

BUILD

No. 2 – 2022

Leca®

A MAGAZINE FROM LECA

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A629 Corridor Scheme

Work has started for the Calder Junction (part of the A629 corridor scheme) – where over 5000 m³ of Leca Lightweight Fill (LWA) has been specified for a new highway development. The works are set to improve the Calder and Hebble junction and form a significant phase of a wider scope project to improve the A629 between Halifax and Huddersfield. This project will include a new link road, which will be created via a bridge spanning the Calder and Hebble Navigation to a round-about on Stainland Road. The project is fully funded by the West Yorkshire Combined Authority through the West Yorkshire Plus Transport Fund.

1.000 m³

It is unavoidable to prevent the accumulation of dust during the production of expanded clay. But instead of disposing the accumulated dust as waste, we can feed this into production. This solution makes the dust a resource to our customers to create additional volume and this can reduce our annual dust volume at the German plant by 1,000 m³ as a result, thus protecting people and the environment.



-50% CO₂

In January 2022, LECA Finland initiated a major sustainability investment worth approximately €1.7 million to build a wood pellet combustion line facility at its factory in Kuusankoski. By switching to wood pellets, the carbon dioxide emissions of the factory's production will decrease by 23,000 tons annually, i.e. from 38,000 tons to approximately 15,000 tons. The investment is part of a larger whole, where LECA Finland will transform its business operations to become carbon neutral by 2035.

BUILD

is a magazine published by Leca International

Cover:

The Mall of Tripla in Helsinki



LECA STARTS AN EXPANDED CLAY KILN IN ESTONIA

LECA Eesti, part of the Saint-Gobain group, restarted the production of lightweight clay aggregate (LWA) at the Fibo ExClay plant in Häädemeeste, Estonia with a production capacity of 350,000 cubic meters per year. More than 2 million euros were invested in the factory.

Eik Erich Tahk, Leca Estonia's Baltic Sales Manager, says that the demand for high-quality construction materials is increasing and the Häädemeeste factory is the only producer of expanded clay with such quality and certification in the Baltic region.

Tormis Vilberg, the Manager of the Fibo ExClay factory, says that half of the production goes into LWA, and export is of great importance here - a ship with 6,500 cubic meters of expanded clay just left for Sweden. The other half is used to produce Fibo blocks.

According to Vilberg, the main part of the investment was spent on modernizing the equipment, among which he emphasizes the acquisition of a new burner and a continuous flue gas monitoring system. With the help of a modern burner, you can work with five different fuels at the same time, which increases flexibility in the choice of fuels and enables the gradual replacement of fossil fuels with new renewable fuels. The continuous flue gas monitoring system installed on the chimney can provide in real-time updates on how efficient the fuel burning process is and how to regulate the process so that the combustion can be even more efficient.

The reproduction of LWA at Häädemeeste has led to the creation of 25 local new jobs and they have been working at the factory since the beginning of the year and were engaged in preparation before production started.



After a long period of closure due to the pandemic, it was time to open our doors and celebrate together with the local communities.

In May, **LECA Finland** received around 400 participants for their recent "Open Day". Visitors were told about LECA Finland's many corporate responsibility measures, such as the new wood pellet plant, which will reduce the production's CO₂ emissions. Additionally, visitors were given the opportunity to learn more about our Leca Lightweight Aggregate solutions. Other activities included the attendance of the Kouvola Football Association and lunch was offered to all the participants.

In June, **Leca Poland** had its "LECA FOOTBALL DAY" in the production plant. Over 450 inhabitants of Gniew and the surrounding area visited our plant, which was a new attendance record. Attractions included a tour of the factory and the clay pits, hiking trails, with lots of fun activities and attractions for the whole family with a football theme. This family led event also included a barbecue, sausage baking and sweet refreshments.

The event was attended by the Mayor of the City and Municipality of Gniew Maciej Czarnecki and his deputy Joanna Kamińska. Other valued guests also visited, including the Advisor to the President of the Republic of Poland Marcin Drewa and the Undersecretary at the Ministry of State Assets Karol Rabenda. During the meeting, a presentation took place to demonstrate the process of production to the Ministers, with a discussion on the possibilities of its use – this included our policy and initiatives taken in the field of sustainable development and environmental protection.

After this unique meeting, we were delighted to receive a written congratulations from the Chancellery of the President of the Republic of Poland. Mr. Marcin Drewa, Advisor to the President, personally appreciated our efforts to develop the construction industry, sustainable development, but also to improve the quality of life for the local residents and support offered to local social and sports projects. We were honoured to have received this distinction.

Finally in October, **Leca Portugal** opened its doors to show the plant to the community. Around 100 participants had the possibility to be with us during the day. All the participants were given the opportunity to visit the plant and the photovoltaic plant. The day also included the possibility to participate in different workshops such as how to prepare a sustainable and healthy meal to eat at work; optimal sleeping routines; how to be more sustainable in daily life and to know more about organic substrates and soil types. Different activities included blindfolded puzzle; where the goal was to experience the consequences of a work accident. Lunch was offered to all the participants and the children were provided with a dedicated play area.



PNEUMATICALLY DELIVERED LECA® LWA RESCUES ZERO EMISSION GENERATING SCHOOL

NORWAY *The construction site is emission-free, and the school will be sustainability driven. This could not be achieved without ten metres of LECA® Lightweight Aggregate (LWA) backfill.*

"We couldn't use local materials. The building was not designed to allow it," says Even Krog, construction manager at Ole Martin Almeli. The heavy equipment contractor carried out the earthworks at Fjerdingsby School. Rælingen Municipality built a new school which is unusually environmentally friendly, both during the construction period and when it was completed.

BIODIESEL

"We have operated our equipment and vehicles using biodiesel since day one, everything else runs on electrical power, and there are solar cell panels on the roof," Krog explains.

The school is an almost zero-emission generating building. It will be heated by a borehole thermal energy storage system shared with several other

buildings in the area, including Rælingen Town Hall and Rælingen Upper Secondary School.

"When we came here in October 2020, there was a mass rock outcrop here. This area was blasted and then more than 60 wells were drilled to obtain heat," Krog explains.



Even Krog is the Construction Manager at Ole Martin Almeli.

POOR QUALITY ROCK

Rock protection has been an important part of the work. The rock at Fjerdingby is of poor quality. Even Krog and his colleagues specified Leca LWA as a lightweight fill between the rock and the building, to a height of ten metres. The Leca LWA was then pneumatically delivered and then compressed.

"We chose Leca LWA, partly because it was so easy to work with. Additionally, the material is manufactured locally. The factory is located here in Rælingen. So this allowed a flexibility for us, as it allowed us to postpone or accelerate the work by a couple of days, with quick coordination with the LECA team," he says.

