2026

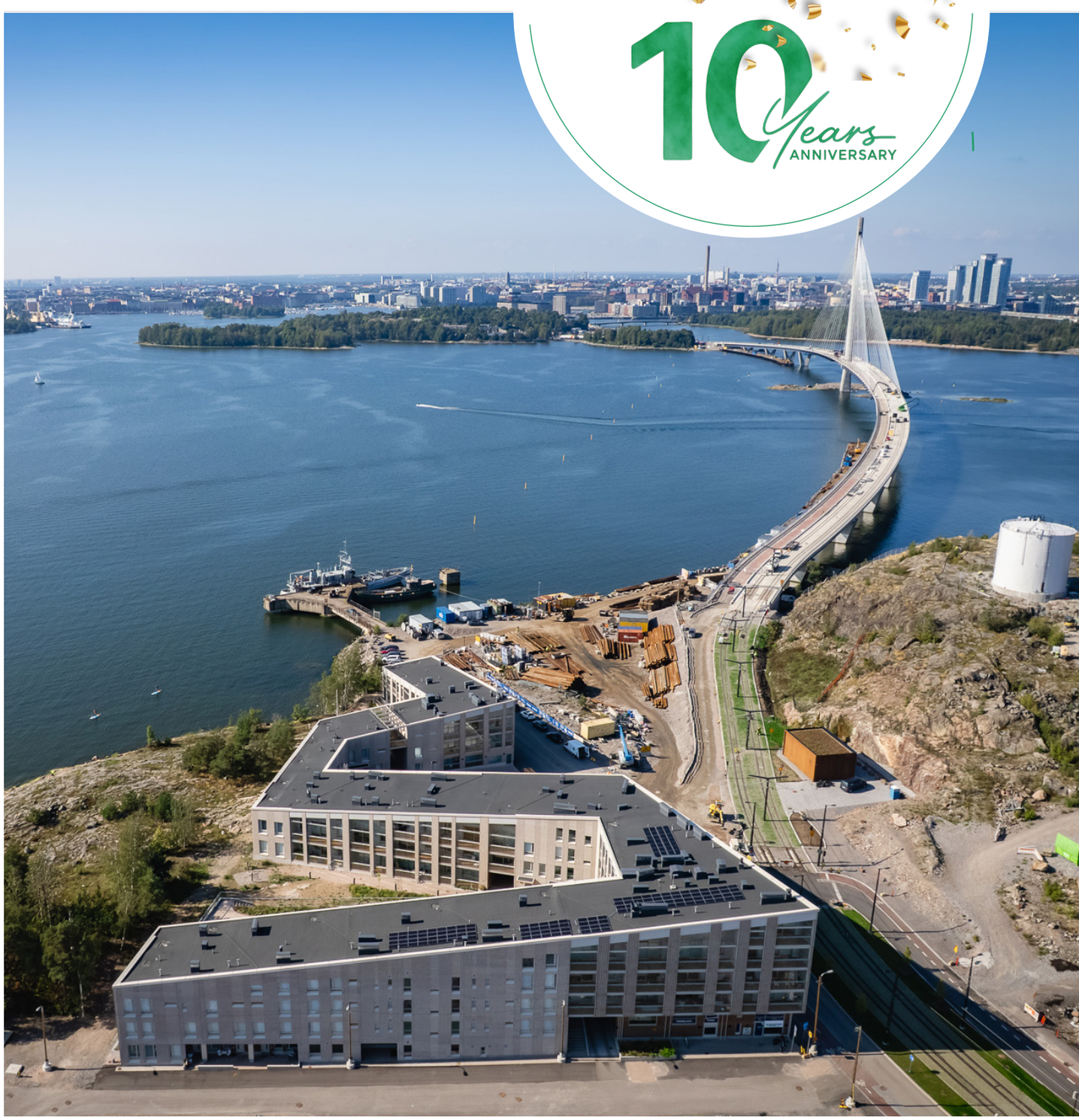
Leca®
SAINT-GOBAIN

BUILD

A MAGAZINE FROM LECA

CELEBRATING 10 YEARS OF STORIES, PROJECTS & SOLUTIONS

10 Years ANNIVERSARY



Water Management

Housing

Infrastructure

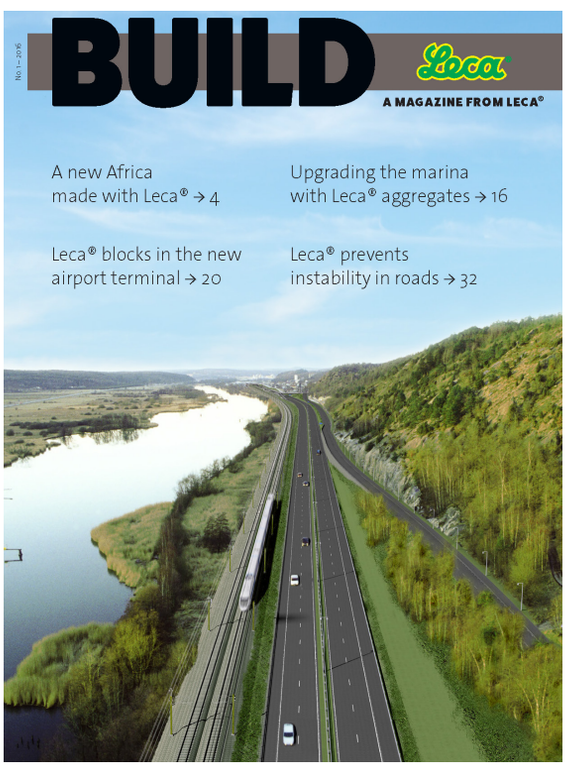
1-2026

BUILD is a magazine published by Leca International
Cover: Residential building in Kruunuvuorenranta, Helsinki, Finland

Flash Facts

10 years of BUILD

First published in spring 2016, Leca BUILD magazine has been sharing projects, insights and expert perspectives for a decade. Issued twice a year, it covers applications in building construction, infrastructure and water management. Over the years, BUILD has highlighted practical solutions, customer cases and industry developments across the Leca network.



Fibo ExClay adopts the Leca® look

Fibo ExClay Deutschland GmbH has adopted the LECA look in Germany, making its connection to the wider Leca family and Saint-Gobain more visible across the market.

The new identity is being rolled out across:
- Packaging
- Printed materials
- Online communications

Only the visual identity is changing — the products, people, and trusted expertise remain exactly the same.

