2024

Leca®
SAINT-GOBAIN

BUILD

A MAGAZINE FROM LECA

Water Management

Housing

Infrastructure

2-2024

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Cover: Helsinki's New Skyscraper, Finland

Flash Facts

3 550 m³ Leca® lightweight aggregate (LWA) for Reuse

Have you ever wondered what recycled Leca LWA looks like in practice? In the picture, you can see 3,550 m³ of Leca LWA received by Leca Sweden. The material was previously used in a road embankment and will be delivered to new projects in the winter of 2024.

Thanks to its ceramic shell, strength, and durability, Leca LWA can be reused multiple times without losing its original quality and properties. Through our recycling concept, Leca Tur & Retur, the material is given new life in different applications, without requiring additional production processes. This way, Leca offers a circular product with an EPD that shows nearly zero carbon emissions.

50L Bag Sales Specialist: Introducing Our New Expert

As part of our continued growth in the UK Lightweight Aggregates market - we are excited to welcome Emma Cooper to the Leca UK team! Emma will oversee sales for our underfloor solutions including Leca® Insufill and Leca® UNO and also manage the consistent growth of our small bag market for Leca® Home Renovation Products and furthermore provide support to our customer service team. With her extensive experience and knowledge, we're confident she'll help us expand our reach in the renovation sector.

52 people from 12 Nationalities Unite for Collaboration in Estonia

From 25th to 27th September 2024, 52 Leca employees from 12 different nationalities and various departments gathered at Vihula Manor Country Club & Spa in Estonia for a two-day event focused on collaboration and team building. The meeting aimed to strengthen shared goals across the organization.

Workshops covered key topics such as Saint-Gobain's mission of Making the World a Better Home, the TEC culture (Trust, Empowerment, Collaboration), LEAN practices, and strategies to enhance the effectiveness of Monthly Business Review (MBR) meetings. The event fostered active participation, aligning teams and improving internal processes.

New Recycling Concept for Leca® Lightweight Aggregate (LWA) in Finland

Reusing building materials is crucial for sustainable construction and the circular economy. In Finland, Leca LWA can now be recycled for new construction projects, thanks to a new concept developed by Leca Finland and GRK Suomi.

This concept enables Leca LWA to be recovered from demolition sites and processed at GRK Suomi's facility. After undergoing quality control and receiving a CE marking, the recycled material is ready for use in new building projects, thus supporting Finland's sustainability goals.

50 Years of Success at Leca Poland

The Saint-Gobain Leca plant in Gniew is celebrating its 50th anniversary! This is a unique opportunity to look back at half a century of success, hard work, and growth that have allowed us to build a strong market position and become a trusted partner in the construction industry. Our production of expanded clay plays a key role in many infrastructure and construction projects, supporting innovative, durable, and sustainable solutions.

This celebration is also thanks to each of you – the employees of Leca Poland, who contribute to the success of our plant with your skills, commitment, and daily efforts. We are grateful for your loyalty, diligence, and teamwork, which enable our company to achieve ambitious goals and make a positive impact on the environment around us. Together, we build for the future!

50 LAT RAZEM

Flash Facts

Leca Portugal Opens Rascoia Clay Pit to Celebrate Sustainability on Open Day

On October 12th, Leca Portugal hosted an Open Day, inviting the local community to experience a unique behind-the-scenes look at the Rascoia Clay Pit, where the raw materials for its products are sourced. Over 100 participants were immersed in the company's commitment to sustainability, with the event designed to deepen their connection with nature and showcase Leca's environmental responsibility at every stage of its production process.

The day featured a variety of workshops, offering participants the chance to explore new hobbies, and a train tour through the village, led by Margarida Freire and Eduardo Rego of the AMA (Avelarense Memory Association), which provided fascinating insights into local heritage. Despite forecasts predicting poor weather, the event enjoyed clear skies and sunshine, contributing to the cheerful atmosphere. Entertainment was provided by the traditional singing group "Nós e (a)Vós" and Teteanima, bringing joy to the children in attendance.

Workshops led by Leca Portugal's team members Fernando Pereira and Paulo Lopes, alongside partners Pedro Ferraz and PshysioGo, provided valuable moments of learning and collaboration, reinforcing the community spirit that defined the day.

At the top of the world's most environmentally friendly furniture factory – The Plus – you will find Leca® lightweight aggregate (LWA)

The Plus furniture factory, owned by Vestre, is one of Europe's most successful producers of sustainable outdoor furniture. Their colorful and exciting pieces can be found in iconic locations like Times Square in New York, Forum Des Halles in Paris, and Aker Brygge in Oslo.

