

POSITION PAPER

Military Mobility and the Role of Concrete Pavements

Military mobility is a strategic priority for the European Union, directly linked to security, resilience and the effective functioning of the internal market. **Dual-use transport infrastructure** is a cornerstone of this effort, ensuring that civilian and military needs are addressed in a coherent and cost-effective manner.

Roads, bridges, airports and multimodal hubs must be designed and maintained to meet demanding requirements in terms of load capacity, reliability, availability and resilience. In this context, concrete pavements offer clear advantages. Their **structural performance, durability, low maintenance needs and climate resilience** make them particularly well suited for critical dual-use infrastructure.

EUPAVE supports a holistic approach to military mobility, where infrastructure adaptation is aligned with long-term performance, sustainability and societal benefits. **Concrete pavements should be recognised as a key solution in EU policies and funding programmes aimed at strengthening military mobility and Europe's strategic autonomy.**

EUPAVE calls on EU policymakers and Member States to prioritise concrete solutions for corridors of military mobility

- **Optimised Performance:**
Concrete pavements represent the technically superior solution for heavy-duty, dual-use roadways, airports, and multimodal hubs.
- **Operational Availability:**
Concrete ensures long-term reliability and minimises maintenance-related closures, guaranteeing maximum infrastructure uptime for strategic movements.
- **Safety and Resilience:**
National Road Authorities should anticipate future resilience requirements. The use of non-combustible pavement materials in all new or renovated dual-use tunnels significantly enhances fire safety, safeguarding both personnel and critical equipment.



Introduction: Military Mobility, Dual-Use Infrastructure and Strategic Importance

Military mobility refers to the ability to move armed forces, personnel, equipment and supplies rapidly and seamlessly across the European Union and beyond, both in peacetime and during crises. It encompasses the efficient use of transport infrastructure, regulatory frameworks and operational procedures to ensure that military movements can take place without delay, bottlenecks or capacity constraints.

A central concept within military mobility is *dual-use infrastructure*. Dual-use transport infrastructure is designed, built or upgraded to serve both civilian and military needs. Roads, bridges, railways, ports, airports and multimodal hubs must primarily support civilian mobility and economic activity, while being capable of accommodating heavy, oversized and exceptional military movements when required. This approach ensures cost efficiency, avoids duplication of assets and strengthens overall societal resilience.

The strategic importance of military mobility has increased significantly in recent years. A deteriorating geopolitical environment, heightened security concerns at the EU's borders and the need for rapid reinforcement of allied forces have highlighted infrastructure as a critical enabler of defence readiness. At the same time, climate change, extreme weather events and ageing infrastructure pose growing challenges to reliability and availability. Ensuring that Europe's transport networks are fit for both civilian and military purposes is therefore a matter of security, resilience and competitiveness.

Components of Military Mobility

Military mobility is not limited to infrastructure alone. It is a comprehensive framework built on several mutually reinforcing components:

Streamlining of Administrative and Regulatory Procedures

Efficient military mobility requires the reduction of administrative barriers such as complex permit systems, customs procedures and border controls. Harmonised and predictable rules across Member States are essential to enable rapid cross-border movements, especially in crisis situations.

Adaptation and Upgrade of Transport Infrastructure

Existing transport infrastructure must be assessed and, where necessary, upgraded to meet military requirements. This includes higher load-bearing capacities, sufficient geometric design, adequate clearances and 24/7 availability under all weather conditions. Adaptation efforts should focus on the Trans-European Transport Network (TEN-T), where civilian and military priorities converge.

Interoperability and Standardisation

Differences in technical standards, design practices and operational rules can create bottlenecks. Interoperability across modes and borders – for example in axle loads, pavement strength, bridge capacities or terminal design – is a key enabler of effective military mobility.

Multimodality and Logistics Nodes

Military movements often rely on a combination of road, rail, maritime, inland waterways and air transport. Efficient multimodal hubs, equipped for heavy and oversized loads, are essential to ensure smooth transfers between modes and to optimise logistics chains.

Resilience and Security

Transport infrastructure must be resilient against physical damage, cyber threats, climate impacts and intensive use. Reliability and rapid recovery after disruption are critical requirements for both civilian continuity and military readiness.

General Infrastructure Requirements for Military Mobility

Military mobility places specific demands on transport infrastructure, particularly in the fields of roads, bridges, airports and multimodal hubs.

Roads and Tunnels

Road networks must be capable of accommodating occasional movements of very heavy and oversized vehicles, including tracked and wheeled military equipment. Tunnels represent critical nodes where safety is paramount. Infrastructure must be designed to withstand fire load and prevent catastrophic failure during transit.