Leca® Uno was specified as part of a cottage renovation project in Cambridgeshire

In older buildings, limiting the loads imposed on the existing structure is a key factor in the selection of construction solutions. In this context, Leca® Uno proved to be a practical and technically suitable solution, meeting the specific requirements of refurbishment projects and heritage buildings, where compatibility with the existing structure is of particular importance.

The customer provided further insight, “We chose Leca Uno primarily for a manageable bag size. Using 25L Leca Uno bags removed the need for bulk sand deliveries and allowed us to mix each batch directly on site and place it immediately.”

2 Biogas-powered blowing trucks for Leca® deliveries

LECA Norge AS has added another biogas-powered blowing truck to its fleet. This means that two trucks are now available to deliver Leca LWA with lower transport-related emissions.

The solution supports increasingly strict requirements for fossil-free transport to construction sites, while maintaining the same delivery capacity, reliability and technical performance.

Combined with efficient installation and the low weight of Leca LWA, the new transport solution helps support more resource-efficient infrastructure and construction projects.

Flash Facts

Five years of reuse with concept Leca® Tur&Retur

In April 2026, Leca Tur&Retur (Swedish for “return trip”) celebrates its five-year anniversary in Sweden. Since its launch, the concept has evolved into an established model for circular construction materials.

Through the Leca Tur&Retur-program, contractors can sell Leca LWA from demolition projects to LECA Sverige AB, instead of sending the material to landfill. During the first five years, reusing Leca LWA has grown immensely and reused Leca LWA is starting to enter the design process for projects.

In 2025, LECA Sverige AB was one of three finalists at the Swedish Recycling Awards, in the category Reuser of the Year. The same year, one of the largest reuse projects was carried out at Lärjes a new train stabling yard. The project demonstrates that reused Leca LWA works even in large and technically complex projects. Read more on page 16.

Bridge replaced overnight

When the Kobbervoll bridge in Kongsberg, Norway, needed replacement, the project could have meant several days of road closure on one of the region's busiest highways.

Instead, the new bridge was lifted into place during a single night and the road reopened at 03:00 Monday morning.

A lightweight concrete solution using Leca 800 reduced the bridge weight by 20% without compromising strength.

Three lifts of up to 100 tonnes made it possible to complete the work overnight, minimising disruption for road users.

LIGHTWEIGHT ROOF IN DEMANDING CONDITIONS

A hybrid lightweight roof in Helsinki demonstrates energy-efficient construction and reliable performance in demanding Nordic conditions.

Residential building in Kruunuvuorenranta, Helsinki, designed to meet high energy performance and sustainability targets.

Project context

In Kruunuvuorenranta, Helsinki, a new residential building with 78 apartments was designed to meet high energy performance and sustainability targets. The project features complex roof geometry and is exposed to coastal weather conditions, requiring a robust and adaptable solution.

Lightweight and ventilated roof structure

A hybrid roof structure was selected, combining Leca lightweight aggregate with an additional insulation layer. This enables improved thermal performance while maintaining a relatively compact structure.

The lightweight aggregate layer supports ventilation within the structure and helps manage moisture, contributing to long-term durability. Its ease of handling enables efficient installation and precise slope shaping, as well as flexibility around roof penetrations and technical elements.

Efficient installation and design flexibility

The multi-directional roof geometry made traditional solutions more complex and costly. Lightweight aggregate provided a flexible and efficient installation method, simplifying execution on site.

PROJECT INFORMATION

Construction Client: As. Oy Helsingin Maininki

Contractor: Skanska Talonrakennus Oy

Architect: Arkkitehtitoimisto KONKRET Oy

Structural Design: Sitowise Oy

Roofing Contractor: Kerabit Oy

Leca product: Leca® LWA 8–20 mm

Lightweight aggregate was delivered to the roof (5–9 storeys) using a lifting box, supporting efficient installation on site.

The hybrid structure also meets increasing energy-efficiency requirements. By combining materials, the design achieves the required insulation performance without significantly increasing structural thickness, supporting architectural constraints.

From local application to broader use

While this type of solution is primarily used in Finland, the underlying principles are broadly applicable. Lightweight aggregate can be used in roof and deck structures where low weight, adaptability and moisture robustness are essential.

Successful implementation requires careful design, particularly in moisture management and detailing. Early-stage planning and quality assurance are key to ensuring reliable long-term performance.

- Lightweight roof solution for demanding Nordic conditions.
- Flexible and energy-efficient hybrid roof design.
- Improved insulation with low structural weight.
- Durable roof system with efficient moisture control.
- Lightweight aggregate enabled fast and flexible installation.

The completed roof integrates technical installations and solar panels within a lightweight and adaptable structure.

Housing

Portugal

NEW PORTO HOTEL FEATURES LECA® LIGHTWEIGHT CONCRETES ON RIVER-VIEW TERRACE

Leca® Uno and Leca® Mix concretes were used as lightweight fill in the construction of the terrace and garden area of a new hotel in the city of Porto, ensuring thermal and acoustic insulation in a solution tailored to the project's requirements.

On one side, the Dom Luís I Bridge – so close it almost feels within reach. On the other, the River Douro flows gently towards its mouth, dotted with sight-seeing boats flying colourful flags. This will be the view enjoyed by guests of the new hotel taking shape in Porto's historic centre, next to the Cathedral, on Rua de D. Hugo.

With 34 rooms, a spa, restaurant and wine bar open to the public, the hotel results from the refurbishment of a group of adjoining historic buildings. The original façades have been preserved, while interior historical features such as the staircase and carved wooden ceilings have been restored or replicated.

The works, which began in 2021 and are now in the finishing stage, are being carried out by the engineering and construction company A3LC.
"It is a complex project because it involves a historic building where many details must be carefully balanced," explains Armando Coelho, Engineer at

PROJECT INFORMATION

Project: Hotel Alaía (working name; official name yet to be disclosed)

Location: Porto, Portugal

Developer and contractor: A3LC – Engenharia, Construção e Reabilitação, S.A.

Leca solutions: Leca® Uno and Leca® Mix

Quantity applied: 47 m³ of Leca® Uno and 30 m³ of Leca® Mix

A3LC. “It was necessary to preserve the façade and parts of the interior, while also adapting the building to modern standards, with air conditioning, fire protection systems and thermal and acoustic insulation in what is often a limited space,” he adds.

In addition to the construction challenges, archaeological remains of historical interest were discovered during the excavation of the lower floors, intended for technical areas and the kitchen. The project was adapted to integrate these findings into the building and allow hotel guests to visit them.