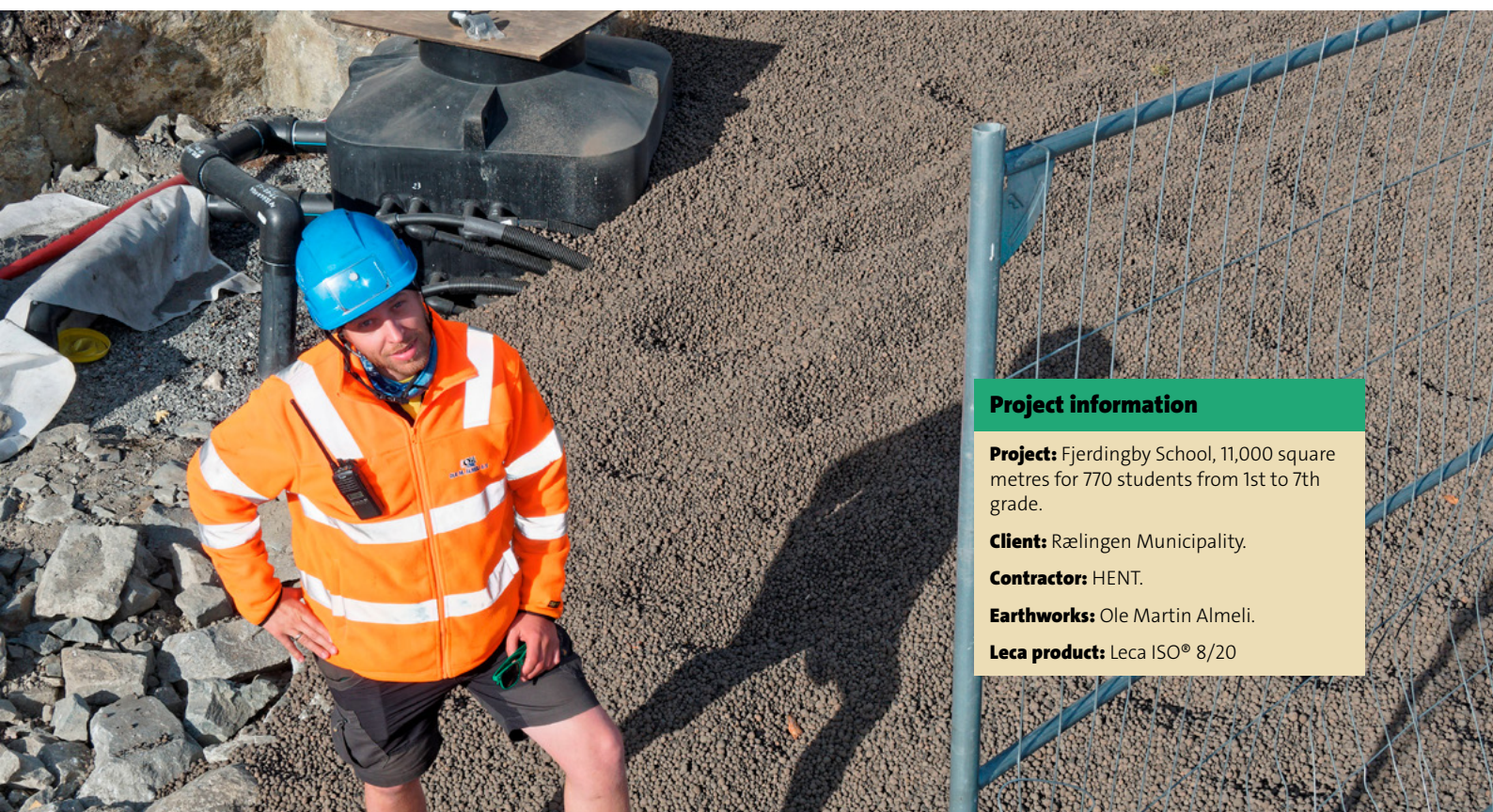
ACCELERATED DELIVERY

It was just a matter of getting a fully-loaded blower truck into place, setting up the hose pipes and then starting to pump the material into place. "It took about 25 minutes to empty the vehicle. Then it took 40 minutes to drive down to the factory, fill up the vehicle with material and then be ready to pneumatically deliver the material accurately into place again," says Krog.

535 M³ OF LECA LWA

has been delivered for this project. "We finished our part of the work in August, and the school opened its doors to students in September. As things stand now, everything is going according to plan," says Krog.

The school is also getting an underground multi-purpose arena. Outside there will be play facility, a running track and football pitch, and on the roof there will be an outdoor classroom.



Project information

Project: Fjerdingby School, 11,000 square metres for 770 students from 1st to 7th grade.

Client: Rælingen Municipality.

Contractor: HENT.

Earthworks: Ole Martin Almeli.

Leca product: Leca ISO® 8/20



SPORTS COMPLEX UNDER HARD GROUND CONDITIONS

Installation of the hall structure

POLAND *There were plans to build a covered tent hall with artificial turf, as well as further facilities, as part of the expansion of the Skolwin DAWN Sports Club's sports infrastructure, which has been in operation since 1952.*

This ambitious project included the construction of an 884 m² football field with artificial turf and an arched tent hall canopy. The main load-bearing elements of the hall are circular frames made of steel I-beams connected with purlins and bracing, based on reinforced concrete foundations. Two layers of tarpaulin cover the hall. A containerized sanitary and changing room building with a built-up area of 125 m², as well as, access

roads, pedestrian routes, and parking spaces for cars and bicycles, round out the project.

BUILDING LOCATION

The construction site includes a section of the Odra valley, which runs along its western bank in a wide strip. It is an alluvial, marshy peat valley with wetlands, peat bogs, and meadows flooded with spring, alder, and riparian forests that are linked by

branches, ditches, and swamps. Most of these wetlands have deformed as a result of human activity in these areas, and surface waters are now discharged into numerous watercourses and canals. These areas have undergone a systematic transformation over the last century. As a result of the transported soil and rubble material - gradually filling them.



Relieving the ground under foundation footings

SEVERE GROUNDWORK CONDITIONS

The analysis of available archival data revealed that there are geological and engineering conditions impeding construction in the area of the planned investment. The primary challenge will be the deposition of low-bearing organic soils and embankments, as well as the shallow occurrence of groundwater with potentially aggressive CO₂ content. The geological tests confirmed the presence of marsh soils, which are low-bearing silts with high compressibility and low shear resistance. They form a continuous layer that extends to a depth of 11.2 meters. Embankments with thicknesses ranging from 1 m to nearly 1.5 m were also discovered, the majority of which had poor properties due to the ratio of rubble and household waste to earth masses.

Soils of this type should not be used as a direct support for building on land or specialized construction, necessitating the use of indirect foundation methods.



Filling under the parking lot

ADDITIONAL CONSTRUCTION PROBLEMS

Water conditions were another impediment to the construction area. It is caused primarily by a slight elevation above the level of adjacent wetlands. The water conditions in the substrate were thought to be variable, ranging from low to moderate. Because the majority of the area has soils that are impermeable to the planned facilities and road infrastructure, water dissipation will be accomplished primarily through horizontal filtration. Any facilities built in these conditions will further disrupt hydrographic conditions. A support system of rainwater in the form of drainage was considered to limit the possibility of creating local water reservoirs in the area's surface zone.

