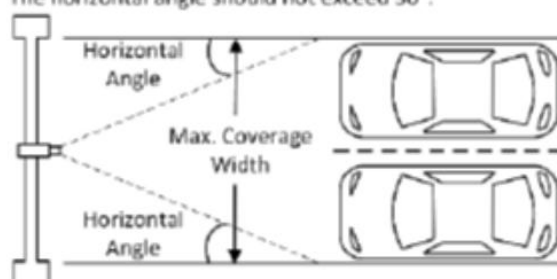


Side of the Lane

City Street

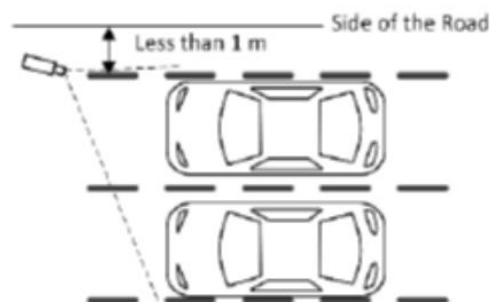
Horizontal Angle

The horizontal angle should not exceed 30° .



Middle of the Road

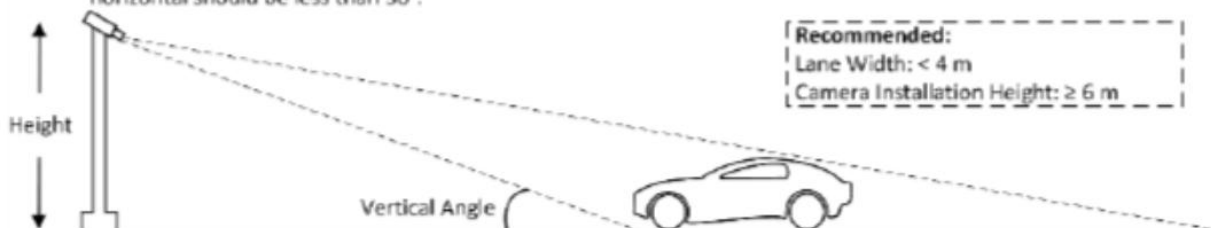
Recommended:
Lane Width: < 3.5 m
Camera Installation Height: 1.6 to 2 m



Side of the Gantry

Vertical Angle

The angle between the lens direction and the horizontal should be less than 30° .



Recommended:
Lane Width: < 4 m
Camera Installation Height: ≥ 6 m

UPS System

The UPS is dedicated to the electrical protection of IT networks and loads.



Online Double Conversion technology



Rack/Tower convertible *



Multi-directional LCD control screen



Remote control software



Backup time up to 30 min. **

Technical Specifications

GENERAL CHARACTERISTICS

	E3 Pro 1000 RM	E3 Pro 1000 RT	E3 Pro 2000 RT	E3 Pro 3000 RT	E3 Pro 5000 RT	E3 Pro 6000 RT	E3 Pro 10k RT
Technology	On Line Double Conversion						
Power	1000VA/800W	1000VA/900W	2000VA/1800W	3000VA/2700W	5000VA/4500W	6000VA/5400W	10000VA/9000W
Power factor	0.8				0.9		
IEC Output connectors	3 (10A)		4 (10A)	4 (10A) + Terminal	Terminal		

PROTECTION & FILTERING

Output form	Pure Sine Wave	
Protection	Discharge / overcharge / overload	
Input protection	Fuse	Breaker

PHYSICAL CHARACTERISTICS

Dimensions - LxIxD (mm)	438 x 477 x 44 (1U)	438 x 310 x 88 (2U)	438 x 410 x 88 (2U)	438 x 638 x 88 (2U)	UPS: 438 x 530 x 88 (2U) Battery pack: 438 x 688 x 88 (2U)	UPS: 438 x 605 x 133 (3U) Battery pack: 438 x 605 x 133 (3U)
Net weight (Kg)	12,7	12,7	19	29,3	UPS: 15 Battery pack: 55	UPS: 18 Battery pack: 65

INPUT TECHNICAL CHARACTERISTICS

Nominal voltage	110/120 VAC or 220/230/240 VAC*	110/115/120/127VAC or 208/220/230/240 VAC*	208/220/230/240VAC
Voltage range	55-150 VAC or 110-300 VAC at 50% load* 80-150 VAC or 160-300 VAC at 100% load*	60-145 VAC or 120-300 VAC at 50 % load* 90-145 VAC or 180-300 VAC at 100 % load*	110-300 VAC (based on load at 50%) 176-300 VAC (based on load at 100%)
Frequency range	40/70 Hz		46Hz ~ 54 Hz or 56Hz ~ 64 Hz

OUTPUT TECHNICAL CHARACTERISTICS

Voltage - AC mode	110/120 VAC or 220/230/240 VAC*	110/115/120/127 VAC or 208/220/230/240 VAC*	208/220/230/240VAC
Automatic voltage regulation	± 1%		
Frequency range (Synchronized range)	57 ~ 63 Hz ou 47 ~ 53 Hz	47Hz ~ 53 Hz or 57Hz ~ 63 Hz	46Hz ~ 54 Hz or 56Hz ~ 64 Hz
Frequency range (Batt mode)	60 Hz or 50 Hz ± 0,3 Hz	50 Hz ± 0,25 Hz or 60 Hz ± 0,3 Hz	50 Hz ± 0,1 Hz or 60 Hz ± 0,1 Hz
Harmonic distorsion	≤ 3 % THD (Linear Load) - ≤ 5 % THD (Non-linear Load)	≤ 3 % THD (Linear Load) - ≤ 6 % THD (Non-linear Load)	≤ 3 % THD (Linear Load) - ≤ 5 % THD (Non-linear Load)
Transfer time	Line mode to battery mode	0 ms	0 ms
	UPS to Bypass	4 ms (Typical)	0 ms
Current crest ration	3:1		