Terrace overlooking the river with Leca® Uno and Leca® Mix

One of the most striking areas of this new hotel is the terrace and garden facing the River Douro, covering approximately 470 m² and extending across the full width of the building. In the future, it is intended to function as a lounge for guests and customers of the restaurant and wine bar and may also host events.

For the fill and formation of slopes in this outdoor area, A3LC selected Leca Uno and Leca Mix lightweight concretes.

In practical terms, Leca Uno was applied directly onto the slab, creating the slope for water drainage and forming the base for the waterproofing system. On top of this, rigid extruded polystyrene (XPS) boards were installed, followed by geotextile and finally a layer of Leca Mix, on which the final paving—composed of granite slabs—rests.

“At an early stage, we encountered some difficulty in executing the screeds on this terrace. We turned to the market to apply traditional screed but were unable to find a partner capable of carrying out the work, as site conditions did not allow the material to be pumped,” says Armando Coelho. Faced with this limitation, the team opted for Leca Lightweight Concretes.

“The main advantage of Leca Uno and Leca Mix is that they are bagged products and easy to transport. In addition, they are pre-mixed and pre-treated, so only water needs to be added. The application was ultimately carried out by our own team and made the process much easier,” he explains, adding that “as there are eight rooms beneath the terrace, in addition to waterproofing, Leca also provided acoustic and thermal performance in that area.”

Alongside the ease of transport and application, the site manager also highlights the sustainability aspects of the product. “With this solution there is virtually no waste apart from the bags, which are easy to collect—an important factor on a site in the heart of the historic centre,” says Armando Coelho. “Our experience with Leca was positive, it brought several advantages to this project, and we are already considering it for future developments,” he concludes.

The terrace overlooking the River Douro — where Leca® Mix is visible in the image — will be the focal point of the hotel’s leisure areas.

“We received solid technical guidance, which helped us understand the advantages of Leca®,” says Armando Coelho.

Amanda Borneke is a strong voice in sustainability, a specialist in circular economy at Sweco, Sweden.

CIRCULAR CONSTRUCTION IN PRACTICE – BUSINESS VALUE, BARRIERS AND HOPE

How do we make circular construction happen in reality? Amanda Borneke, Specialist in Circular Economy at Sweco Sweden, has the answers – and the energy. With concrete examples and plain language, she tackles reuse, leadership, business value and the Leca® Tur&Retur approach in an industry that still thinks linearly.

Business value in reuse – but you have to see it

Amanda Borneke is a strong voice in sustainability, a speaker and a specialist in circular economy at Sweco, Sweden.

According to Amanda, one of the biggest barriers to circular construction is that the business case is not recognized.

– It's easy to look at deconstruction and say it's expensive, without seeing that projects already today pay high costs for waste that could be turned into products and sold on.

Many projects miss that reuse can solve other challenges – such as material availability or shorter lead times. Instead, the focus is solely on the cost of taking a product down, forgetting that it is a resource someone else may need.

– What if we looked at waste invoices and asked: who is actually paying for this resource as a newly produced material? Maybe we can sell it to them.

Barriers to reuse – and how to overcome them

The construction process is still built around a linear logic. This

means reuse and circularity are not included from the start. Amanda highlights four common barriers:

- The project does not plan for reuse at an early stage
- The project does not understand the business value
- Roles within the project lack a shared language
- Design and procurement are based on new products

But she also sees positive signs. Architects describe reuse as a creative challenge rather than a problem.

– Imagine having to design with a niche material in a specific environment – it requires new solutions. That's very good for our industry.

Smart choices and mindset: how we can rethink

For Amanda, circularity is less about technology – and more about mindset.

– We've really only been wasting resources the way we do now for the past 200 years. Go back just two generations and it was common sense to preserve and repair.

She believes we can take inspiration from other industries where circularity is already the norm, such as food waste management or landscape architecture, where bricks, natural stone – and even shrubs – are often reused.

Amanda's glossary: talk reuse like a pro

When contractors, demolition specialists, procurement teams and consultants don't speak the same language, projects fall through the cracks. Amanda believes more bridges can be built between stakeholders with a better shared understanding of terminology.

– One example is demolition, which is an umbrella term for building preparation, selective demolition and total demolition. Using the right term based on the outcome you want to achieve in procurement is crucial for the final result.

Here is her glossary for improving the circular dialogue in projects, procurement and planning:

Demolition	Can mean preparation, deconstruction or total demolition.
Selective demolition	The process used for reuse and repurposing.
Total demolition	The process used for recycling and complete teardown.
Building preparation	An umbrella term for all the terms above.
Reuse	A collective term for reuse and refurbishment of products that have not been classified as waste.
Re-use	Where a product is treated so it can be used again for the same purpose it was originally intended for. This includes washing and cleaning.
Refurbishment	Repainting, repairing or upgrading a product before it can be reused for the same purpose it was originally intended for.
Material recycling	Breaking down materials into new raw material.
Energy recovery	Breaking down materials into energy.
Material inventory	An environmental and reuse inventory in a document, mapping materials for waste management, recycling and reuse.
LCA / Life Cycle Assessment	A tool for measuring the climate benefits of reuse.

Word choices don't just affect how we describe things – but how we think, plan and make decisions. This is especially true for circular construction.

Infrastructure

Norway

Representatives from Leca visiting the project site to inspect the installation of Leca® LWA, used to reduce earth pressure and improve safety and efficiency in a confined construction area.

LIGHTWEIGHT SOLUTION FOR THE FORNEBU METRO STATION

35,000 m³ of Leca® LWA is helping reduce earth pressure at the new Fornebu metro station in Oslo.

Building the metro of the future

At Fornebu in Oslo, construction is underway on what will become one of Northern Europe's most advanced metro stations. As part of the Fornebubanen project, Leca Norway is delivering 35,000 m³ of Leca LWA to support the underground structures.

Reducing earth pressure

The lightweight aggregate is used as backfill between the concrete wall and sheet piling surrounding the station. With its low density, the material significantly reduces the earth pressure acting on the structures.

PROJECT INFORMATION

Project: Fornebubanen – Fornebu Station and Base

Client: Oslo Municipality in cooperation with Akershus County

Contractor: HAB-Dragados

Product: 35,000 m³ Leca® Lightweight Aggregate 8/20

Application: Earth pressure reduction

The material is blown into place using special blowing trucks, allowing efficient installation even in confined spaces. In some areas the material is installed in sections where the fill height reaches up to five metres.

According to the contractor HAB-Dragados, the material's stability makes it easy to work on before compaction – an important advantage in a complex underground construction environment.