A SOLUTION FOR THE PROBLEM

Several foundation variants for the planned facilities were considered. Following a technical and economic analyses of the proposed solutions, a solution utilizing Leca LWA was chosen. For all designed facilities, a compensatory foundation consisting of partial soil replacement with Leca LWA was used. This included the foundations of the hall structure, container buildings and communication routes and parking. This fast and simple-to-use method not only ensured the varied substrate's sufficient load-bearing capacity, but also effectively solved the problem of rainwater drainage, even in the case of its

carbonate and acidic aggressiveness. To solve this difficult engineering problem, it was sufficient to use a layer of Leca LWA 8/10-20 R with a thickness of 0.5 to 0.8 m.



Ready sports and recreation complex

OUTCOME AND REWARD

This ambitious project was recognized by the Civil Engineering industry. The developer of the geotechnical project was honoured and recognised at the Geoengineering and Underground Construction 2022 congress.

Project information

Investment: Municipality of Szczecin City

Project: ABRYS Design Studio

Construction and foundation design: Consprojekt Design Services and Construction Supervision Mariusz Boderek

Contractor: KS General Construction Services Szymon Koza

Leca product: Leca® LWA 8/10-20 R

Quantity: 1680 m³

INTERVIEW

Meet the new CEO of LECA **Harald Cholewa**



After 30 days at Leca International, the new CEO is impressed by the commitment and enthusiasm of the people in the team. He sees a perfect storm coming in the construction market but also a huge potential for Leca and for new applications of the Leca product – not least for a more sustainable future.



Harald Cholewa moved to Copenhagen at the end of the summer to take over as CEO at LECA International. He has worked at Saint-Gobain for his entire career, starting 17 years ago in Germany in the glass industry and moving on to other Saint-Gobain teams in France, Italy, Poland, Sweden, the Czech Republic, and now Denmark.

FIRST IMPRESSIONS

"I think it's absolutely fascinating to discover a new part of Saint-Gobain, and I'm excited about the Leca product – a sustainable, natural product – and its vast possibilities for application. When I visited the teams, there were so many examples of how we are using this lightweight aggregate to do something exceptional.

My first routine at LECA was traveling to all the plants, getting to know as many people as possible within my new responsibilities. It's important to me that they get to know me and that I get to know them. This will remain a routine in the future, visiting the plants and having a face-to-face talk with everyone there so that we understand and share the same vision and pursue the same goals. I have been happy to see a very committed and engaged team all over the country. That makes me proud working for LECA and excited about the future."

A KEY PLAYER NOW AND TOMORROW

"I see LECA today – and even more tomorrow – as a key player in the construction industry. Leca is present in the three basic market segments: housing, infrastructure, and water management. So, the applications will always be relevant.

For the LECA business itself, I see a couple of exciting opportunities. We have been focusing a lot on the infrastructure sector: on road construction and hopefully also soon railway construction, which our team is working hard at. We will continue to be involved in these big, public investments. But we also have some niche applications, like Filtralite, where I think that with a bit more effort and focus we can still grow our market share.

Water management and treatment is another interesting area for the Leca products. We know that with climate change, the topic of water retention in big cities gets increasing attention. And having clear and clean drinking water is a concern already today and will be of even greater concern tomorrow.

There are so many possibilities of application and a huge potential still ahead of us. I'm sure that we have not yet explored all the possibilities."



THE PERFECT STORM

“Right now, we are close to a perfect storm. Times are changing extremely fast, and we have to be very agile to adapt to the situation. The energy prices are soaring, and as a logical consequence, the prices of our products have to reflect the increased production costs. On the other hand, with rising inflation and rising mortgage rates, we start to see a market cooldown from the historical highs in the past two years. So, the first and utmost priority right now is to conserve our margin. That means we have to compensate on the selling price. On top of that, we need to launch all the improvement projects that we have to minimise the cost-impact. That's priority number one.

The second priority is to switch to new energies and new ways of producing sustainably. Leca aggregates already allow the construction industry to reduce its CO₂ footprint. By switching our production of the aggregates to renewable energies, we can also reduce our own footprint. We have committed to a very tight roadmap to reach net-zero carbon by 2050 at the latest, which is challenging, but I'm

convinced that as a team we can lead this to a success.

TRUST, EMPOWERMENT, AND COLLABORATION

“What is important for me in a company is the people. I'm very proud of the transition in management I have been able to make in all the countries where I worked at Saint-Gobain in terms of trusting people, empowering people, and collaborating.

The impact has been visible in the yearly Me@Saint-Gobain survey, which also measures how people feel involved and committed and how they identify themselves with the company. But you can also measure this kind of transition in decision-speed and even, ultimately, in operating profit.

I believe that if you give the right people the right information, they can make miracles. And it's usually better to give people more information than you think. That way they understand the background, and they feel fully involved and will more easily commit to the whole journey that we have to take.”



MAKING THE RIGHT DECISIONS

“My physics background makes it a bit faster and easier to understand what is happening and having a chat with the worker, the operator, the foreman, or production manager, which is usually on quite a technical level. But in physics, you also learn analytical skills. That is a big asset for leading a company and making the right decisions.

A natural behaviour of human beings is that you see a problem, and you directly reflect on a solution; you're building the answer straight away. This is something that I believe you need to push a bit in the background. Instead, you need to look at the facts that you collect for this decision in a calm, reasonable way, without emotion. I do this, and then I usually go back to the first reaction I had to see whether I can align the facts with my gut feeling. Before sharing my decision with anyone, I will usually talk with my management team because the decision-making process is also about getting your team involved and convinced.”

“

I believe that if you give the right people the right information, they can create miracles.”



WELCOME TO DENMARK

“My biggest achievement in life is quite simply: my family. I am very happy to have a wife and two kids, who follow me through all the challenges. Every 2-3 years we've been moving, and I know it's not easy for them. The step to Denmark was less difficult, though, because we've lived three years just across the bridge in Malmö, and we've been to Copenhagen several times.

We moved here at the end of the summer, which was fantastic. Everyone here is super open, welcoming, and helpful. I'm also happy to have the sea so close because I like everything on water: windsurfing, sailing, waterskiing. But mostly, I love cycling in the countryside. It clears my head, and I often think about the decisions to come during cycling. Of course, in Denmark there are no mountains so mountain biking is a bit difficult. I still have to change my mountain bike to a city bike.”



The green roof area at the Mall of Tripla is one hectare.

THE LIGHT-FILLED GREEN ROOF OF THE MALL OF TRIPLA

FINLAND *The Mall of Tripla in Helsinki is a combination of a shopping centre, railway station, hotel and high-rise office buildings. About one hectare of the building's roof area is a green roof.*

Text: Leena-Kaisa Simola

One of Finland's leading landscape architecture companies, Loci Maisema-arkkitehdit Oy, carried out the landscape design for the Mall of Tripla. Most of the one-hectare area designated for the landscape design is on the roof of the building.

