AI-POWERED PLATFORM · ELMNTX

Smart Command Center

for Construction & Real Estate

Transforming reactive site reporting into predictive, real-time control — every project, every tower, every decision, informed the moment it matters.

5
INTELLIGENT AI MODULES

99.2%
FR ATTENDANCE ACCURACY

87%
EQUIPMENT FAILURE PREDICTED

90 days
FROM POC TO FULL DEPLOYMENT

THE PROBLEM

Why construction projects fail to deliver

2–4 wks
Delay Detection Latency
Schedule slippage goes undetected for weeks. By the time issues surface, corrective action is too late — triggering liquidated damages and client disputes.

10–15%
Labor Idle Time
Workers wait on materials, instructions, or equipment. Without real-time tracking, supervisors cannot redistribute workforce before productivity losses compound.

6–12%
Rework Cost
As-built conditions deviate from BIM models unnoticed. Late-stage discovery means demolition and redo — one of construction's most preventable cost drains.

3–5%
Asset Loss Annually
Heavy equipment idles undetected, gets misused across sites, or disappears. Without telematics and geofencing, every asset is a blind spot.

Strategic Imperative: **Transform from reactive reporting → predictive real-time control**

FUNCTIONAL MODULES

Five intelligent modules. One unified view.

99.2% FR accuracy

Workforce Intelligence
- Biometric face-recognition attendance — zero manual roll call
- PPE compliance flagged within 2 seconds of violation
- Anonymised density heatmaps reveal congestion and fatigue zones

<60s incident response

EHS & Incident Detection
- YOLOv8 detects falls, fights and fire in real time
- Near-miss events auto-logged with GPS coordinates (<2m)
- One-click site evacuation broadcast to all wearables

±3mm scan accuracy

LiDAR + BIM Digital Twin
- Robot dog scans entire floors weekly — no manual survey
- PointNet++ segments structural elements for deviation mapping
- Colour-coded overlay: green = on plan, red = rework required

87% failure predicted

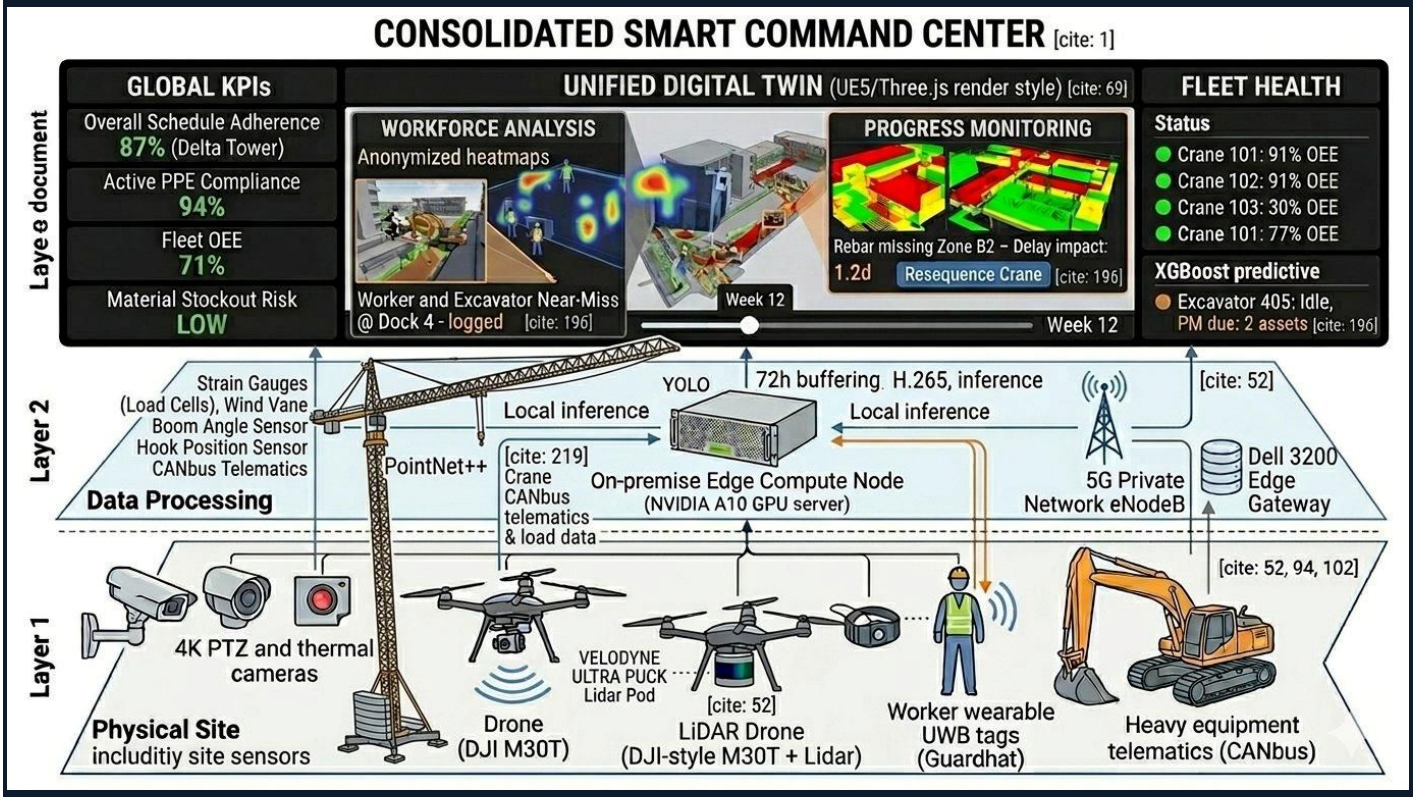
Equipment Telematics
- CANBUS streams OEE, fuel, load and boom-angle live
- XGBoost flags maintenance need 5–7 days before failure
- Geofence alerts stop theft and unauthorised site exits