Vestre has not only been a pioneer in design and innovation but also in environmental preservation. On the green roof, which is a key feature of the project, Leca Norway, in collaboration with Mattak, delivered LWA® for soil improvement. Adding Leca to the soil provides excellent drainage properties, improves soil structure, prevents soil compaction, and enhances airflow to plant roots.

Green roofs not only reduce climate emissions but also contribute to increasing biodiversity. Thousands of native plants have been seeded and planted on the roof to preserve green areas and promote biodiversity in the region. No invasive species were used, and stones, sand, and old stumps have been brought up to serve as insect hotels. The natural vegetation from the surrounding area has gradually taken over the factory roof in just a few years, blending beautifully into the forest.

The Plus has already gained significant recognition, and as the first project of its kind, the building has received the highest environmental classification: BREEAM Outstanding – an achievement that truly sets a new standard for sustainability in the industry.

LECA® LIGHTWEIGHT AGGREGATE (LWA) PROVIDES FIRE PROTECTION IN BYHAVEN – A NEW DISTRICT IN FREDRIKSTAD

Leca LWA contributes to advanced and cost-effective construction techniques.

PROJECT INFORMATION

Project: Byhaven Fredrikstad
Contractor: Solid Entreprenør
Design: Bjølstad Utvikling AS
Leca product: Leca® LWA 8/20, blown

We recently visited the construction site of the Byhaven project in Fredrikstad, where we got a closer look at the advanced and cost-effective building techniques being used. The project, which is part of the larger urban development project Værstetorvet, represents a new era in urban development and offers a mix of housing, office spaces, and retail areas, with a total of approximately 249 homes and a shopping center covering nearly 30,000 m².

Highly Efficient Delivery and Installation of Leca LWA

Joacim Hovde, concrete foreman at Solid Entreprenør, guides us through the process of blowing Leca LWA directly to the third floor via a 60-meter-long hose, a method proving to be highly efficient. With a delivery capacity of around 50 m³ per hour, Leca LWA is delivered straight from the truck, practically pre-compacted, with no need for manual unloading. This technique reduces both labor and material waste on the construction site and completely eliminates the need for packaging.

Joacim Hovde, concrete foreman at Solid Entreprenør, guided us through the Byhaven project in Fredrikstad, where we gained insight into the advanced and cost-effective construction techniques being used.

Leca LWA is blown into place directly from the truck, practically pre-compacted, with no need for manual unloading. It's hassle-free to walk on and requires zero packaging.

A Chosen Solution for Safety and Logistics

"Leca LWA was chosen for its many advantages, including fire safety and logistics, which require minimal setup space and resources" Hovde states. He also highlights how quick and easy it is to install Leca LWA compared to alternatives like polystyrene, which would require extensive use of construction cranes and more manpower.

Setting New Standards for Urban Development with Sustainable Solutions

Since the start of the Byhaven project, around 3,500 cubic meters of Leca LWA have been delivered, used both as insulation material between floors and as fire protection between commercial and residential sections. Leca LWA has also been applied in the basement rooms and around the building's foundation for drainage.

The project marks an important step forward in the urban development of Fredrikstad, just nearby the pedestrian bridge over to Stortorvet. With its approach to sustainable construction and innovative solutions, Byhaven is setting new standards for future projects.

It is quick and easy to install Leca LWA compared to alternatives like polystyrene, which would require extensive use of construction cranes and more manpower.

Leca blown into place, straight from the truck, fully compressed - no need for manual unloading, no problems to walk on and zero packaging.

Housing | Finland

LECA® AGGREGATE ROOF TOPS HELSINKI'S NEW SKYSCRAPER

Leca® lightweight aggregate (LWA) was a key component in the construction of the 33-storey residential tower, Atlas, in Helsinki. This challenging project demonstrated the importance of collaboration between various stakeholders, from the material supplier to the contractors.

Efficient and Sustainable Insulation Solution

The use of Leca LWA as a roof insulation material offers several benefits, particularly for high-rise buildings. It eliminates internal convection even with thick insulation layers, making it ideal for long-lasting and durable roof solutions. Furthermore, Leca LWA is a CE-marked product that ensures efficient execution of roof slopes and thermal insulation, which is crucial in complex projects such as high-rise constructions.