"The aim was to create a small-scale, open-plan, light-filled green environment that fits into the scale of

the built environment in terms of design and rhythm. The raised beds with walls for planting greenery form a whole in which the components evoke a cosy and relaxed atmosphere that is unlike others," says the project landscape architect Niilo Tenkanen.

According to Tenkanen, the idea of using Leca Lightweight Aggregate (LWA) as the growth medium was

introduced when it was time to plan the green roof construction phases in more detail.

"Since the roof structures were mostly designed to withstand traffic from heavy construction vehicles, there was no need to base the green roofs on a lightweight aggregate, so the focus was on creating conditions that promote root growth in plants. The

solution was cost-effective and provides an aerated growth medium. If we had only used soil, the structure of the growth medium would have easily become too dense.”

IMPORTANT TO CHOOSE THE RIGHT GROWTH MEDIUM

The thickness of the layer of Leca LWA in the green structures of the Mall of Tripla is between 10 and 70 centimetres. Leca LWA was used in the green roof both as part of the growth medium and in the structures underneath them.

“It is essential to choose the growth medium based on the purpose of use and to separately define the desired nutrient concentrations for each patch of vegetation. The desired acidity will also affect the choice of growth medium. The higher the number of different species of plants, the better it is for the green roof,” says Juha Liukkonen of Tieluiska Oy, which supplied the growth media for the Mall of Tripla.

Designing and building green roofs requires an understanding of structural engineering, but also knowledge of the water management of the layers of plant materials and their adaptability to changing weather and growth conditions. The key technical



The green roof of the biggest shopping centre in the Nordics also serves as an outdoor recreation area for the residential buildings.

reason for the increasing popularity of green roofs is the way that well-designed green roof structures can be used to manage storm water runoffs.

VERSATILE SOLUTIONS

“Creating accessible environments that effortlessly fit the surrounding green infrastructure, promote diversity in nature and can be constructed whilst minimising the emissions generated is a key aspect of landscape design. The details of the design are always tailored to each site. Finding versatile solutions is of course impor-

tant in landscape design,” says Pia Kuusiniemi, Landscape Architect and Partner at Loci Maisema-arkkitehdit Oy.

“For the Mall of Tripla, we first designed the plant composition and then chose the optimal growth media solutions. At the end of the day, plants are simple creatures that will succeed if they are provided with a decent surface to grow on, the right amount of water and lighting and temperature conditions that are favourable to their growth,” says Tenkanen.



Project information

Site: Mall of Tripla

Scope: Total commercial space for rent 85,000 m², almost 250 shops

Location: Helsinki, Finland

Design: LOCI Maisema-arkkitehdit Oy

Main contractor: YIT

Environmental construction: Terrawise Oy and Tieluiska Oy

Green roof growth media supplier: Tieluiska Oy

Leca products:

Leca® LWA crushed 3–8 mm, Leca® LWA 4–32 mm

The green roof's colourful furniture makes it a highly inviting place to spend time.



The river runs through the town

FLOOD PREVENTION IN THE BASEMENT

DENMARK: ... Is what you want to avoid in Randers. That is why Randers, in collaboration with the local Randers Municipality, is carrying out a climate adaptation project for the district of Vorup. The Storkeengen project is an interdisciplinary project with elements of climate adaptation, rainwater management, urban development and access to nature.

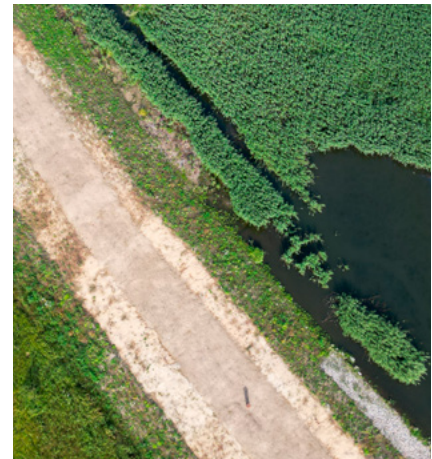
The dyke in Storkeengen is built on "unstable ground". In order to ensure a solid and long-lasting result, studies and experience from other dyke constructions identify that the work must alternate between building a dyke layer and then allowing for a rest period. During the 6-month rest periods, the bottom layer under the dyke settles, achieving a greater load-bearing capacity, and then another layer can be created. If we had not used Leca LWA, we would have made thinner layers – which could possibly have led to longer rest periods between layers. So this would have taken a

very long time!", says Project Manager from **Water Environment Randers, Susanne Jensen.**



The solution with Leca makes the project go much faster

In Storkeengen, existing ditches are cleaned, pools are established, and the Randers Municipality carries out various recreational measures, e.g. boardwalks that will give citizens access from Vorup Nord into the meadows west of the railway. In this way, rainwater from the district will be able to be "stored", even if there is extremely high water in the Godt river. So this project benefits the area and the rest of Randers with new and consistent opportunities to experience the city's unique nature up close.



Gudenåen is a river located in East Jutland, which with its 149 kilometers is Denmark's longest river

To tackle extreme rainfall and to provide a high water protection for the near sea level district, a water course way is being built between the Storkeengen and the God river. To prevent the potential issue of piling up soil in the wet meadow, where the soft bottom could potentially give way, and create a soil mass slide into the stream. Large quantities of Leca LWA were used in the dyke's core. Making this development simpler and easier - ensuring that the job can be done safely and rapidly.

Project information

Project: Storkeengen project

Place: Randers, Denmark

Year: 2022

Customer: Water Environment Randers

LECA Product: LECA® LWA (10-20mm)



"At LECA, we were pleased that the developers chose to use Leca LWA as a solution to build the entire core of the dyke. The material's natural lightness and the delivery possibilities offers multiple engineering benefits to a project of this nature. This is especially evident in this ground-breaking project, where it has played a decisive parameter to affect the soft subsoil as little as possible.

Leca are produced from Danish clay which is dug up and converted at the factory south of Randers. For us, it makes good sense to use a material that comes from the Danish soil, and give it back to nature in its new form. With the material's light but strong structure, we ensure that the project can be carried out faster and at the same time it will have a long life." - **Morten Dysted - Sales manager**

**LECA is part of
the Saint-Gobain
Group which is
committed to bring
more sustainable
products and
solutions to the
construction sector.**

To understand why these commitments are so important for us, we invited Eric du Passage, Sustainable Business Manager at Saint-Gobain, to share with us Saint-Gobain's sustainability view.



FIRST OF ALL, ERIC, WHAT DOES SUSTAINABLE CONSTRUCTION MEAN FOR SAINT-GOBAIN?

By publishing its new GROW & IMPACT strategy for the period 2021-2025 in October 2021, the Group shared its new vision: to be the world leader in sustainable construction. But what are we talking about?

A new building or renovation project can be described as sustainable if, over its entire life cycle, it has a reduced impact on the environment while contributing to improving people's health and well-being. And this without any prejudice neither for the quality or for the economic value of the property.