Fossil-free transport

The Fornebubanen project has ambitious environmental targets. Large volumes of excavated rock are crushed and reused locally to reduce transport needs, and low-emission construction solutions are prioritised.

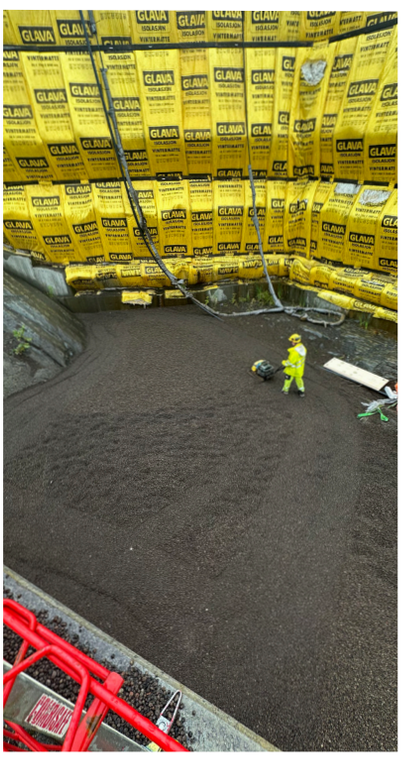
Leca LWA contributes to this effort by delivering the material with biogas-powered blowing trucks, reducing greenhouse gas emissions during transport. CO_2 emissions are also monitored and reported as part of the project's environmental requirements.

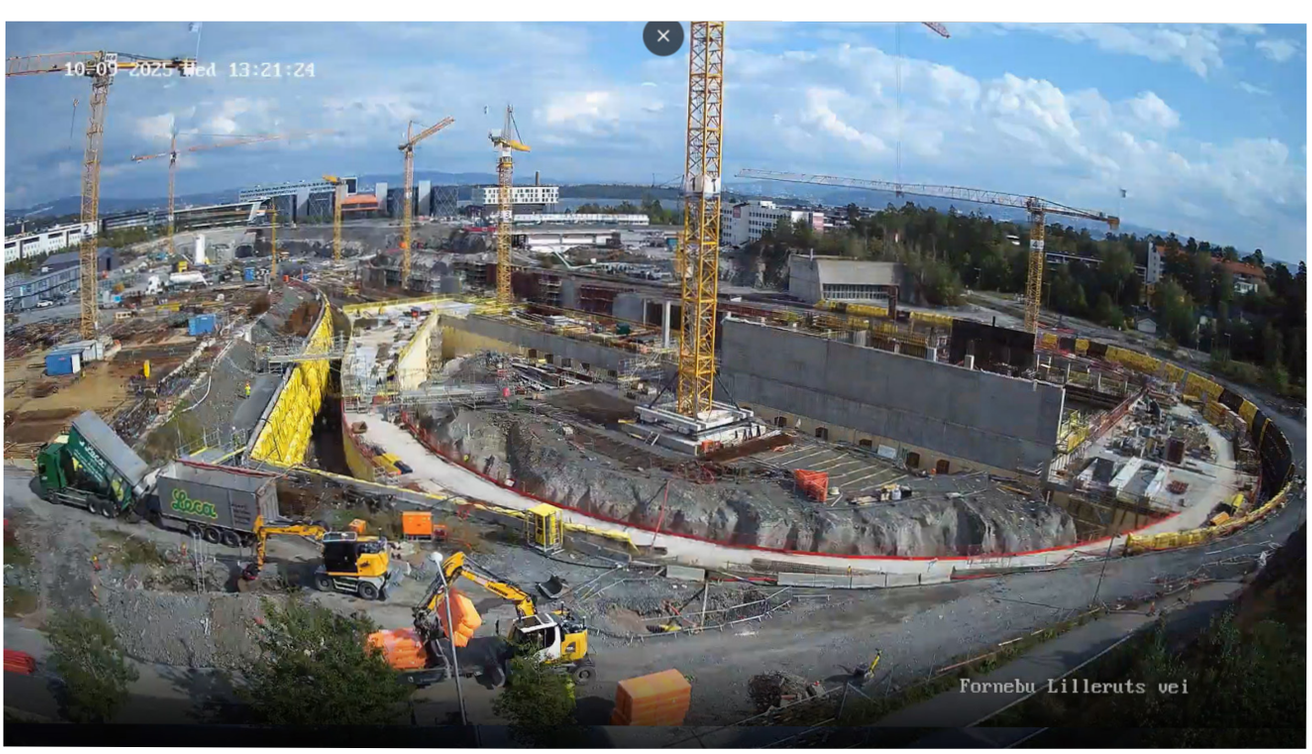
Circular material

Leca LWA offers long-term performance and can be excavated and reused in new projects without losing its technical properties.

The project highlights how lightweight solutions can support efficient construction while helping reduce environmental impact in major infrastructure developments.

Due to limited access and the propping system, traditional backfilling methods were challenging. After evaluating alternatives, Leca LWA was selected as the ideal solution. The lightweight aggregate was installed pneumatically through a 100 mm hose over distances exceeding 35 meters, improving both safety and efficiency on site. Its low density also helped reduce earth pressure on the retaining structures, while the rounded particles ensured efficient and fast installation in the confined area.





Leca® LWA is blown into place to reduce earth pressure around the new Fornebu metro station in Oslo.

A large, modern skate plaza was built in Piła's riverside areas.

LECA® LIGHTWEIGHT AGGREGATE PROVIDES GROUNDWORK SOLUTION FOR RIVERSIDE RECREATIONAL AND SPORTS AREAS IN PIŁA

Revitalization of public space in Piła – the riverside areas of the Gwda River and the northern part of the municipal island

This project covered public areas near Dąbrowskiego Street and the northern part of the park on the municipal island, with a total area of 5.63 hectares. It gave new urban functions to unused land and the degraded area of a former rubble landfill.

The project, worth approximately PLN 20.1 million, was carried out between 2018 and 2021 with the support of European Union funds and the statebudget, with the funding level reaching 85%. In the riverside areas of Piła, one of the largest and most modern skate plazas in Poland was built, with an area of 3,387 m², along with a 186-metre roller-skating track. Sports courts for volleyball and basketball were also constructed. A space for calisthenics

PROJECT INFORMATION

Project: Revitalization of riverside recreational and sports areas in Piła

Location: Piła, Poland

Contractors: Kormost S.A. Bydgoszcz; Thermbau Polska Sp. z o.o. sk. Piła

Designer: Pion Sp. z o.o. Przedsiębiorstwo Projektowo-Realizacyjne Budownictwa, Bydgoszcz

Product: Leca® LWA 8/10–20 mm

was prepared as well, including gymnastic equipment and outdoor exercise bars. The entire area was connected by an attractive communication system for pedestrians, cyclists and runners.