In the Atlas project, sustainability was a priority. With its 288 rental apartments and three commercial units, the building aims for RTS environmental certification, highlighting the importance of selecting responsible building materials. Thanks to the use of renewable energy sources in production, the carbon footprint of the Finnish Leca LWA has been reduced by 54% compared to previous levels. Environmental Product Declarations (EPD) were published in March 2024, underlining the product's environmental benefits.

PROJECT INFORMATION

Project: Leca® Aggregate Roof at As. Oy Helsingin Atlas

Location: Vuosaari, Helsinki

Architectural and Main Design: B & M Architects Ltd.

Contractor: Skanska Talonrakennus Oy

Roof Contractor: Kerabit Katto Oy

Structural Design: SWECO Rakennetekniikka Oy

Leca product: Leca® LWA Roof 4–20 mm

A Challenging Installation

The roof installation at the Atlas project was carried out by Kerabit Katto Oy. Although the roof structure was typical for a Leca LWA roof, installing the material on a building of this height was far from straightforward. The windy conditions in November posed a significant challenge, as lifting operations had to be carefully timed to ensure safety.

"We were fortunate with the weather. The morning of the lifting was calm, and everything went smoothly," says Matti Mäkinen, Site Manager at Kerabit Katto Oy.

Precise planning was required to ensure that the material deliveries and lifting operations were executed without delays. The original plan was to use two tower cranes simultaneously, but due to height restrictions, adjustments were necessary.

Fast and Seamless Coordination

To prevent the lightweight aggregate from being blown away, the team had to work efficiently, completing the pouring of concrete directly after the Leca LWA installation. This method ensured the aggregate remained in place despite the site's exposure to wind and nearby traffic.

"The lifting cycle for each load was approximately 13 minutes, including lifting, unloading, and returning. The total roof area was around 550 square meters, so the job was completed in two stages," Mäkinen explains.

Lifting Leca LWA onto the 33-storey Atlas rooftop for efficient and durable insulation.

A Testament to Teamwork

Weather conditions in November are notoriously unpredictable in Finland. The installation date and start time had to be adjusted multiple times due to changing weather patterns. Mäkinen emphasizes the importance of flexibility and teamwork in achieving the project's goals.

"These types of projects require close cooperation and a positive attitude. There are always unforeseen variables, but together we can find solutions," Mäkinen states.

"The collaboration with Skanska and Leca Finland was excellent. We all shared a common goal: to ensure that the residents have a warm, watertight roof over their heads," Mäkinen concludes.

This project is a prime example of how innovative materials and well-coordinated teamwork can overcome the challenges of high-rise construction, paving the way for more sustainable and efficient building solutions across Europe.

Skilled workers from Kerabit Katto Oy expertly handle the Leca LWA installation.

Photo, Urban Studies Programme, The Chinese University of Hong Kong

A STORYTELLER WITH A PASSION FOR GREEN SPACES

Trees, green landscapes, and guided tours that leave a lasting impression. Leca sat down with Helen Johansson to discuss why vegetation is crucial for our urban environments.

Cycling tours in Copenhagen, walks through Malmö, or webinars on extreme weather – these are just a few of the activities that keep Helen Johansson busy. She is a consultant and lecturer under the name Green Blue Guide. Her clients are not limited to Scandinavia but come from all over the world.

Based in Malmö, Sweden, she educates, inspires, and opens the eyes of people to how we can—and must—do better at adapting our cities to the changing climate. Central to her work is the concept of blue-green-gray solutions, so naturally, our conversation starts there.

What is a blue-green solution, and why are they needed in our cities?

"Blue-green solutions can encompass a variety of things, like vegetation and spaces designed to manage stormwater. When we have too much concrete and stone, we create problems in our cities—rainwater has nowhere to go, and hard surfaces accumulate heat. Blue-green solutions help create cities that are more comfortable and enjoyable to live in," Helen explains.

The channels in Augustenborg relieve pressure on old drainage systems by managing rainwater. Photo, Essi Malinen-Lallukka

BUILDING EXPERTISE IN CLIMATE ADAPTATION

The demand for Helen's expertise is significant.

"Our cities need to be both resilient and viable. As we continue building, we close off nature's ability to do what it has always done. We lose the space for roots, water infiltration, and clean air. But we can't live in cities where the air is so bad that we need masks, where temperatures exceed 50 degrees, or where torrential rains nearly drown us. We need to replicate nature's solutions in our cities to tackle the problems we've created."

There are two aspects to addressing climate change in urban areas: reducing emissions and adapting to the consequences, like heatwaves and heavy rainfall. Helen's focus is on the latter, and her most powerful tool is her ability to engage and inspire through storytelling.