For Saint-Gobain, the sustainable dimension of a building is prioritised around 4 pillars: Energy & Carbon, Resources & Circularity, Health & Safety on the jobsite, and Health & Wellbeing for the occupants. We can see LECA's contribution in each one of this pillars.

THE CONSTRUCTION SECTOR REPRESENTS 38% OF THE WORLD'S CARBON EMISSIONS, HOW CAN THIS BE REDUCED?

This is the result of two sources of emissions, 27% is related with the energy consumption during the use of heating, lighting, etc. and 11% is related to the production, transport and the end of life for building materials. It is necessary to change the construction practices to guarantee energy efficiency of the building and have construction materials with a low carbon footprint.

SAINT-GOBAIN is decarbonizing its transport, manufacturing processes and raw materials, for example by using more and more recycled material. Ambitious targets have been defined on scopes 1, 2 and 3 for 2030. LECA is changing the energy source of its production process to more sustainable ones, which will have positive impact on carbon footprint of Leca® lightweight aggregate (LWA) and Leca® blocks.



CAN YOU DISCUSS THE 'RESOURCES & CIRCULARITY' PILLAR?

As is well known, construction accounts for around 40% of the world's natural resource consumption and solid waste generation; there is a need to significantly reduce the use of water and non-renewable resources - to recover waste and to make better use of existing buildings.

For example, SAINT-GOBAIN reduces the water footprint for its products, and develops dry solutions that minimize water consumption on site.

On the other hand, one way of avoiding the resources exploration is through the circularity of the existing materials, thanks to reuse or recycling. At LECA, for example, it is possible to incorporate waste materials from other SAINT-GOBAIN industries, such as ISOVER, GLAVA, ECOPHON, into the manufacturing process.

When we talk about extending the life of a building we can see a significant environmental benefit. Being able to change the purpose of a building, for example from commercial to residential use, avoids early deconstruction. Deconstruction must be favoured over demolition: this is a way to reduce the quantities of non-recovered waste and to increase recycling or reuse. Today, at Leca Sweden, there is a concept called Leca Tur & Retur that makes it possible for Leca to buy back material from the market that can be reused in a future project.



INTERVIEW WITH ERIC DU PASSAGE

SUSTAINABLE BUSINESS MANAGER AT SAINT-GOBAIN



***THE HEALTH AND SAFETY
OF CONSTRUCTION
WORKERS ARE AT THE
HEART OF SAINT-GOBAIN'S
APPROACH. CAN YOU TELL
US MORE ABOUT THIS?***

Safety on construction sites consists of reducing occupational risks for workers throughout the construction, renovation or deconstruction of buildings. Construction workers can be exposed to emissions of hazardous substances from construction products and we cannot forget the physical efforts needed for their functions.

SAINT-GOBAIN takes care to minimize as much as possible the risks linked to the substances contained in or emitted by the products. We also provide lighter products or products that are easier to handle and install to reduce the risks of musculoskeletal disorders: See for example Leca block, compared to traditional blocks.



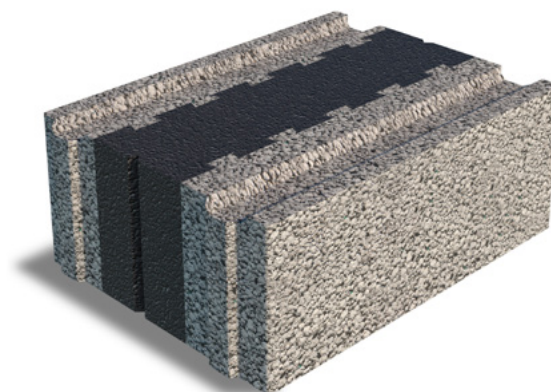
WE SPEND 90% OF OUR ENTIRE LIFE INSIDE BUILDINGS, HOW IS THE HEALTH AND WELLBEING OF THE OCCUPANTS SEEN IN SAINT-GOBAIN?

The health and wellbeing for the occupants are influenced by a lot of different aspects. The ventilation of spaces; the release of organic compounds to the air from the construction materials and thermal and acoustic solutions are some of the examples that significantly influences the experience of occupants. SAINT-GOBAIN offers a range of solutions to meet these challenges.

A balanced thermal environment is essential to feel good. Buildings must maintain the ideal indoor temperature throughout the year whilst consuming very little energy. As we can see, thermal and acoustic comfort can have a huge impact in our daily-life. In recent years, LECA has developed solutions to meet these needs – this includes improving the characteristics of thermal and acoustic insulation of Leca blocks.

THANK YOU ERIC FOR THIS OVERVIEW ON THE IMPORTANCE OF A SUSTAINABLE CONSTRUCTION. WHAT DO YOU LIKE TO SAY TO CONCLUDE OUR CONVERSATION?

SAINT-GOBAIN is at the side of its customers and partners to innovate and help them design, build and renovate more sustainable buildings by offering them innovative and efficient solutions. Being a leader in sustainable construction does not only mean being the best in the market. It also means being a pioneer in our sector, transforming the market and mobilizing the entire value chain. It also means inspiring our teams, attracting talent and having an impact on society in all its diversity.



The new Leca® Smart Block

has 30% lower carbon footprint than before.
The product is available in Finland.



This £200m road scheme is the biggest new road programme in Preston

LECA[®] LIGHTWEIGHT AGGREGATE (LWA) SPECIFIED FOR 4 SECTIONS OF THE NEW PRESTON WESTERN DISTRIBUTOR ROAD DEVELOPMENT

UNITED KINGDOM Leca[®] Lightweight Aggregate (LWA) was specified for four sections of the major new road development - the Preston Western Distributor Road (PWDR), which will link Preston and southern Fylde. These four sections formed part of the complete development and the use of Leca[®] LWA provided a fundamental role in the speed and stability of this new road scheme.

This £200m road scheme is the biggest new road programme in the Preston, South Ribble and Lancashire City Deal. The development includes a new motorway junction to the M55 together with water attenuation ponds; landscaping and ecology mitigation areas; the construction of two bridges; two viaducts; two underpasses and a cattle creep.

LECA LWA CREATES KEY GROUNDWORK SOLUTION

Due to the key properties of Leca LWA including reduced compaction rates, cost effectiveness, low density and phi values, Leca LWA was specified as a key engineering solution for this ambitious redeveloping project. Rosey Thurling (Senior Engineer) at Costain commented that: "Leca LWA was selected for use on structural back fill to four bridges on PWDR for its lightweight properties. Each bridge had a slightly different reason for this requirement. The South Abutment at Lea Viaduct is right next to a live railway line so the use of Leca LWA minimised the risk of uplift on the track. Beconsall bridge is an integral structure and therefore less weight on the abutment walls was preferable. For both Savick Brook and Bartle Lane Bridge, the use of Leca LWA enabled the scope of the foundations to be reduced and therefore ensured the structural design was value engineered."