In the park on the island, walking paths were also modernized, and the pedestrian and bicycle ring surrounding the island from the north was completed. The system of pedestrian and bicycle paths fits into the network of cycle routes in Piła, helping to build and complement the city's alternative bicycle transport infrastructure. In order to integrate and connect the municipal island with the riverside areas, a pedestrian and bicycle bridge over the Gwda River was constructed.

Challenging ground conditions

Typical riverside soils with limited load-bearing capacity, combined with anthropogenic soils, posed a significant challenge for this project. Leca LWA proved to be a very good and effective solution to most of the problems related to the ground conditions.
The use of expanded clay aggregate was chosen due to the low weight of the fill, which did not excessively load the ground, as well as the speed of implementation, ease of installation, convenient routing of utilities and very good insulation properties. All of this was achieved using only standard earthmoving equipment.

In this project, Leca LWA was used as a lightweight fill beneath the skatepark facilities, roller-skating track, sports courts and other sports structures and paths. Depending on the location and type of structure, the thickness of the expanded clay aggregate layer ranged from 50 cm to 150 cm. Compacted Leca LWA (8/10mm–20mm), enclosed in geosynthetic material, formed load-reducing "expanded clay aggregate mattresses", which enabled the designed structures and installations to be safely founded.

Compacted Leca LWA (8/10mm–20mm) in geosynthetic material forms load-reducing "expanded clay aggregate mattresses".

The Leca LWA was delivered by tipping truck, enabling fast and efficient installation directly on site.

Infrastructure

Sweden

New stabling tracks taking shape – designed for increased capacity and future rail traffic. Photo Tim Cato, The Swedish Transport Administration

STABILITY, REUSE AND LECA® TUR&RETUR - GOTHENBURG'S NEW TRAIN STABLING YARD

When The West Link Project (Västlänken) comes into operation, new stabling tracks are needed to handle the increased train capacity. These are being built in Lärje, north of Gothenburg, to ensure infrastructure that is ready for the future. Challenging ground conditions have required careful foundation design, where Leca® lightweight aggregate is part of the solution – both new and reused material.

When the West Link opens in 2026, rail traffic in Gothenburg will change. Demands on infrastructure capacity will increase, while parts of the current stabling tracks at Gothenburg Central will disappear as the area is redeveloped. This creates a need for new stabling tracks that are easily accessible and adapted to increased train capacity.

Leca® LWA reduces load on Gothenburg's clay soils

The soil is highly sensitive to settlement and places high demands on stability. To meet these requirements, a combination of lime-cement columns and load reduction with lightweight fill is used, where Leca LWA has been selected.

"*What we build adds load to the ground. To reduce that load and achieve as slim a structure as possible, we need to compensate with something lighter. That's what we've done with Leca LWA.*" says Per Kelloniemi, Site Manager at Peab, contractor for the project.

Reused lightweight aggregate

In total, LECA Sverige AB has supplied more than 26,000 m³ of Leca LWA to the project. Part of the material consists of reused Leca LWA.

"*Reusing is the best thing you can do, so we try to make the most of available resources*," says Per.

The reused Leca LWA has been recovered from the E6

Leca International visiting Lärje – Søren A. Aabye, Sales Director, and Ilona Miszczak, CEO, on site with Peab

motorway in Stenungsund, stored and tested by LECA Sverige AB, and then used in this project. The decision to use both new and reused Leca LWA was made in dialogue with the Swedish Transport Administration, which approved the material choice based on the project's technical and quality requirements.

"*There's no difference in working with the materials. The properties, the very reason we use Leca LWA, are the same as for new material,*" Per explains about the experience of working with reused material.

Pride at the building site

Working with reuse does not only bring environmental benefits. Per Kelloniemi describes how it also creates engagement and pride within the team.

> ***It feels good to use reused material. You know what it means and the difference it makes.***

Leca LWA is not the only material that has been reused. Peab has also used crushed rock from the West Link tunnel excavations, where technical requirements allow it. Per reflects on the industry's overall approach to reuse:

"*We need to handle materials as if they will be reused, both when building and when excavating, so that we can close the loop.*"

Smart logistics in a tight and complex construction environment

The large volumes of Leca LWA have placed high demands on logistics. The project's location also presented challenges.

"*The site is surrounded by existing infrastructure – roads, tramways and railways where traffic must not be disrupted. The connection to the E45 also meant we had limited time windows for material deliveries*," explains Per.

Peab and LECA Sverige AB planned the logistics together from the start to best meet the project's conditions.

"*We had many discussions early on to set the framework and explain our needs. It comes down to the mindset of all parties involved, and Leca really contributed by understanding our needs and coming back with solutions that worked for the project.*"

PROJECT INFORMATION

Project: Stabling tracks in Lärje

Contractor: Peab

Project owner: Swedish Transport Administration

Leca products: 22,736 m³ Leca Infra 10–20 and 3,540 m³ Leca Infra Eco

SALFORD RISE ELEVATED BRIDGE DEVELOPMENT

As part of the transformative Salford Rise development, over 3,000m³ of Leca® Lightweight Aggregate was specified for use in the construction of a new elevated bridge walkway.

The project, located adjacent to the University of Salford, aims to remove longstanding physical barriers and establish seamless connectivity between surrounding communities and the evolving innovation district.

Funded in part by a £13.17m Levelling Up Fund grant, the scheme represents a major investment in the urban regeneration of Greater Manchester.

Geotechnical Challenge

The construction of the bridge abutments presented challenging ground conditions, requiring a solution that would:

- Minimise settlement and structural pressure
- Address long-term risks such as sliding, tilting, and bearing failure
- Accelerate installation to reduce time on site

Traditional fill materials were deemed unsuitable due to their weight and the corresponding structural demands.

Engineering Solution: Leca® Lightweight Aggregate

The Eric Wright Group is the main contractor leading the delivery phase and Leca LWA was selected

3,000 m³ of Leca LWA used in retaining walls for a new elevated pedestrian walkway.

by the designers for its exceptional strength-to-weight ratio, reducing load by up to 75% compared to traditional fill.

Key Advantages of Specifying Leca® LWA for the retaining wall structure:

- Lightweight: Reduces vertical and lateral pressures on the structure
- High permeability: Supports integrated drainage systems
- Installation efficiency: Speeds up construction and simplifies logistics
- Improved design outcomes: Enables leaner structural profiles, reducing costs and materials

The use of Leca LWA enabled faster abutment construction, minimised ground disturbance, and contributed to the resilience and long-term performance of the structure.