"I enjoy delving into topics and sharing what I learn. I've realized that people enjoy listening when you present things in a way that's memorable and interesting."

Anyone who has heard Helen speak knows that her storytelling is not just engaging—it serves a clear purpose: spreading knowledge about how we need to use nature's methods if we want to keep living in our cities.

"I can't control how people build cities, but I can help them become knowledgeable. My way of doing that is through informing and educating, helping to create more enthusiasts."

She also shares her expertise with students in programs like *Green Urban Developers*. The skills they acquire will be critical for climate-proofing our cities in the future.

"We need a general increase in knowledge. I see progress, but it's slow. Trees are still being cut down to make way for buildings. With the right knowledge, we could plan differently, like adjusting the orientation of a building to allow the trees to remain."

PLACES THAT SERVE MUTLIPLE PURPOSES

Another concept that comes up in the conversation is multifunctionality—that is, spaces that can serve more than one purpose depending on the situation.

"We need to focus on multifunctionality. Cities are expanding, but there's not enough room for all the functions we need. We have to find other solutions."

Can you give some examples?

"A park or green courtyard, for instance. It's pleasant to spend time there and helps cool the surroundings, but at the same time, it can manage large volumes of water during heavy rainfall. Or a green roof that provides biodiversity while also being a place where children can learn to garden."

Helen spends her time educating on green-blue solutions for climate resilience.

Trees play a key role in creating viable cities. Photo, Helen Johansson

THE INVALUABLE ROLE OF TREES IN THE CITY

Another key player in creating viable cities is trees. They provide essential ecosystem services, offer shade and cooling, and store carbon dioxide.

"People are talking more and more about how important trees are. Summers with soaring temperatures and alarming reports of torrential rains and landslides are waking people up."

And for those who haven't yet realized the value of trees in urban areas, Helen's guided tours can be a powerful tool. She shares a story from a tour in Malmö:

"It was a very hot summer day, and I was talking about trees. Some people commented that tree roots cause problems when building. We were standing in the shade of a couple of trees, so I suggested they step out onto the cobblestones, and I'd continue the tour in the sun. They weren't too keen on that..."

She sums up the story with a smile: "Even the most anti-tree people will sit under a tree when it's hot outside. That's just how it is."

INNOVATING RETAINING WALLS: LECA® LWA AND KINGPOST SYSTEM COMBINE FOR A MODERN RECONSTRUCTION

The Turner Street retaining wall reconstruction faced significant geotechnical and logistical challenges, including restricted access, poor ground conditions, and proximity to homes. A solution was needed that ensured structural stability while minimizing disruption, with traditional methods like sheet piling ruled out due to vibration, noise, and accessibility concerns.

Project Background

The project involved the reconstruction of a dilapidated retaining wall located on a narrow strip of land at the top of an embankment between rows of houses on Turner Street. The wall, which served as the rear boundary to the terraced properties, varied in height between 1.2m and 2m, with the embankment height contributing to a total height difference ranging from 2.5m to 3.9m. Site access was severely limited, as it could only be reached via a narrow 1.5m-wide footpath running behind the properties on Mount Street, making it unsuitable for heavy construction equipment.

Site and Geotechnical Challenges

The primary challenges of the project included restricted access, poor ground conditions, and the proximity of residential properties. The site investigation report identified mudstone at a shallow depth (around 3m below ground level), which raised concerns regarding drivability without pre-auguring or access to heavy plant equipment. Above the mudstone, the ground was relatively poor, preventing the option of battering the ground to excavate for a foundation.

In addition, the nearby homes presented vibration and noise concerns, making traditional sheet piling methods unsuitable. The use of sheet piles risked damaging the existing wall and temporary works due to vibrations, while noise concerns from nearby residents needed to be addressed.

Evaluation of Alternative Engineering Solutions

Several solutions were explored to address the technical and logistical challenges. A gabion wall was initially considered, as it could be constructed using small equipment, but the size and mass of the gabion units encroached on the existing propping system, creating further complications. A reinforced earth solution was also evaluated; while it allowed for construction using hand tools on a shallow foundation, the required excavation length to resist lateral earth pressures conflicted with the propping system.

Underpinning or anchoring the existing wall was ruled out due to safety risks in working near the deteriorated structure and the presence of scaffold propping. Anchoring would have further complicated the project, as anchors would need to be installed beneath private properties, raising additional legal and engineering concerns.