LECA LWA's robust lightweight properties provided the key solution for poor ground-work conditions

ALTERNATIVE SOLUTIONS TO LECA LWA

There were many proposed materials available for the structural backfill requirements for this project and this included traditional rock aggregates, but as with many projects where Leca LWA has been specified as a design solution – it was Leca LWA's robust lightweight properties, which provided a key component to tackle the existing poor groundwork conditions for this project. Rosey Thurling (Senior Engineer) at Costain, goes on to explain that "there is an alternative product available on the market



The project continued over a live rail track

however, it is not as lightweight as Leca LWA. The low density property of Leca LWA gave it an advantage over its competitor."

The developers recognised that Leca LWA has an installed bulk density of approximately 20% of that of general fill materials and will considerably reduce settlement of the road or rail carriageway, both immediately and in the long term. Widening and replacing existing carriageways is also simplified by using Leca LWA with no specialist techniques necessary. Because the compaction of Leca LWA material requires substantially less compaction effort when compared to conventional fills - layer depths can be greater, typically up to 1000 mm. "The main property for the use of Leca LWA on PWDR was its low density enabling the structural design to be as efficient as possible. The phi value (angle of repose) of the material was also an important factor when choosing this material for use at Beconsall Bridge in particular.", explains Rosey Thurling (Senior Engineer) at Costain.

SUSTAINABILITY AND CARBON EMISSION TARGETING

Thanks to the lightweight nature of Leca LWA, this provided Costain, the opportunity to positively contribute to their own sustainability initiatives to tackle the impact of CO₂ emissions for this project. Rosey Thurling (Senior Engineer) at Costain goes on to explain, "As the material is lightweight it can be transported in large volumes with up to 70m³ on Walking Floor Trucks. This takes a number of delivery vehicles off the roads and therefore reduced the carbon impact the project has on the local environment."

COST EFFECTIVE SOLUTION WITH LECA LWA

All the material for the four phases for the PWDR project where Leca LWA was specified was successfully delivered and applied - providing a key solution for the groundwork issues faced for the completion of the PWDR Project. Rosey Thurling (Senior Engineer) at Costain concluded, "I would use Leca LWA again for the properties mentioned and the opportunity to value engineer the structures at the design phase."

Project information

Site: Preston

Scope: New Highway Development – The Preston Western Distributor Development

Location: Preston, England

Main contractor: Costain

Delivery: Walking Floor (70m³ per delivery)

Leca product: 14,000m³ of LECA® LWA (10-20mm)



LECA[®] LIGHTWEIGHT CONCRETE CREATES AN ENGINEERING SOLUTION FOR THE PRESERVATION OF BIODIVERSITY

GERMANY *Since the year 2000, the bypass of the city of Celle has been developing and incorporates various geotechnical structures - primarily bridges of different functions, to bypass consistent and busy traffic.*

In the planning area of the bypass development, various bat species have settled over the years, which need to be protected through habitat improvement measures. Additionally, typical nature conservation measures such as planting and reforestation along the B3, two bat bridges are being developed as part of the planning for the bypass. These structures are

not exposed to large dynamic loads and essentially only have to bear its own weight and have been designed to allow the various bat species to cross safely.

The bridge body is divided lengthwise by three beams into two flight lanes, where further elevation is to take place. The interspaces will be filled

with soil and planted afterwards.

In order to reduce the total weight of the bridge, the reinforced beams (approx. 190 m³) were made of lightweight concrete LC 12/13 with an apparent density of < 1.200 kg/m³, which reduces the total weight of the bridge by 240 tonnes.



Installation of the lightweight concrete with concrete bomb.

WHAT WERE THE CHALLENGES FOR LIGHTWEIGHT CONCRETE?

The design concept was characterised by different challenges:

- LC 12/13 D 1.2 to be produced with a lightweight aggregate granulation for processing
- Transport and installation with changing consistencies
- Transportation to the construction site by means of a truck-mounted and site crane in concrete bombs
- Mixing time in the factory, logistical time, keeping delivery rates within the time slot of 10 h
- 2 concrete layers ($130 \text{ m}^3 + 60 \text{ m}^3$)

INSTALLATION OF THE LIGHTWEIGHT CONCRETE

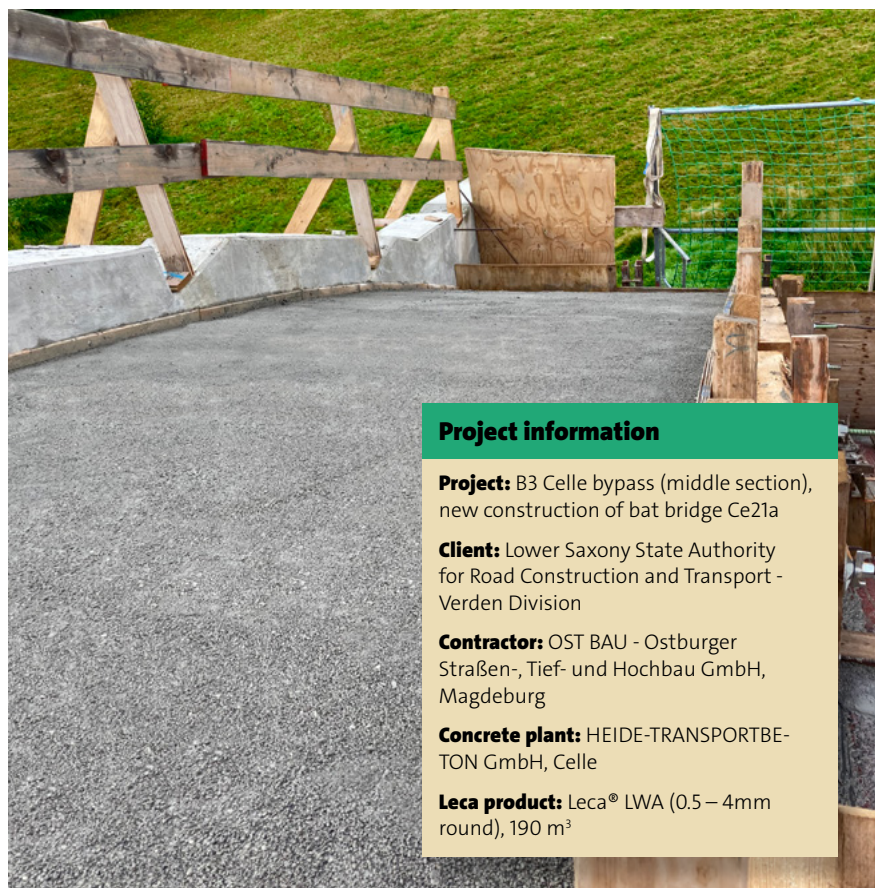
The lightweight concrete was mixed by HEIDE-TRANSPORTBETON GmbH, based in Celle, and was then transported and placed in concrete bombs to the corresponding construction section using a truck-mounted and site crane.

RECIPE OF THE LIGHTWEIGHT CONCRETE

The components for the lightweight concrete was developed incorporating Fibo ExClay Deutschland GmbH and the concrete laboratory of HEIDE-TRANSPORTBETON GmbH.

WHAT ARE BAT BRIDGES?

Bat bridges are structures erected over highly frequented traffic routes to allow low-flying bats to cross trunk roads and railway lines without danger.