Conclusion

The Salford Rise project demonstrates how Leca LWA provides a geotechnically sound, for infrastructure developments with complex ground conditions. By significantly lowering structural load and installation time, Leca LWA plays a key role in delivering safer, more efficient civil engineering outcomes — supporting urban regeneration and infrastructure resilience.

PROJECT INFORMATION

Project: Salford Rise in Manchester

Contractor: Eric Wright Group

Product: 3000m3 of Leca® LWA (10-20mm)

Delivery Method: Walking Floor

Application: Retaining Wall for footbridge

Lightweight fill required to reduce settlement risk and structural load on bridge abutments.

Infrastructure

Denmark

Fast installation and delivery make Leca LWA an obvious choice in infrastructure.

LECA® LIGHTWEIGHT AGGREGATE STABILISES ROAD PROJECT ON SOFT SOIL

At Vejsager in Vemmelev, Slagelse Municipality saw cracks appear in a newly laid asphalt surface shortly after completion. The problem was not the surface itself, but the layers below.

"It did not take long before cracks started appearing in the wearing course. There were clear signs that the subbase was giving way," says Rune Nordenlund, Senior Consultant at Slagelse Municipality.

The conventional solution would have been to excavate the weak soil completely and rebuild the road with traditional materials. Instead, the municipality explored an alternative using Leca LWA.

Less Excavation – Same Function

"When we realised that we might need to excavate a significant amount of soil and transport it to landfill, we started looking at alternatives," says Rune Nordenlund.

By using Leca LWA, the project could be completed with reduced excavation depth and lower material consumption. The material functions both as ground stabilisation and partial load compensation, reducing pressure on the soft subsoil while maintaining the structural integrity of the road.

The project is also part of LECA Danmark AS renewed focus on infrastructure solutions, supported by new testing that documents the strength and drainage performance of Leca LWA.

Lightweight Material – Easier Installation

At first, contractor Colas was somewhat sceptical.

"You think: isn't this the material used in flowerpots — why would you use it in a road?" says Sara, Project Manager at Colas.

The experience on site quickly changed that view.

"The truck simply reverses the excavation, and the Leca LWA is discharged directly into the trench. It is far more straightforward than traditional materials."

The low weight also made handling easier.

"It is a lightweight material, and you can move it around using an ordinary rake. It is much easier to work with than crushed gravel, which is heavy and demanding."

Faster Progress on Site

Only 50 cm of material was excavated to make room for 20 cm of Leca LWA, 15 cm of crushed gravel and 15 cm of asphalt.

"The excavation and reconstruction progressed very quickly because we did not have to spend as much time transporting materials to and from the site," explains Rune Nordenlund.

Resource-Efficient Road Construction

The decision was not only about technical performance, but also resource efficiency.

"We save both transportation and the raw materials that would otherwise need to be extracted from gravel pits — and those resources are not unlimited," says Rune Nordenlund.
Reducing excavation can also bring significant savings in projects involving contaminated soil, where disposal costs are high.

Long-Term Perspective

Although the project is still new, expectations are clear.

"We expect that we have solved the settlement problem — and that no new cracks will appear in the pavement," says Rune Nordenlund.

The contractor also sees potential.

"It is an exciting material to work with, and we look forward to following future LECA projects," says Sara from Colas.

PROJECT INFORMATION

Location: Vemmelev, Slagelse Municipality

Client: Slagelse Municipality, Municipal Properties

Contractor: Colas Danmark

Leca product: Leca® 10–20 mm

Leca LWA replaces sand as bottom protection

FROM THE FIRST ISSUE OF BUILD (2016)

The first issue of Leca BUILD, published in spring 2016, already showcased the wide range of applications for Leca® lightweight aggregate across different markets.

Africarium, Poland

A large-scale zoo facility where Leca LWA was used in green roofs and water management, supporting both drainage and plant growth in a demanding environment.

Fredericia Marina, Denmark

Leca LWA was used to stabilise soft ground conditions, enabling the development of modern marina structures and infrastructure.

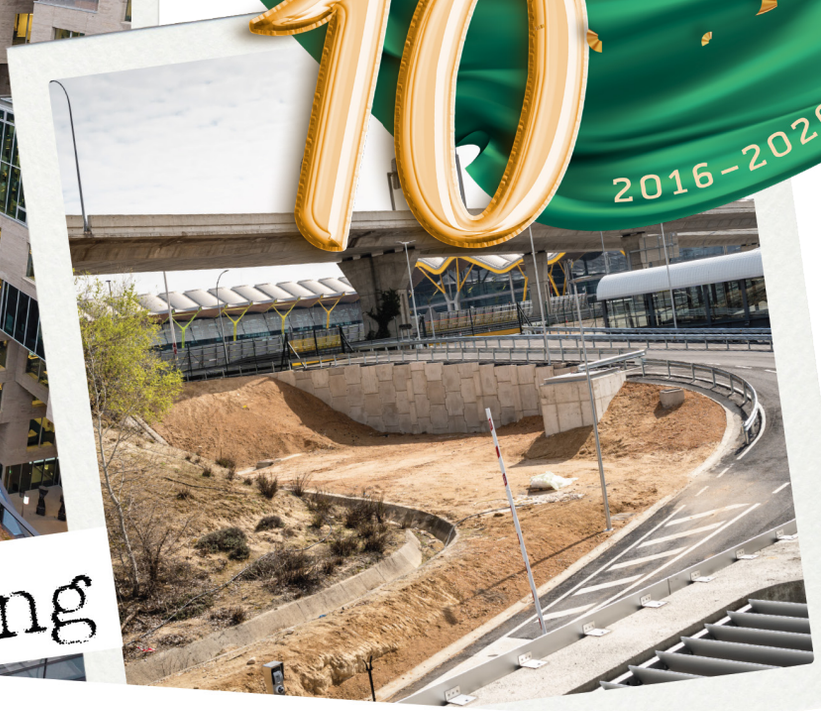
Highway and railway E45, Sweden

Leca LWA helped prevent settlements and improve stability in challenging clay soils, ensuring long-term performance of transport infrastructure.

West Marsh project, UK

A major redevelopment project where Leca LWA was used as lightweight fill to reduce load and improve ground conditions in a reclaimed area.

These early projects reflect the diversity of Leca® LWA solutions — from infrastructure to water management — that continue to define BUILD today.