Combining a Kingpost Wall System with Leca® LWA

The presence of mudstone at a shallow depth favoured the use of an embedded wall system. After thorough consideration, a kingpost wall system was deemed the most appropriate solution for the project. Through early collaboration with piling contractors, it was determined that 450mm diameter bores for the piles could be augured using a small remote-operated SFA (Segmental Flight Auger) rig, which was capable of navigating the narrow footpath.

The kingpost sections were sized for manageable lengths and weights, allowing them to be installed using a small crane positioned in the nearby car park. The final design included 19 kingposts spaced at 3m intervals, with retained heights varying between 1.4m and 3.4m to accommodate the site's geometric variations. The decision to use a kingpost system eliminated the need for a contiguous or secant pile wall, which would have been impractical under the project's constraints.

Geotechnical Analysis and Design

Additional lab testing of the site's geotechnical data confirmed that the mudstone layer had suitable drained Mohr-Coulomb parameters of ϕ=28° and c'=10kPa, enabling the bore diameter and pile depths to be optimized for maximum efficiency. Sampling and testing of the near-surface ground also facilitated an accurate assessment of the slope's stability and the risk of global retaining wall failure.

Backfilling and Use of LECA® LWA

While the kingpost wall system addressed many buildability challenges, backfilling between the new and old walls remained a significant issue. Traditional compaction techniques using large machinery were not feasible due to the narrow access and the presence of the propping system. Additionally, using small compaction tools like Wacker plates posed safety risks, as workers would be confined between the old and new walls.

After conducting research on alternative backfill materials, Leca LWA was proposed as the ideal solution. This lightweight, rounded material could be placed pneumatically via a 100mm diameter pipe, allowing it to be delivered from a distance of over 35 meters. This innovative approach eliminated the need for traditional compaction and ensured a safe, efficient backfilling process.

PROJECT INFORMATION

Project: Retaining Wall on Turner Street UK

Location: Turner Street UK

Main Designer: Kier Group

Leca product: Leca® 10-20mm Lightweight Fill (LWA)

Conclusion

The reconstruction of the retaining wall at Turner Street presented a complex set of geotechnical challenges, including restricted access, poor ground conditions, and proximity to residential properties. After evaluating various solutions, the use of a kingpost wall system, combined with Leca LWA for backfill, proved to be the most effective solution. The project showcased the importance of early collaboration with piling contractors and the innovative use of lightweight materials to overcome difficult site conditions.

LECA® LIGHTWEIGHT AGGREGATE (LWA) SUPPORTS COMPLEX GROUND CONDITIONS

Leca® lightweight aggregate (LWA) provided a key solution to the poor ground conditions for the regeneration of a railway track. The existing low-bearing ground conditions required a solution which would reinforce the foundations to provide stable conditions for the new railway construction.

During the investigation into the groundworks for the proposed regeneration of railway line No. 207 - Sztum section, groundwork investigations revealed the presence of clayey sands mixed with stones and fine sand, as well as clay, sandy clay, silty clay, and silty sand. Within the cohesive soil layers, both as continuous layers and as lenses, non-cohesive soils occur in the form of fine sands, locally interbedded with clayey sands and organic soils, with a thickness of 0.6 to 2.1 m.

Tackling Complex Ground Conditions

Complex ground conditions were identified, and the structure was classified into the second geotechnical category. The subsoil beneath the track bed contains layers of low-bearing mineral soils (cohesive soils in a soft plastic and plastic state) and organic soils (peat). The subsoil in this condition did not meet the requirements set out in instruction Id-3. Therefore, additional solutions were necessary to allow the track bed to be properly founded.

Maintaining a Pedestrian – Bicycle Path for the Local Community

On the eastern side of the section, a pedestrian-bicycle path runs along the shoreline of a nearby lake. Along the boundary of the railway plot on the lake side, it was necessary to construct a retaining wall to ensure the stability of the terrain incline. The escarpment heights in this section reached up to 2.54 m.

Creating an Innovative and Long Lasting Structural Solution

A protective structure was designed and constructed to secure the crown of the track bed, consisting of a retaining structure made of a sectionally anchored steel sheet pile wall, topped with a reinforced concrete cap, and with load relief using geomattresses made of lightweight ceramic aggregate – expanded clay (Leca LWA).

Due to the significant variation in geotechnical conditions, a solution was designed to include subsoil relief (reducing stress) and balancing the stresses transferred to the subsoil. It was decided to use a geomattress made of Leca® GEOTECHNICAL EXPANDED CLAY 8/10-20RX (a lightweight material with a density of 4 kN/m³, which is approximately 14 kN/m³ less than the soil in the embankment), wrapped in polyester geotextile. The thickness of the relieving geomattress varied from 0.5 to 1.4 m. Directly on the expanded clay geomattress, a 45 cm layer of crushed aggregate 0-31.5 wrapped in geotextile was placed, located between two layers of geogrid.