±2% count accuracy

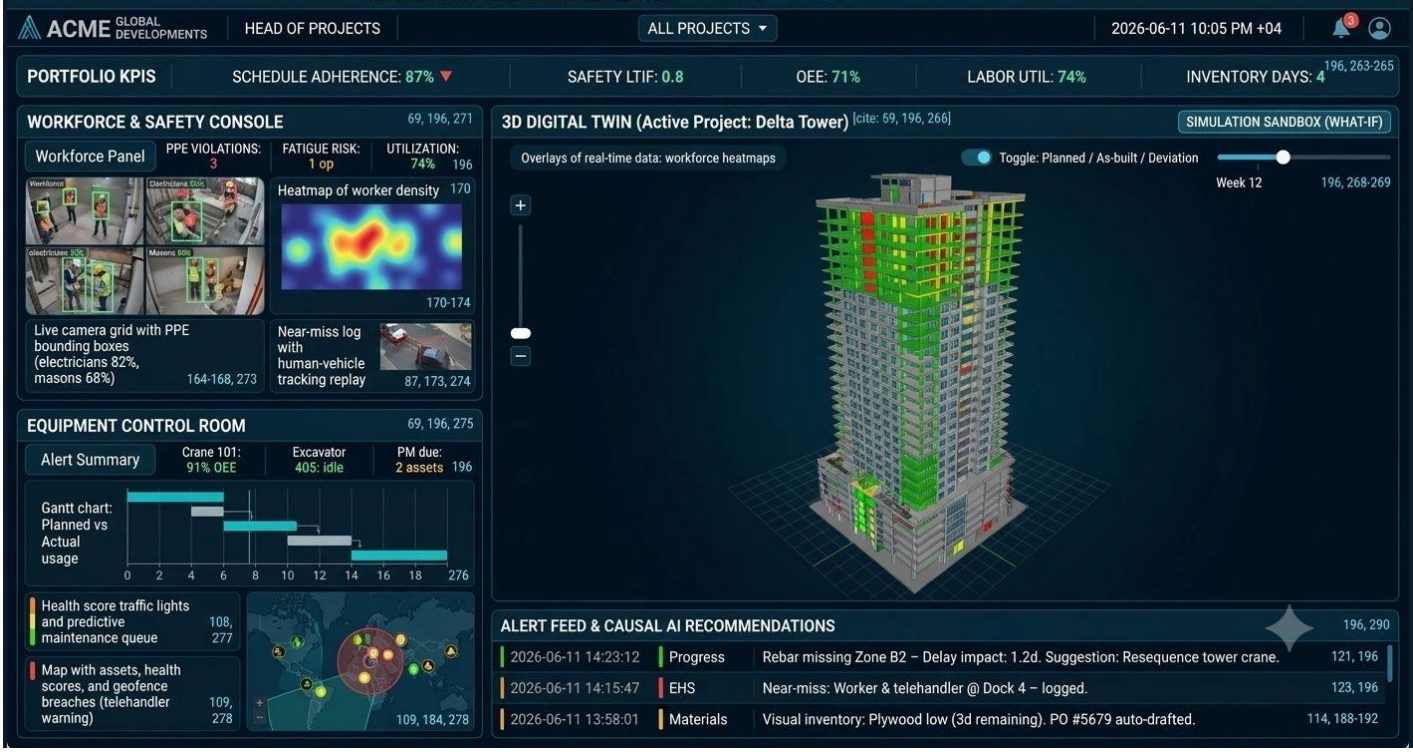
Material & Inventory AI
- Mask R-CNN counts rebar, timber and block stacks visually
- JIT triggers auto-PO when stock falls below threshold
- RFID gate readers catch material removal without sign-out

The Smart Command Center consolidates workforce, equipment, safety and BIM data into a single AI-driven operations hub. Project managers gain live schedule adherence, safety officers see every PPE violation the instant it happens, and the digital twin updates continuously as the building rises — so decisions are always grounded in reality, not last week's report.