EFFICIENCY

AC mode	86%	88%	89%	90%	92%	93%
Battery mode	83%	83%	87%	88%	90%	91%
Eco mode	92%	90% ~ 93%	92% ~ 94%	93% ~ 95%	-	

BATTERY

Battery charger	Operates when UPS connected to mains					
Cold start (no mains)	Yes					
Charging current	1A	Adjustable from 1 to 3.5A			Adjustable from 1 to 6A	
Battery type & number	6V/9 Ah x 4	12 V/9 Ah x 2	12 V/9 Ah x 4	12 V/9 Ah x 6	12 V/9 Ah x 16	12 V/9 Ah x 20
Recharging time	4 hours to 90% after complete discharge				9 hours to 90% after complete discharge	
Backup time	From 5 to 30 min. depending on the connected load					

INDICATORS & ALARMS

LED (E3 Pro RT)	AC mode, Battery mode, fault	-
LCD screen display	-	Load level, Battery level, AC mode, Battery mode, Bypass mode, and fault
Audible alarms	Battery mode, low battery, overload and fault	

BYPASS

Static bypass	Yes
Manual bypass	Yes (optional External Maintenance Bypass switch)

COMMUNICATION

Communication ports	USB	USB / RS232
Software	InfoPower (supports Windows® 2000/2003/XP/Vista/2008, Windows® 7, Linux, Unix et MAC)	
SNMP (Option)	Management system through SNMP software (VMware® compatible) and web browser	

ENVIRONMENT

Ideal environment	20-90°C, 0-50% relative humidity (non condensing)	0-95°C, 0-40% relative humidity (non condensing)	
Noise level	Less than 50dBA @ 1 meter	Less than 55dBA @ 1 meter	Less than 58dBA @ 1 meter
Operating Altitude	Up to 1000 m above sea level (> 1000 m 1% deterioration for every 100 m)		

UHF Reader at the Gates

SRIRU69-1



ELECTRICAL SPECIFICATIONS

Air Interface Protocol	EPC Class 1 Gen 2, ISO 18 000-6C
Operating Frequency	US (902-928MHZ)
	EU (865-868MHZ)
Built In Antenna	9 dBi circular antenna
RF Power	26dbm(adjustable)
Word Mode	Active/trigger/answer/password mode(optional)
Power Supply	9-24V
Interface	RS232/WG26/RELAY/TCP/IP/POE/ WIFI(optional)

UHF Tags for Vehicles



Size: 105*30mm

Features:

- Self-intellectual property
- Excellent anti-collision performance
- Support ISO18000-6B, ISO18000-6C (EPC C1G2) protocol tag
- 902~928MHz/860-865MHZ frequency band (frequency customization optional)
- FHSS or Fix Frequency transmission
- RF output power up to 30dbm(adjustable)
- Built-in high performance 9dbi circular antenna, one more extendable external antenna port
- Support auto-running, interactive and trigger-activating work mode
- Low power dissipation with single +9 DC power supply
- Support RS232, RS485, Wiegand interface with TCP/IP interface optional

Relevant Credentials

- SLF – Smart Landfill System

A government-scale waste management platform integrating physical infrastructure and digital workflows.

Scope:

Weighbridge hardware integration

License Plate Recognition (LPR) & UHF RFID gate validation

Full audit trail with tamper-proof logs

Inspectors' mobile application.

Client: Confidential (Government Waste Management Entity)

Region: KSA

Relevance: Strong alignment with SLMMS scope on automation, hardware integration, and audit compliance.

- AVL – Automatic Vehicle Location System (afaqy.pro)

A cloud telematics platform for real-time fleet tracking and operations control.

Scope:

Real-time GPS tracking and vehicle telemetry

Mobile and Web dashboards for fleet owners and operators

Multi-tenant design with customer-specific access

RFID-based vehicle authorization and geofence alerts

Client: B2B Clients

Region: KSA

Relevance: Demonstrates our experience in microservices, real-time event processing, and secure stakeholder portals.

- MyFleet – Fleet Maintenance and Utilization Platform (myfleet.me)

Fleet maintenance and performance system with predictive KPIs.

Scope:

Web and mobile access for fleet operators

Maintenance history tracking and reminder system

Utilization KPIs and operational dashboards

Audit trail for each action and digital record keeping

Client: B2B Clients

Region: KSA

Relevance: Strong match for stakeholder portal functionality, digital records, and multi-tenant access logic in SLMMS.

- Smart City

Client: Riyadh Municipality

Region: KSA

Scope:

Deployment of smart poles with surveillance cameras

Integration of weather condition sensors and alert systems

Real-time road safety monitoring

Centralized dashboard for multi-sensor visualization

Relevance to SLMMS: Demonstrates capacity in smart infrastructure deployment, real-time monitoring, and integration of physical sensor networks — a strong parallel to site automation and centralized observability.

Municipal Waste Collection Systems

Client: Makkah Municipality

Region: KSA

Scope:

Waste collection route planning and operational dashboards.

Integration with **MOMRAH's Madinati platform** for reporting and compliance.

Relevance: Demonstrates direct municipal waste management experience and integration capability with Madinati — highly relevant for BE'AH's SWMS scope.

Al Haram Project – Smart Mobility Integration

Client: Confidential (Holy Mosque Projects)

Region: KSA

Scope:

Deployment of UHF RFID readers at **Saae** and **Tawaf** zones for golf cart access control.

Distribution and management of RFID tags for authorized golf carts.

Relevance: Strong hardware deployment and high-traffic access control expertise in a sensitive, large-scale environment.