It was decided to use a geomattress made of Leca® GEOTECHNICAL EXPANDED CLAY 8/10-20RX."

A protection of the track bed crown was constructed in the form of a retaining structure made of a sectionally anchored steel sheet pile wall.

PROJECT INFORMATION

Project: Railway line 207

Investor: PKP PLK S.A.

Location: Sztum, Poland

Architectural and Main Design: GEO-EKSPERT, Dr. Grzegorz Horodecki

Contractor: PPMT Gdańsk

Leca product: Leca® GEOTECHNICAL EXPANDED CLAY 8/10-20 RX (2400 m³)

LIGHTWEIGHT SOLUTIONS FOR BRIDGES IN JÄMJÖ | BLEKINGE

Leca lightweight aggregate (LWA) is paving the way for sturdy bridge foundations, tackling tough soil conditions between Lösen and Jämjö.

The E22 road between Lösen and Jämjö has long struggled with substandard conditions, given its heavy traffic load. Now, with Peab as the contractor, the road is being rebuilt to improve its quality, boost traffic safety, and enhance the living environment in Jämjö. The project spans 15 kilometers of new highway and 23 bridges. Several of these bridges face unstable soil, where Leca LWA provides essential stability, eliminating the need for extensive piling.

This significant project will better connect the Blekinge region, addressing capacity increases and flood control. But, as with many large-scale endeavors, challenges remain. Rerouting traffic for 15,000 daily vehicles is no small task, and working with land that has poor load-bearing capacity adds another layer of complexity.

Lightweight solutions for geotechnical needs

Several of the project's bridges faced difficult geotechnical conditions. Solutions were needed to manage the load on the ground, ensuring it wouldn't be too high. For some of the bridges, the solution was piling, but for several others, they could work with lightweight fill, avoiding the need for additional piling.

"We've had a skilled geotechnician who designed incredibly effective solutions and did a fantastic job with the calculations. These solutions are both economically and environmentally sound, and they've worked well in practice. This allowed us to use lightweight fill for these bridges instead of piling," says Martin Isoaho, site manager at Peab.

Where the ground around the bridges couldn't handle conventional, heavy fill, lightweight fill was specified, with Leca LWA selected as the material of choice.

An excavator spreads Leca LWA, critical for addressing geotechnical challenges along the Lösen–Jämjö road.

Earthworks for the new highway, improving capacity and safety for the 15,000 vehicles passing daily.

One of the 23 bridges being built to enhance infrastructure, where Leca LWA prevents additional piling.

There was a lot of calculation and control behind the decision, but the work resulted in finding the best possible solutions and making excellent material choices," Martin explains, adding,

"We chose the most cost-effective and production-friendly material. There are several types of lightweight fill available, and we landed on lightweight aggregate because it was the best fit for this project."

Precise and minimal waste delivery

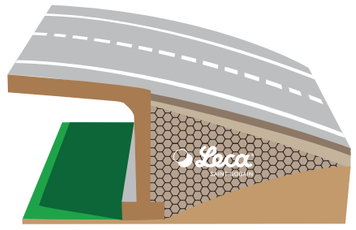
4,000 cubic meters of Leca LWA were delivered to five different bridges. The groundwork for each bridge took about a week and a half, and the delivery of the lightweight aggregate itself was quick and efficient. This was largely thanks to solid preparation and support from Leca's technical sales team.

"The delivery went very smoothly because we had planned exactly how we wanted it. We were able to place it precisely where it was needed and lay it down directly. Minimal waste and always in the right spot," says Martin.

The way the lightweight aggregate behaved during installation also left a positive impression. A common concern among those unfamiliar with Leca LWA is that it may be more mobile than desired.

"We were unsure about how volatile the aggregate would be. Several people thought, 'We can't walk on this or use a compactor' – but it worked perfectly! We quickly learned how to compact it, and after a few rounds with the compactor, it went great."

The project, which began in the spring of 2022, is scheduled for completion in December 2024.



