

The logo for AME, featuring the letters 'A', 'M', and 'E' in a bold, white, sans-serif font. The letter 'A' is partially enclosed by a yellow circle that overlaps it from the top and left sides.

AME

REINVENTING PROTECTION

The background of the entire page is a photograph of a large-scale construction or mining site. A yellow tracked excavator is the central focus, positioned behind a large, rectangular concrete structure. In the distance, two workers in orange safety vests and white hard hats are visible on the left. The sky is a clear, bright blue. The overall scene is one of active industrial work.

**From traditional to smart
construction sites:**
IoT and safety in major infrastructure
projects



January 26th, 2026

From traditional to smart construction sites: IoT and safety in major infrastructure projects

2025 infrastructure investments: strategic sites and major projects

In 2025, Italy continues its extraordinary acceleration in infrastructure investments, with a public plan exceeding €200 billion dedicated to strategic projects in transport, railways, and national technology networks ([MIT](#)).

On the railway front, the FS Group allocated €18 billion in 2025 for key construction sites, of which around €7 billion are part of the National Recovery and Resilience Plan (PNRR), with a 2025–2029 strategic plan that anticipates over €177 billion in investments between 2026 and 2034 ([MIT](#)).

These figures highlight how Italy is undergoing an unprecedented period of modernization and infrastructure transformation, with complex, large-scale, technologically advanced construction sites that require highly sophisticated process and safety management.





Workplace safety in major construction projects: critical numbers and emerging prevention needs

At the same time, **workplace safety** in large-scale construction sites remains a central and sensitive issue. In the first eleven months of 2025, the **Workplace Safety and Environment Observatory** recorded 735 fatal workplace incident reports, of which 133 occurred in the construction sector alone ([Vega Engineering](#)). Construction continues to be the sector with the **highest rate of serious and fatal accidents**, highlighting a structural criticality that significantly affects complex projects. The main causes of fatal incidents include **falls from height or depth, collisions between machinery and workers, and exposure to gases or dust in tunnels and confined spaces, conditions typical of major infrastructure works.**

These data clearly show that **mere regulatory compliance is no longer enough**: in major construction sites, where high-speed railway tunnels, urban passages, and intermodal infrastructures coexist, **proactive risk management is essential**—integrating **worker safety, operational efficiency, and continuity** throughout the project lifecycle.

IoT and construction digitalization: a strategic factor for operational safety

In today's construction landscape, **digitalizing site processes** has become a strategic necessity for ensuring worker safety and operational continuity. Advanced digital systems allow safety management to move from reactive to proactive, providing a **real-time, comprehensive view** of site conditions. Being able to track personnel and equipment, monitor critical environmental factors like gases and dust, manage access and workforce flows, and maintain reliable communication even in the deepest tunnels is **essential for reducing risks and making rapid, informed decisions**, particularly in emergencies.



How AME meets the needs of the Tunnel & Construction Sector: integrated safety, real-time data, operational continuity

AME has built its approach around these operational needs. For over 25 years, the company has been a trusted partner in safety and security for complex infrastructure projects, assisting contractors, clients, and site managers in high-risk environments. Over this time, AME's solutions have helped secure more than 500 km of infrastructure, contributing to numerous major projects both aboveground and underground.

Today, this expertise is applied daily in 8 of Italy's largest active construction sites and railway tunnels, where worker safety, emergency management, and operational continuity are top priorities.



At the heart of AME's approach is AMESPHERE, a modular digital ecosystem that integrates safety, security, and communication in a single operational platform. From operator tracking and Multireader systems to emergency stations, every component works together to deliver proactive, measurable, and continuous safety, without interrupting the normal workflow.

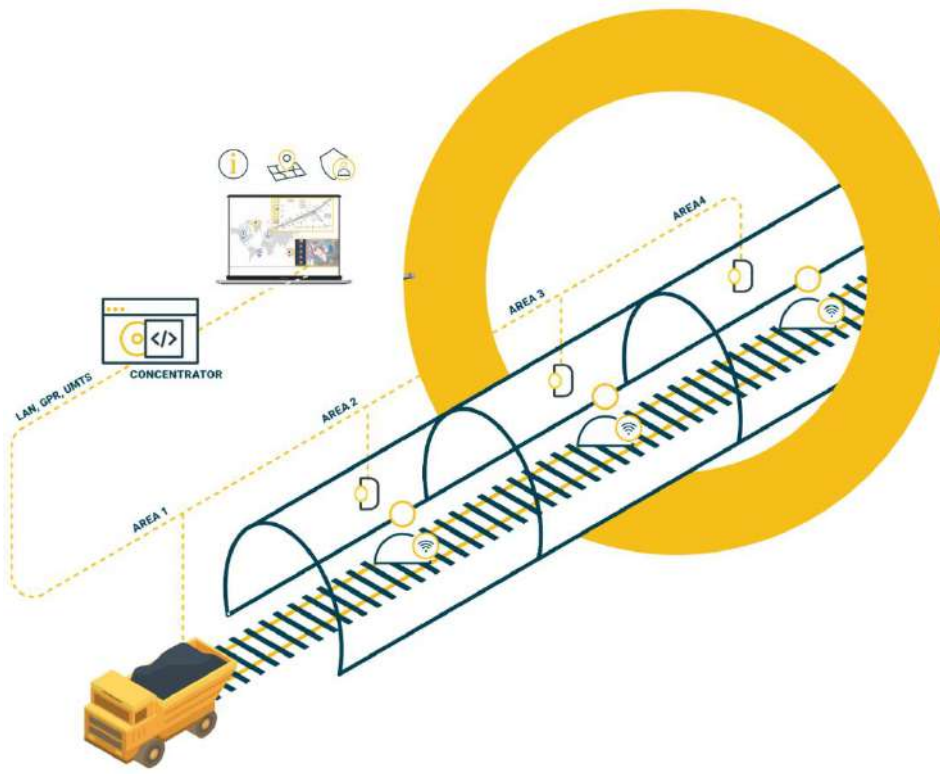
➤ *Safety-first: protecting people in complex environments*