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2016–2026

Housing

Water Management

Infrastructure

LIGHT MATERIAL, HEAVY PROOF

INTERVIEW WITH JOSÉ ESTAIRE GEPP, DIRECTOR, GEOTECHNICAL LABORATORY, CEDEX

Inside a 21-metre steel box in Madrid, hydraulic actuators impose the load of a train over a railway section at simulated speeds up to 400 km/h. It is Europe's only facility of its kind, and it just put lightweight expanded clay aggregate through the most rigorous railway test it has ever faced.

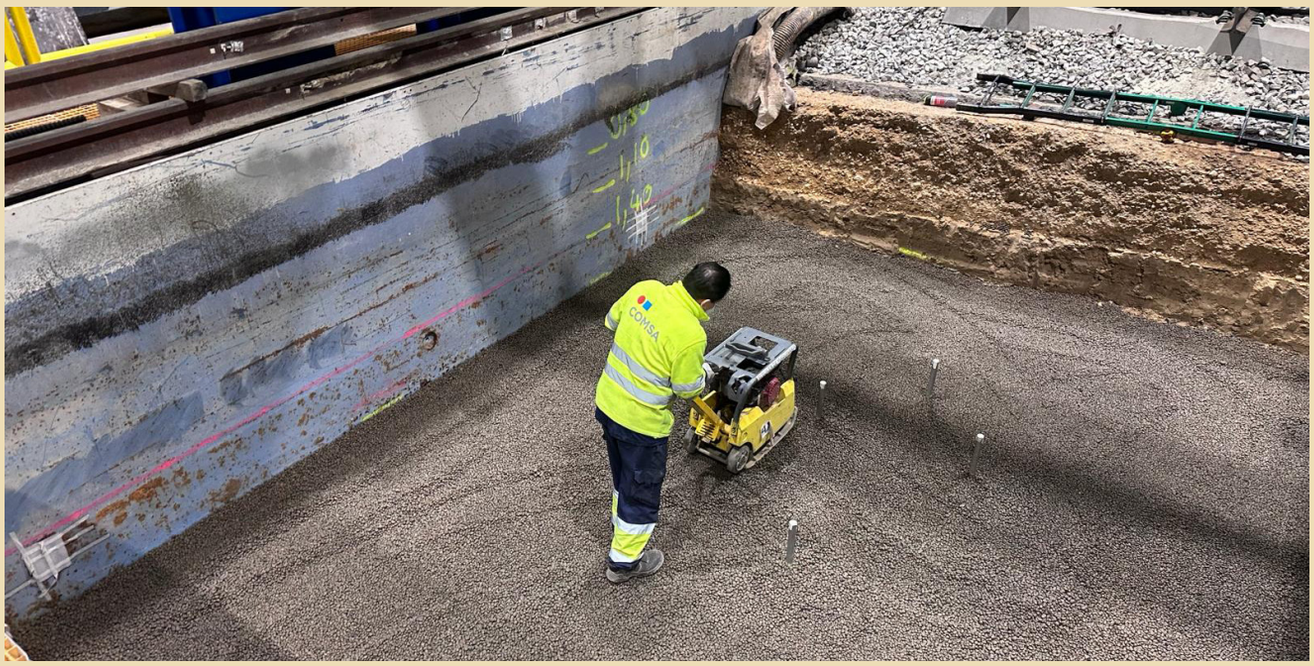
LECA Lightweight aggregate, has a well-established role in infrastructure construction: in geotechnical construction: retaining walls, bridge transitions, embankments over soft ground. Its low density reduces stress on underlying strata; its high internal friction angle gives it shear strength that belies its weight. What it lacked was a definitive answer to a specific question: How does it perform under fatigue caused by high-speed railway traffic loads? How does it perform beneath a high-speed railway line?

The PEDLER project, Performance and Durability of LECA filling in Railway embankments, was designed to provide that answer. Carried out at the CEDEX Track Box in Madrid, the program subjected a full-scale section built to Spanish high-speed standards to static, dynamic and fatigue loading across the entire operational speed range. José Estaire Gepp has directed experimental railway research at CEDEX for more than twenty years. He explains the facility, the methodology and what the results confirm.

Inside the Track Box

How does the Track Box actually work?

The installation is a steel enclosure 21 metres long, 5 metres wide and 4 metres deep. Within that space we build a complete railway structure from the ground up: embankment, form layer, sub-ballast, ballast, sleepers and rails. Loading is applied by three pairs of hydraulic actuators, each capable of delivering 25 tonnes, 50 tonnes per pair, well above the axle loads of a freight train. The actuator pairs are sequenced to replicate the approach, passage and departure of a train, with wheel-rail contact geometry matched to reality.



Speed is the demanding variable. A high-speed train at 300 km/h passes a fixed section in under three seconds, delivering 30 to 35 axle loads in that interval. At 400 km/h, the same event takes less than two seconds. Our system must apply those loads at the correct intervals and magnitudes within that window. The current ceiling is 400 km/h, the upper bound of European high-speed operations.

The section is fully instrumented throughout: LVDTs, potentiometers and laser systems for displacement; geophones on rails and sleepers for velocity; accelerometers where dynamic response needs resolution; pressure cells to measure load distribution through the layers. We capture behaviour at the surface and inside each layer simultaneously.

Is there anything comparable elsewhere in Europe?

No. This is the only facility of its kind on the continent, which is why we work with railway administrations and research institutions across Europe. The Track Box has been operational since 2004, developed under a European research programme. More than twenty years of experimental work with both public operators and private industry. PEDLER is one of the more technically demanding tests in that history.

The PEDLER Section

How was the test section configured?

The upper structure replicates exactly what the Spanish railway administration specifies for high-speed lines: 30 cm form layer, 30 cm sub-ballast, standard ballast, sleepers, rails. The departure from convention is beneath: instead of an earth embankment, we placed a 1.1-metre layer of Leca lightweight aggregate.,. The objective was to evaluate that layer's behavior in isolation, with everything above it held constant and matched to operational practice.

CEDEX had already studied Leca LWA at the grain level: more than a thousand individual grain resistance tests, followed by large-scale triaxial and direct shear testing using oversized apparatus to avoid scale effects. The material showed high stiffness and resistance for its density. PEDLER was the next step, proving that behavior holds inside a loaded track structure.

Stiffness and Stability: Static Results

What did track stiffness measurements show?

Static tests were conducted at multiple points throughout the testing. Track stiffness values came in

consistently between 90 and 100 kN/mm, the range typical of operational Spanish high-speed infrastructure. Before reaching usable test conditions, the ballast was mechanically stabilized using tamping equipment, then the section was loaded with the equivalent of 100,000 tonnes of traffic. That process increased stiffness by 20 to 25 kN/mm, bringing the section into the acceptance range.