Key requirements include:

- **High structural capacity of pavements to withstand exceptional axle loads and gross vehicle weights.**
- **All-weather usability, with surfaces that are resistant to temperature extremes, precipitation and freeze-thaw cycles.**
- **Adequate lane widths, turning radii and geometric design for long and wide vehicle combinations.**
- **Predictable performance under repeated heavy loading, even if such movements occur only occasionally.**

Bridges

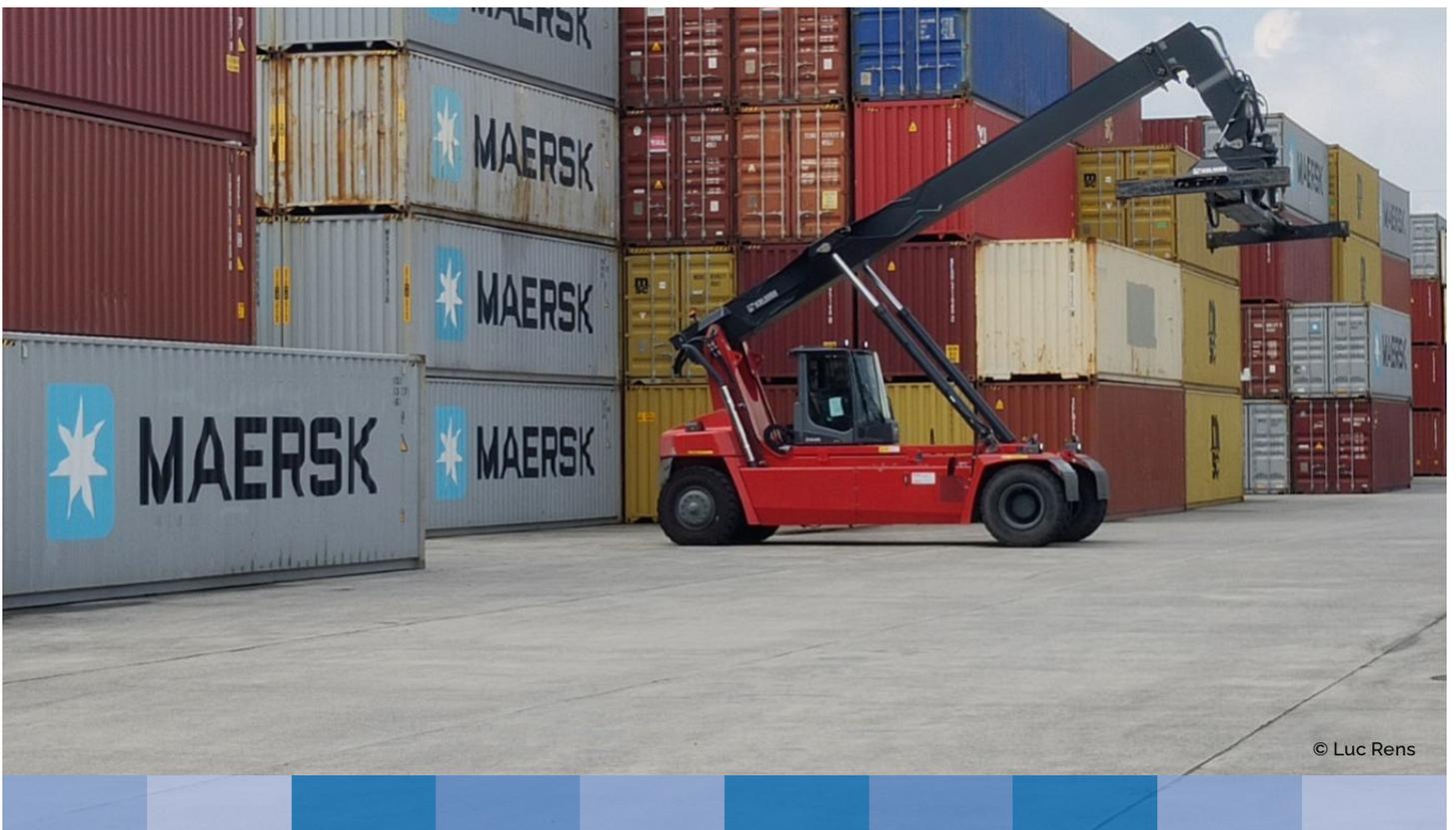
Bridges are often the most critical bottlenecks in military mobility. They must be able to safely carry exceptional loads, sometimes under specific operational measures such as reduced speed or controlled traffic. Structural robustness, redundancy and clear information on load capacity are essential. For long-term supply routes, permanent concrete bridges are the best choice because of the low maintenance needs and use of local materials.

