

AI Use in Horizontal vs. Vertical Construction

BOTTOM LINE

Vertical/building construction is using AI most visibly for document-heavy project workflows: estimating, RFIs, submittals, drawings, BIM, safety monitoring, scheduling, and quality control.

Horizontal/engineering construction is using AI more around asset systems: transportation operations, infrastructure monitoring, predictive maintenance, digital twins, geospatial analysis, drones, traffic and safety analytics, and public-agency decision support.

Quick Comparison

	Horizontal / Engineering Construction	Vertical / Building Construction
Typical work	Roads, bridges, utilities, transit, water, ports, public works	Commercial, residential, healthcare, education, data centers
Main AI driver	Managing large, distributed infrastructure systems over long lifecycles	Reducing paperwork, rework, delays, and coordination burden
Most common AI uses	Asset management, inspections, traffic optimization, predictive maintenance, safety analytics, digital twins	RFIs, submittals, spec review, estimating, BIM, scheduling, safety, quality inspections
Data source	Sensors, GIS, drones, traffic systems, pavement/bridge data, inspection logs	Drawings, specs, RFIs, submittals, photos, schedules, cost data, BIM models
Adoption pattern	More owner/public-agency led; cautious because of safety, public accountability, procurement	More contractor/developer led; faster pilots because ROI is tied to project admin and field productivity
Risk concern	Public safety, explainability, data governance, procurement fairness	Liability, hallucinations in documents, worker privacy, contract reliance

Horizontal / Civil Infrastructure: Where AI Is Being Used

AI in horizontal construction is less about chatbots on projects and more about infrastructure intelligence. Civil engineering AI research now spans design, construction, monitoring, transportation, geotechnical, environmental, and asset management. Common technologies include machine learning, computer vision, drones, digital twins, robotics, and generative AI.

State DOTs are moving fast. The AASHTO/NOCoe dashboard covers 51 state DOTs and 76 responses, showing transportation agencies actively deploying AI across traffic management, data analysis, safety and incident detection, predictive maintenance, infrastructure management, freight and logistics, and mobility operations.

Public works delivery is also moving. Camera-based safety monitoring, PPE detection, restricted-zone alerts, construction traffic monitoring, and subcontractor safety trend analysis are all in active use. A FIDIC/EY infrastructure report cites Hong Kong's Civil Engineering and Development Department using AI-enabled smart site safety systems on a major public infrastructure project.

Vertical / Building Construction: Where AI Is Being Used

Vertical construction is adopting AI around project execution friction — drawings, specs, RFIs, submittals, estimates, schedules, safety observations, site photos, and quality control. Generative AI research in construction identifies five dominant application areas: safety and risk prevention, sustainable construction, design automation, construction education, and construction management.

BIM plus AI is especially active. Tools now help retrieve model information, identify problematic areas, suggest alternatives, automate design optimization, and support project management. For many building contractors, BIM is becoming the primary entry point for AI on projects.

Document intelligence is moving quickly. Startups are building tools that interpret technical drawings, cross-link documents, and flag coordination issues early — especially for healthcare and residential building projects. The near-term ROI is tied directly to reducing the time PMs and engineers spend chasing information.

KEY CONTRAST	
Horizontal construction uses AI to understand systems. <i>What is happening across the network, asset, corridor, utility system, or public works program?</i>	Vertical construction uses AI to manage complexity inside the project. <i>What do the drawings, specs, RFIs, submittals, schedules, photos, and field reports say — and what needs action now?</i>