In tunnel construction and other underground works, personnel safety is critical. AME's solutions adopt a "safety-first" approach, always providing visibility of who is on-site, where they are, and in what conditions they are operating.

Operator tracking via AMESPHERE Active TAGs offers constant, real-time visibility of workers, visitors, and operational teams. This data is crucial not only for everyday site management but especially during emergencies, evacuations, or critical events, where speed and accuracy can make the difference. The system simultaneously monitors personnel and machinery, even while moving in vehicles, thanks to Multireader technology, which automatically



identifies multiple operators without requiring any action. Detection areas are dynamically configurable to adapt to tunnel progression and site evolution.



Supporting emergency management, **SOS Tunnel Boxes** installed throughout the tunnels act as intelligent safety nodes. Strategically placed at regular intervals, they provide **immediate connection to the control room and response teams**. Every call or alarm activation is automatically linked to the precise location, drastically reducing response times and increasing operational effectiveness. Tunnel Boxes can integrate **voice communication, audible and visual alarms, video surveillance, and tracking antennas**, concentrating multiple critical functions in a single point.

The system is complemented by **continuous environmental monitoring**, including detection of **toxic or flammable gases, oxygen levels, smoke, and other critical parameters** typical of confined environments. When safety thresholds are exceeded, the platform automatically triggers **pre-alarms and alarms**, notifying operators and the control room and supporting timely evacuation procedures.



Finally, **collision-prevention solutions** for machinery and personnel are a key element in high-density sites. Real-time visual and audio alarms alert the presence of personnel in risk areas, even in **low-visibility** conditions, significantly reducing the risk of accidents and ensuring operational continuity.



➤ *Security: access control, visibility, and event correlation*

In large construction sites, **safety** also involves **access control** and infrastructure protection. AME integrates **smart access control systems**, embedding badges into tracking devices to allow **centralized management** of entries, authorizations, and attendance logs. With intelligent multimedia technologies, every movement on-site can be monitored in real time, with detailed reporting for audits, control, and operational planning.

Advanced **video surveillance**, synchronized with geolocation data and the control room, enables correlation of images, events, and personnel in a **single operational view**. This approach enhances **preventive capabilities**, supports internal investigations, and strengthens overall site security.

➤ *Continuous communication and reliable network infrastructure*



Communication is essential for safety and efficiency in tunnel and construction sites. AME designs **robust network infrastructures**—fiber optics, industrial Wi-Fi, and routing systems—to guarantee critical data transmission even in the deepest and most complex parts of tunnels.



Mobile Communication, integrated with alarms, monitoring, and reporting, ensures a continuous command chain, allowing operational teams and the control room to communicate reliably throughout all phases of work. The solution combines GSM, digital UHF radio, and fixed VoIP over fiber, providing uniform coverage and high-quality audio in any condition.

Tangible benefits: measurable safety and operational efficiency

The adoption of integrated digital solutions like AME's delivers concrete, measurable benefits in large-scale construction sites:

- Reduced emergency response times
- Improved operational efficiency through aggregated real-time data
- Support for regulatory compliance and audit processes
- Enhanced planning based on reliable, historical information

In increasingly complex and regulated infrastructure contexts, AME solutions for tunnels and construction go beyond technology—they constitute an integrated operational model that accompanies projects through every phase, keeping personnel safety at the center.

[See AMESPHERE in action: explore the Base Brenner Tunnel case study.](#)



Looking ahead: safety, data, and responsibility in major infrastructure projects

The future of major infrastructure projects inevitably requires **digital, integrated, and responsible site management**. Increasing **technical complexity**, extended underground works, and intensified work schedules make it essential to prioritize **worker safety** and **operational continuity** in project planning and organizational decisions.

In this scenario, **digital systems** in tunnel and construction sites are no longer experimental—they are a **strategic tool** to convert data into action, prevent risks, and support personnel operating in **high-risk environments**. Solutions developed by AME show how **technological innovation, operational reliability, and regulatory compliance** can coexist, raising **safety standards** across the entire infrastructure lifecycle.

Today, securing a construction site means knowing in real time what is happening, anticipating events, and maintaining constant communication between surface and underground operations. This is the direction of present and future major works: **smarter, safer, and more sustainable construction sites**, where technology is a tangible ally of human labor.



A large yellow excavator bucket is the central focus, filled with dark grey, rectangular stone blocks. The bucket is positioned vertically, with its handle extending upwards. The background shows a clear blue sky and a rocky, excavated hillside. In the distance, two workers in orange safety vests and white hard hats are visible on the left. To the right, the cab and tracks of the excavator are partially visible.

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