PROJECT INFORMATION

Project: Highway/ Bridge Construction

Location: Jämjö | Blekinge

Contractor: Peab

Leca product: Leca® LWA (10-20mm)

LECA® LIGHTWEIGHT AGGREGATE – THE STRONG AND SUSTAINABLE SOLUTION FOR ROAD CONSTRUCTION

At Leca Danmark, infrastructure is a priority, and our customers are always at the center of our focus. We listened to our customers and asked how we could make things easier and better for them. The answer was clear: There was a need for improved documentation and quality assurance for Leca LWA. We took this to heart.

Quality-Assured Test Results – A Reliable Foundation Structure

In collaboration with one of Denmark's leading infrastructure contractors, we conducted extensive tests to re-evaluate the properties of our Leca LCA. The result? Leca LWA shows an even higher performance than previously measured for the E-moduls. One of the test's objectives was to outline a principle for quality assurance when incorporating the material. It is important for us to provide the best service, correct guidelines, and, in every way, make it a great and easy experience to work with Leca LWA.

"When building roads, the robustness of the foundation is crucial. With the new test results, we have been able to document that Leca® Lightweight Aggregate exceeds previous expectations – and this will revolutionize many infrastructure projects," Product Specialist Michael Lind, Leca Danmark.

Morten Dysted, Michael Lind and John Skalshøj presented test results for the participants, there were lots of good questions and talk about Leca LWA use in future infrastructure projects

Open Test Trials – Transparency in Focus

We wanted to be completely transparent, so we invited our customers to participate in the test trials. 25 industry participants attended in Hvidovre, where they could witness the test process firsthand and ask questions to both us and our partner, Per Aarsleff A/S. The result was positive feedback and valuable dialogue that strengthened trust in our product and in Leca Danmark. Going forward, we will focus more on involving our customers earlier in the process, as we gained insight into their issues and challenges.

More Sustainable Production – Over 50% CO_2 Reduction

At Leca Danmark, we are constantly working to reduce our climate footprint. Through the SPIR project (Sustainable Production & Innovative Recycling), our factory in Hinge has reduced its CO_2 emissions by more than 50% since 2017. This makes Leca LWA a strong candidate for green infrastructure projects where environmental impact is a priority.

Sustainable and Recyclable Solution for Future Projects

With new Environmental Product Declarations (EPDs), we now accurately document the environmental characteristics of Leca LWA. The ceramic, inert product has a lifespan of at least 200 years and can be reused through our "Leca® Return" program, making it a cost-effective and sustainable choice for any construction project.

Save Time and Resources – Use Leca LCA

Dealing with challenges such as soft ground or deep excavation? With Leca LWA, you can save time, stop excavation earlier, and create a robust foundation without large quantities of the scarce resource of sand or the challenging handling of surplus soil. It's both a financial and environmental benefit for your projects.

Setting up measuring equipment to find the Leca LWA E module

BRIDGING HISTORY AND INNOVATION

MANUEL DURÁN

Manuel Durán Fuentes (A Coruña, 1950) is a Civil Engineer, C. and P., from the Polytechnic University of Madrid (class of 1973) and holds a Ph.D. (2001) from the University of A Coruña. In 1974, he began his career working for various companies and, in 1984, launched his own consulting firm, EIC Durán S.L., based in Ourense.

His first significant commission, awarded by the Xunta de Galicia in 1988, was to design and oversee the rehabilitation of a medieval bridge in Ourense. This project marked the beginning of an extensive career, with over a hundred interventions on historical public works commissioned by various Spanish public administrations. His work has mainly focused on concrete bridges, historic stone roads, and military architecture.

In academia, he has served as an associate professor at the E.T.S. of Civil Engineers at the University of A Coruña, where he taught "History of Civil Engineering." He has authored several books and presented at numerous conferences. His notable publication, The Construction of Roman Bridges in Hispania, published by Xunta de Galicia (2004 and 2005), provides a methodology for identifying the Roman origins of historic bridges.

In summary, his extensive career continues to evolve in this specialized field, encompassing an extensive list of projects and construction management endeavours.

Q. You are a Civil Engineer with a lengthy career in developing numerous projects and with a strong passion for historic concrete bridges. When did your interest in this area begin?

A. *I was fortunate enough to study under my mentor, Mr. Carlos Fernández Casado, and work closely with him on a doctoral project in 1974. He introduced me to a unique perspective on Public Works Engineering and sparked my interest in its history.*

Q. To practice your profession, teach, and publish, you must have travelled to many countries and seen numerous bridges and other historical structures. What can you tell us about this experience?