Speed and Response: Dynamic Behavior

How did the section respond as speed increased?

Dynamic tests were run at 14 speed steps from static conditions up to 400 km/h, in 25 to 50 km/h increments. The key question was whether displacement increased with speed in line with theoretical predictions, and it did. Total rail displacement tracked theory closely across the entire speed range.

At the ballast layer, displacement moved from approximately 0.20–0.25 mm under static loading to 0.4–0.5 mm at 400 km/h, normal behavior, comparable with measurements from conventional embankment sections. Inside the Leca LWA layer, movements were below 0.1 mm across the full speed range, with the increase pattern following theoretical trends. The lightweight aggregate was essentially stable while the track structure above it performed normally.

The Long-Term Test: Fatigue

What loading was applied in the fatigue test?

Two fatigue phases. Passenger traffic: one million axles at approximately 15 tonnes each, simulated at 300 km/h, 15 million tonnes in total. Freight traffic: 300,000 axles at 80, 100 and 120 km/h, totalling around 5 million tonnes. Together, the test compressed a substantial portion of a real line's service life into a controlled experimental sequence.

How did the two layers compare under repeated loading?

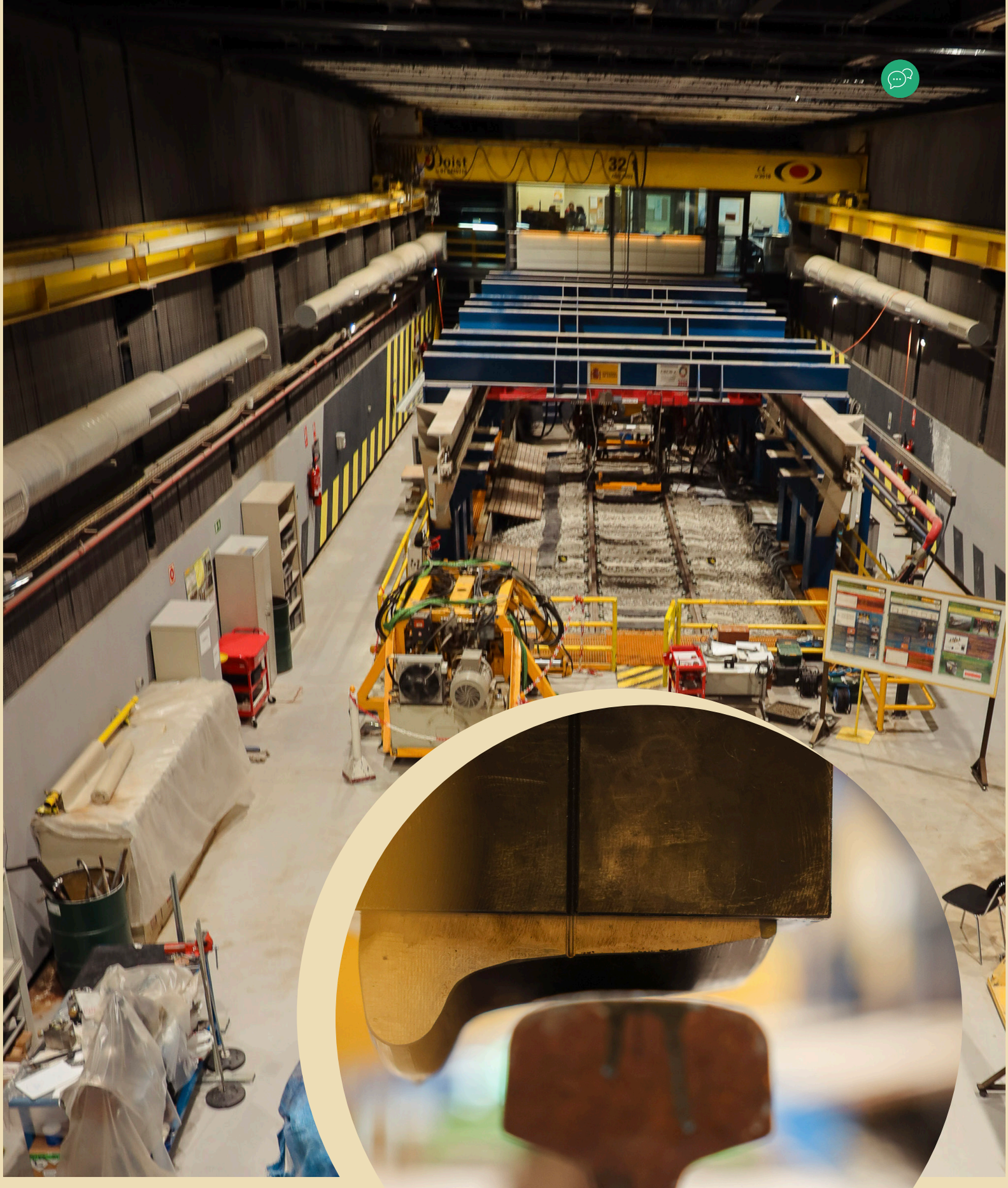
Ballast accumulated permanent settlement progressively and steadily, the expected pattern, consistent with rates observed on operating Spanish high-speed lines. The Leca LWA layer showed a qualitatively different response: permanent deformation was almost negligible after the passenger traffic phase and increased only marginally during freight loading. The rate of settlement accumulation in the lightweight aggregate was a fraction of that observed in the ballast above it.

What the Results Confirm

The comparison that matters most is not between LECA and theoretical benchmarks, it is between Leca LWA and the conventional high-speed sections that CEDEX has been testing and monitoring for two decades. Across stiffness, dynamic response and long-term settlement, the PEDLER section performed within the range established by standard embankment practice. The 1.1-metre LECA layer carried high-speed rail loads without compromising track quality or accelerating deterioration.

For designers working with difficult ground, soft soils, differential settlement risk, bridge approach zones, or sites where minimizing vertical load on underlying strata is a structural constraint, that equivalence of performance, combined with a density roughly one-third that of conventional fill, represents a design option now backed by full-scale experimental evidence.

> "When we compared the LECA section with our data from conventional high-speed lines, we reached the conclusion that its behavior is perfectly valid and perfectly comparable. The material handled the loads imposed by high-speed trains.
>
> — José Estaire Gepp, Director, Geotechnical Laboratory, CEDEX



Hydraulic actuators over the railway section

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