Airports

Airports supporting military mobility must offer runways, taxiways and aprons with sufficient pavement strength to accommodate large strategic transport aircraft. Pavement reliability, resistance to fuel and jet blast effects, and continuous availability are key performance criteria.

Multimodal Hubs and Terminals, Seaports and Inland Waterways

Ports and quaysides, rail terminals and logistics hubs must allow efficient loading, unloading and transfer of heavy equipment. Pavements in these areas are subject to extreme static and dynamic loads, concentrated stresses and intensive use, requiring particularly robust and durable solutions.



The Role of Concrete Pavements in Military Mobility

Concrete pavements can make a decisive contribution to meeting the requirements of military mobility and dual-use infrastructure.

Structural Capacity and Load Distribution

Concrete pavements offer **high load-bearing capacity** and excellent load distribution characteristics. They are particularly well suited to withstand very heavy axle loads, static loads from parked vehicles or aircraft, and slow-moving or standing loads typical of military operations.

Reliability and Long Service Life

A key advantage of concrete pavements is their **long service life** and predictable performance over time. This reliability is crucial for military mobility, where infrastructure availability cannot depend on frequent interventions or uncertain conditions.

Limited Maintenance and Higher Availability

Concrete pavements generally require **less routine maintenance** than alternative solutions and are less sensitive to deformation under heavy loads. This results in fewer closures, reduced life-cycle costs and higher availability of critical routes and nodes.

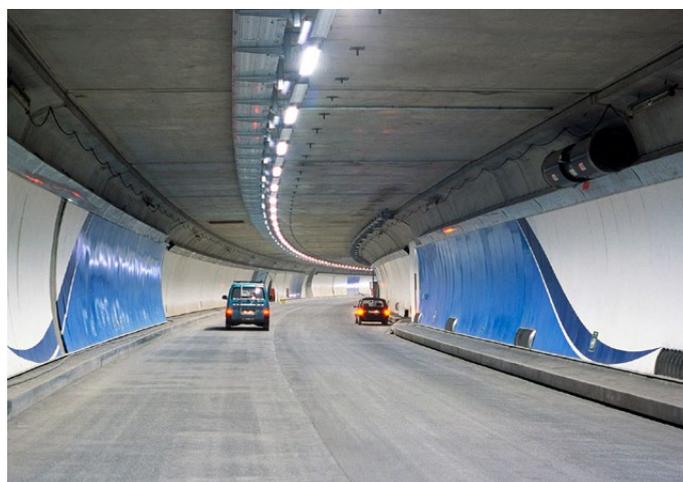
Resilience and Rapid Repair

Concrete roads are **more climate resilient** compared to any other pavement type. They perform well under extreme temperatures, heavy rainfall and freeze-thaw cycles. Their resistance to rutting, softening and moisture damage enhances resilience in the face of climate change, ensuring year-round operability of strategic infrastructure.

While concrete is known for its long service life and low maintenance, it also offers **rapid-repair capabilities**. Through the use of special cement types (rapid-hardening cements), damaged sections or critical bottlenecks can be repaired and reopened to heavy traffic within hours rather than days. This is a critical enabler for maintaining mobility during crises or following infrastructure disruption.

Fire Safety in Tunnels

Unlike asphalt, which is a combustible hydrocarbon-based material, **concrete is incombustible**. **In the event of a vehicle fire within a tunnel, concrete pavements** do not contribute to the fire load or emit toxic smoke and they retain structural integrity at high temperatures, facilitating safer evacuation and access for emergency services. So, if an accident or a sabotage action results in a tunnel fire, consequences will be worse for asphalt. In addition, a fire in a tunnel combined with liquid gas transport can result in a BLEVE (Boiling Liquid Expanding Vapor Explosion), which is a massive and catastrophic explosion.



Cointe tunnel in Liège, Belgium © photo-daylight.com

Suitability for Multimodal and Strategic Assets

Runways, aprons, port areas, intermodal terminals and heavy-duty road sections benefit from the stiffness, durability and fuel resistance of concrete surfaces. These properties make **concrete a natural choice for infrastructure** that must support both intense civilian use and demanding military requirements.

Sustainability and Life-Cycle Perspective

From a life-cycle perspective, concrete pavements offer durability, recyclability and the potential for low maintenance-related emissions. When designed and constructed with modern technologies, they contribute to the EU's sustainability objectives while enhancing security and resilience.