CONSOLIDATED SMART COMMAND CENTER — 3-LAYER ARCHITECTURE



GLOBAL PORTFOLIO COMMAND CENTER — LIVE AI DASHBOARD (DELTA TOWER · WEEK 12)



TECHNICAL ARCHITECTURE

4-layer cloud-native platform

[01] Device Layer

4K PTZ cameras, DJI M30T drones, LiDAR robot dog, UWB Guardhat wearables, CANBUS telematics, RFID gates, Nokia 5G eNodeB

[02] Middleware & Integration

IMPLEMENTATION ROADMAP

90-day POC to full deployment

P 0 Foundation · Weeks 1–4

Deploy Nokia 5G private network, mount 20× 4K PTZ cameras, commission LiDAR robot dog (Boston Dynamics Spot), install NVIDIA A10 GPU edge server, integrate Revit/IFC BIM model.

MQTT/Kafka event streams, Apache Flink real-time processing, Digital Twin sync engine, Drools rule engine, REST & GraphQL API Gateway

[03] AI/ML Application Layer

YOLOv8 vision, FaceNet biometrics, PointNet++ LiDAR segmentation, XGBoost predictive maintenance, Mask R-CNN inventory, DoWhy causal AI — all in Kubernetes

[04] Command Center UI

React 18 multi-project dashboard, Unreal Engine 5 digital twin viewer, WebRTC live video, role-based access for Admin / PM / Safety / Equipment / Viewer

✓ Live video + LiDAR point cloud streaming to cloud

P 1 Integration · Weeks 5–8

Connect CANBUS crane and excavator telematics, train site-specific YOLO model on PPE and worker classes, provision UWB Guardhat tags for 50 workers, deliver dashboard prototype for PM review.

✓ PPE detection accuracy >95%, workforce tracked in real time

P 2 Observation · Weeks 9–10

Activate all five AI modules. Human supervisors review every flag before any automated action. Run AI outputs in parallel with manual inspection to validate false-positive rate and BIM deviation thresholds.

✓ False-positive rate <5% · LiDAR deviation error <2%

P 3 Hard Launch · Weeks 11–12

Enable automated alerts, predictive maintenance queue and JIT material POs. Train safety officers, PMs and equipment managers. Full site go-live. Begin onboarding plan for remaining portfolio.

✓ ≥10% reduction in idle time · Predictive maintenance active

SECURITY & COMPLIANCE

Enterprise-grade security. Privacy by design.

Device Authentication

Every sensor, camera and edge node authenticates via X.509 certificates. MQTT connections enforce TLS 1.3 with OCSP-based certificate revocation — no unsigned device can join the network.

Zero-Trust Architecture

Traffic between site, edge and cloud is VLAN-segmented and routed through Zscaler or Palo Alto NGFW. An AES-256 IPsec VPN carries all site-to-cloud telemetry — zero implicit trust at any layer.

End-to-End Encryption

Data at rest in MinIO object storage and InfluxDB time-series is AES-256 encrypted. All API traffic uses TLS 1.3. Live video streams use SRTP so footage is encrypted in transit from camera to viewer.

RBAC & Access Control

Five least-privilege roles (Admin, PM, Safety, Equipment, Viewer) enforced via JWT claims at the API gateway. Role changes take effect immediately with no restart required.

Privacy & GDPR/CCPA

Worker identities are pseudonymised — face templates never leave the edge node. Workers can opt out via badge flag. Cameras in non-safety zones apply automatic face-blur before footage reaches the cloud.

Immutable Audit Trail

Every AI decision, alert acknowledgement, and dashboard action is written to AWS CloudTrail or Azure Monitor with tamper-evident signatures — providing a complete, legally defensible evidence chain.

> *"This is not a dashboard — it is a profit center."*
>
> — Head of Projects, ConstructAI

15–20% Schedule compression on pilot projects through early intervention

30%+ Reduction in safety incidents within 90 days of full deployment

8–12% Labour productivity gain from real-time workforce reallocation

3× ROI Typical return achieved within 12 months of hard launch

IMMEDIATE NEXT STEPS

01 Approve Phase 0 budget — hardware, edge server and 5G network

02 Form cross-functional team: IT, Safety, Ops and BIM leads

03 Select pilot project — we recommend a high-rise tower (Project Delta model)

04 Execute vendor selection: cameras, LiDAR robot dog, cloud platform

Ready to see ConstructAI on your live site data? Book a 30-minute executive walkthrough and we will map the platform to your current project portfolio.

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ABOUT THIS DOCUMENT

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