A. *Travelling is an essential path to knowledge. For many years, I explored the territories of the ancient Roman Empire, studying preserved bridges to deepen my understanding.*

Q. Has the knowledge you acquired been useful, in the broadest sense of the word?

A. *As I told my students, nearly everything in construction has its roots in ancient techniques. I was particularly struck by the seismic-resistant construction methods, advanced auxiliary tools, and construction techniques—some of which remain unexplained—as well as the early use of hydraulic energy and possibly even steam power (such as in the Lighthouse of Alexandria, third century BCE). The prefabrication of concrete caissons in Roman port construction and their use of lightweight concrete have also fascinated me.*

Q. We find it intriguing those Roman builders used lightweight concrete. How did it improve their constructions?

A. *Primarily, it reduced the dead loads in vaulted buildings, minimizing thrust on abutments. This allowed for the construction of the Pantheon's vast masonry dome (ca. 100 CE), the largest of its kind until well into the 20th century.*

Q. In the recent reconstruction of an abutment on the Xunqueira de Espadañedo Viaduct (Ourense), which collapsed in February 2024, why did you use lightweight aggregates to fill between the supporting walls?

A. *These reconstructed stone masonry walls are about 20 meters high, creating significant structural demands, especially on a fault line with one of Galicia's highest seismicities. The use of lightweight ceramic material allowed us to refine the design of the tall walls, reduce working stresses (to 1.2 MPa) on the slate bedrock, and simplify on-site procedures, improving compaction efficiency and limiting settlement.*

Q. Finally, what is your opinion on the relevance of historical construction methods?

A. *Regarding the viaduct project, I must emphasize that the designs incorporate construction techniques from various historical periods, both in materials and methodology. In conclusion, it is inconceivable to practice any major profession without knowledge of its historical foundations, and civil engineering is certainly no exception.*

LONG-TERM PERFORMANCE OF LECA® LIGHTWEIGHT AGGREGATE

Leca Lightweight Aggregate (LWA) is subjected to a variety of quality standards based on its application, whether it's used for insulation, road construction, or the production of lightweight blocks. These standards are established by the European Standardisation Organisation and ensure that designers and constructors can confidently use Leca LWA in various applications—from pipe insulation to railway embankments.

The Standard Protocol for New Leca® LWA

All standards currently applied focus on Leca LWA when it is freshly produced and ready for use in construction. Extensive testing ensures the material meets all necessary norms before it is applied to projects like bridges, blocks, or flooring systems.

The Real Question: How Does Leca® LWA Perform Over Time?

One aspect less discussed is how Leca LWA behaves over time when exposed to environmental factors such as vibration, moisture, and temperature changes. Leca Estonia sought to answer this question with a case study on a 24-year-old road embankment.

The 160-meter stretch of road leading to the Estonian Border Guard station, is still in excellent condition after over 24 years of use.

The Varska Road Case Study

In the early 2000s, Leca LWA (10-20mm) was used to stabilize a 160-meter stretch of an access road to the Estonian Border Guard station in Varska, located on the challenging, muddy banks of Lake Pihkva, just a few kilometres from the Russian border. The road remained in use for over two decades under harsh environmental conditions, including extreme temperature variations ranging from +30°C in summer to -30°C in winter.

Testing and Findings After 24 Years

In March 2024, test drilling was conducted on the road, and samples were analyzed by the Estonian Transport Authority. The tests focused on two key aspects: volumetric weight in submerged conditions and changes in fraction size.

- **Volumetric Weight:** While geotechnical design norms for submerged Leca LWA in the Baltics and Scandinavia consider 1,000 kg/m³ as the standard, the Varska case showed significantly lower weights. In semi-submerged conditions, the weight was 570-610 kg/m³, and in permanently submerged conditions, it was 700-730 kg/m³. This indicates that Leca LWA outperformed design expectations by 30%.

- **Fraction Size:** Some crushing of the Leca LWA was expected due to traffic load, natural factors, and the drilling process itself. However, tests revealed that 90% of the original Leca LWA remained intact after 25 years.

A Testament to Leca® LWA's Longevity

The Varska road has continued to serve the Estonian Border Guard station reliably, a testament to the durability and performance of Leca LWA, even in extreme conditions. This long-term performance is something Leca Estonia is particularly proud of, as it reinforces the value of using Leca LWA for long-lasting infrastructure solutions.

Test drilling in March 2024 to assess the condition of Leca LWA in the Varska road embankment.

Test sample of Leca LWA taken from the submerged embankment in Varska, Estonia.

ONE SINGLE CLAY PELLET DOESN'T REPRESENT A LOT
BUT MANY CLAY PELLETS CREATE A BETTER FUTURE

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