Project information

Project: B3 Celle bypass (middle section), new construction of bat bridge Ce21a

Client: Lower Saxony State Authority for Road Construction and Transport - Verden Division

Contractor: OST BAU - Ostburger Straßen-, Tief- und Hochbau GmbH, Magdeburg

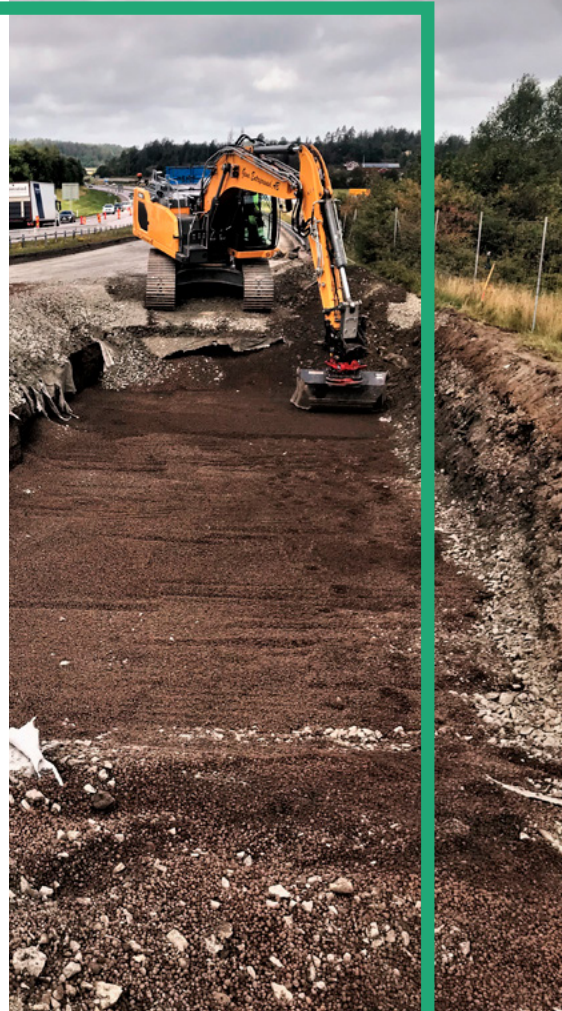
Concrete plant: HEIDE-TRANSPORTBETON GmbH, Celle

Leca product: Leca® LWA (0.5 – 4mm round), 190 m^3

Due to the consistency of the lightweight concrete, capping of the rounding is not necessary.



LECA® LIGHTWEIGHT AGGREGATE ENTERS INTO THE CIRCULAR LIFE CYCLE



SWEDEN By reusing Leca® Lightweight Aggregate (LWA) from an highway, the linear life cycle of the LECA pellets became sustainably circular. Something that saved both on the use of raw materials and the creation of CO₂ emissions.

20 years ago the E6 highway outside Uddevalla was expanded. For sections of the highway expansion, the contractor PEAB used Leca LWA as a lightweight filling material. In 2021, Svevia, Engineering Specialists in highways and infrastructure, carried out some maintenance work. Due to necessary changes on the needs on site, the originally placed Leca Lightweight Fill needed to be dug up and extracted.

BUY BACK CONCEPT MADE REUSE POSSIBLE

“Svevia reached out to LECA to investigate the possibility of buying back material. Since launching the Leca® Tur & Retur concept in early 2021, we already had a clear process in place for how this should be done. This makes it easy for everyone involved”,

says Ola Andersson, Sales manager at LECA Sweden.

Leca® Tur & Retur has been an important step towards a sustainable way of building. The concept enables companies to sell back Leca LWA, which can be reused for future projects. This means that the life cycle of Leca LWA does not have to be linear, but can instead become circular. In a typical scenario of buying back material, a technical specialist from LECA visits site to initially assess and inspect the material in place.

SIMPLE PRODUCT, EASY PROCESS

The excavation of the old material on the highway proceeded smoothly and created no issues. In relation to transporting the material back, this

can be achieved in different ways. In this project, the excavator was able to directly fill containers with material that was then transported back. The already typical lightweight nature of the Leca LWA makes it possible to load huge quantities of material into the containers. Another option for reclaiming material in the ground can be through using a vacuum truck. Leca LWA can be easily reused since it is made from clay, a completely natural and inert material. The material's properties, such as being resistant to frost, chemicals and durable over time, means that it can be in the ground for several decades without ever being affected or damaged.



Project information

Project: Walk and cycle path

Location: Kungälv, Sweden

Year: 2021

Contractor: PEAB

Leca product: Leca Infra® Eco
Reused material from highway E6

The pellets had been in the ground for 20 years but was still as new.

REUSED MATERIAL FOR LOAD COMPENSATION

The excavated lightweight aggregate that LECA Sweden bought back from the highway was quickly reused. PEAB needed a lightweight filling solution for load compensation for a project in Kongahälla.

Kongahälla is a new large area in Kungälv where housing, shopping centers and other properties coexist. The local council's ambition is to create a sustainable and environmentally friendly city area for its local residents.

A PRODUCT WITH LOW CO₂ EMISSIONS

Leca® Infra Eco consists of 100% reused Leca LWA and has a very low CO₂ value, which shows in the product's Environmental Product Declaration (EPD). Material extracted from previous installations is always tested, despite the material's natural durability over time. This is to provide customer assurance - that the properties and values of the material has not been affected from its previous application. Among other things, the density of the material is ensured during sampling and a new Declaration of Performance (DoP) is created.



The reused material was later used in a load compensation for a walk and cycle path.

AS GOOD AS NEW

The load compensation needed to be carried out on the side of the new building in Kungälv, where the footpath and cycle path course. The material was easily tipped out and a small tracked excavator could then carry out the installation and compact the lightweight fill. Even though the material had been used before, site-workers experienced no difference to re-used Leca LWA.

Load compensation with Leca LWA is a solution with a long history in the Civil Engineering market. The reason is that new groundworks can typically be found to have poor bearing capacity, but construction is still required for the area. By replacing soil with Leca LWA, you compensate for the extra load for the groundworks in the settlement-sensitive area. Leca LWA can typically provide a lightweight solution that is both easy to install and solve groundwork issues at the same time.

The lightweight aggregate from the existing highway has due to this innovative recycling process been returned back to the ground to provide a solution for a new development. And there is nothing to stop these clay pellets being used again in the future.



ARLITA® CREATES THE CONNECTION BETWEEN THE MADRID AIRPORT AND ITS NEW BUS TERMINAL

SPAIN *The connection of new passenger transport infrastructures such as airports with bus terminals, makes it easier for travelers to choose more sustainable alternatives when planning their trips. The Arlita® embankment has allowed access from Terminal 4 of the Madrid Barajas Airport to the new bus station by crossing over the underground railway tunnels. This faster, simpler and more sustainable solution was selected by the construction company to meet the delivery deadlines requested by the Spanish airport authority.*

In 2020, the Spanish airport authority took the first step to increase the infrastructure of the Madrid-Barajas airport - with the approval of the new Terminal 4 bus area. The new station has 30 docks and a 12.600 m² building with two floors. The effective design of this infrastructure was critical for its correct operation, but we must not forget that

a bus station requires many needs, including easy accessibility and offer the guarantees that transport is always available.

Further requirement factors were critical for this development, such as that access to the new bus terminal must be from the same road that provides service to the different car

parks at Terminal 4 of the Airport, this required the creation of a ramp that allowed the 7 meter difference in height to be lowered. This ramp was to be located above a railway tunnel so in the future, it will connect the Chamartin Station (Madrid) with the Airport, creating a very high load of up to 9 meters of embankment. This tunnel has not been designed to



withstand this new overload, which has forced the requirement of a lightweight solution.

Engineering has many ways to solve this problem, but after different technical, economic and environmental studies, the ideal solution was proposed by Arlita - using a load reduction with lightweight aggregate (LWA).

Once the load reduction methodology was selected, it had to be implemented in the location required by the project. Here a great challenge was encountered because the available space was reduced, making it necessary to use containment elements such as reinforced earth walls to define the final geometry of the access road.

Arlita LWA is a lightweight aggregate with a high resistance performance that allows the load to be reduced by up to five times compared to a conventional landfill. In addition, it



has sufficient adhesion and a high friction angle capacity to work properly when interconnected with metal strips or geogrids.

The project required a total of about 2,600 m³ of Arlita LWA 10/20, which has a bulk density of 275 kg/m³ and a calculated density of 400 kg/m³ under installation conditions. The execution consisted of two phases. The first consisted of filling a totally confined hole on the concrete slab of the tunnel and then on top of the filling. The second phase was to develop the lightened embankment using a reinforced earth wall as a retaining element. The contact with the land was made with a polypropylene geotextile and the contact with the top layer was with a geotextile with an impermeable sheet to reduce any possibility of water entering the interior of the backfill.

Using Arlita LWA in the backfilling of walls (regardless of the type), has a large number of advantages: this includes offering very low pressure (60% less than with conventional backfilling), high drainage capacity, minimal settlement periods that allow for the development of walls with highly optimized foundations, minimization of movements, as well as settlements if roads are built on top of the embankment. Particularly in reinforced earth walls, it reduces the intrinsic problem in this typology, where fine materials in conventional

aggregates play an important role in the strip-material adherence. Arlita LWA does not have fine materials, so there are no soft spots in case of the loss of fines due to the reaction to water. The problem in this type of walls can lead to sagging of plates and settlements of the embankment, producing serious safety risks within structures. It is also important to consider that the strip-material adherence parameters building with Arlita LWA are independent of the existence of water during its execution.

As a quality control measure, a load plate was developed with values similar to those obtained by a conventional filling (modulus ratio less than 2.2). In summary, we can conclude that embankments with Arlita LWA are a civil engineering solution that allows problem solving in a very economical, fast, simple and sustainable way, without requiring expert knowledge or equipment different from those usual in conventional earthworks. This is a solution that is fully compatible with other existing technologies, allowing the optimization of design and execution times.



Project information

Architect: Efebearquitectura

Building Contractor: Dragados S.A.

Arlita product: Arlita L

Quantity used: 2600 m³

Consulting engineer: Luis Ortuño
(Uriel y Asociados S.A.)

A NEW SERVICE FOR MEASURING THE MOISTURE OF LECA STRUCTURES



FINLAND: Leca Finland and Wiiste Oy have started cooperation regarding the moisture measurement service for Leca® lightweight aggregate (LWA) structures. With the hygrometers included in the service, the temperature and relative humidity of a LWA roof, sub-base or, for example, the cover of a shelter can be monitored remotely. In non-ventilated intermediate floors, sufficient drying of the structure can be ensured before casting the concrete surface slab. On the other hand, in LWA roofs and civil shelter covers, the structure can be verified to have adequate ventilation and ensure that the structure is dry.

The SH4-WAN sensor developed by Wiiste Oy is a wireless sensor for measuring relative humidity and temperature in LWA roofs, civil shelter covers, LWA-filled intermediate bases and other LWA structures where drying and/or temperature fluctuations are to be monitored. SH4-WAN sends measurement data independently to the internet, which enables real-time remote monitoring. SH4-WAN also works during power outages. The service is available in Finland.

SEDIMENTATION BASIN FOR RAIN WATER

GERMANY: During the production, storage and packaging of our products, dust is produced which, in the case of rain, is flushed from the factory premises into the nearby stream via an adjacent road, a drain and roadside ditch. Due to the material and production process, this discharge of material cannot be completely prevented. For this reason, Fibo ExClay, in consultation with the local council, has drawn up a concept that provides the installation of two sedimentation basins - arranged in sequence - on a property used by the company as grassland.

In the future, the rain water will be led from the side ditch into the two basins through piping and, after passing through the basins, will be discharged into the stream via a nearby naturally designed open channel.

At the same time, accompanying measures such as the creation of a hedgerow by means of surplus excavated material along the adjacent road as well as the creation of shallow water areas in the existing shallow ditches (drainage ditch) will create added value in terms of nature conservation on the site.

SCANDINAVIAN BUSINESS 2022 AWARDS

The second edition of the Scandinavian Business Awards has taken place to recognize different companies operating in different regions of Scandinavia. Thirty different business received a distinction for their effort in different categories.



Leca LWA is a simple, flexible and long-lasting product. Alone, it is one single expanded, lightweight clay pellet, but combining them into an aggregate, possibilities multiply within foundations, flooring, walls, drainage and even on green roofs and underneath of houses.

Due to these characteristics, LECA International was one of the recognized winners, receiving the Most Innovative Multi-Use Construction Product of 2022 award.





LECA SUSTAINABILITY FILM FESTIVAL

The morning of September 20th, 2022 started in a different way than usual within the LECA countries. On that morning, all the countries watched "together" the transmission of the first LECA Sustainability Film Festival. An independently created celebratory festival, where each local country prepared a movie about a sustainable action that had taken place in their respective countries.

In total, eight different movies were presented, entirely produced by the LECA employees. Sharing how LECA cares for the environment featuring our local people explaining why sustainability is much more than big projects to reduce our CO₂ footprint. Sustainability is when we take care of our resources, when we can return to Nature what she has provided us or when we can optimize and apply best practices, showing that every small actions counts.

HONOURABLE MENTION FOR THE COLLABORATION WITH LECA POLAND

POLAND: The Congress of Geoen지니어ing and Underground Construction was held in Tomaszowice, near Kraków, on September 20-22, 2022. The event drew approx. 500 participants, including many experts from science and business, who took part in person and online via the educational platform Akademia Inżynieria. We are pleased to announce that the "Consprojekt Usługi Projektowe i Nadzory Budowlane Mariusz Boderek" company was honored with an award in the PROJECT/IMPLEMENTATION category for the recent project in Szczecin, where Leca LWA was successfully specified to resolve complex groundwork conditions for a new Sports and Recreational complex.





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