No. 2 – 2020

BUILD

Leca®

A MAGAZINE FROM LECA

Randers Regnskov

CONTENTS

SEVERAL ADVANTAGES OF ONE AGGREGATE

Leca LWA can be used in plant cultivation. It does not react with humic acids and fertilizers. It can maintain moisture and reduces evaporation. This reduces the need for frequent watering and effectively prevents weeds from growing on the ground. Furthermore, it improves the aesthetics around plants. These are just a few of the advantages of Leca LWA.

HEALTH AND SAFETY SUCCESS AT LECA INTERNATIONAL

The health and safety for our employees in Leca International is a major concern and the goal is to have zero accidents with (LTA) and without (NLTA) sick leave. We are proud to say that Leca International since June 2019 has been successful in achieving this goal. The health and safety is of everyone's concern in Leca International and Saint-Gobain, and the achievement has been attained by the great collective work of the whole team.

Tools are used at Leca International and Saint-Gobain to record near misses and dangerous situations and to take immediate action in order to reduce them. Discussions on how to improve safety in work situations is performed daily at all work sites through Safety visits (SMAT). Every month information about safety levels in the group are shared. Good ideas for improvement are shared between sites to ensure positive health and safety developments everywhere.

BUILD
is a magazine published by Leca International

Cover:
Randers Regnskov, Denmark
Photo: Jens S. Andersen

700 M³ OF LECA® LIGHTWEIGHT FILL INSTALLED FOR A NEW SWIMMING POOL

Over 700m³ of LECA LWA was pneumatically delivered as a backfill for a concrete wall swimming pool in Pontefract, West Yorkshire. This new 10-lane swimming pool development, which forms part of a £20 million initiative, has been a huge investment for the area and when officially open to the public will become a great local swimming facility for all ages and abilities.

REPAIR WORKS CONTINUE DURING LOCKDOWN IN THE UK

In June 2020, during an extensive lockdown in the UK, we were able to continue our day to day business and install LECA LWA into Hullminster through our pneumatic delivery facility. This allowed the contractors onto site to safely and at a safe socially distanced method to complete a groundwork engineering project, which required urgent attention. Our pneumatic delivery facility allowed the pipes to be extended up to 40m, and this also meant that the difficulty in terms of access to site could be overcome simply and effectively.

APPLYING CRUSHED LECA® LIGHTWEIGHT AGGREGATE (LWA) AS A PLAYGROUND SAFETY SURFACE

As a result of our collaboration with Ramboll, crushed LECA LWA 3-8 mm is being tested as a child friendly surface for play-ground swings. Based on discussions and practical field tests conducted in the spring of 2020, this product was selected to replace the traditional pea gravel at the pilot site in Pasila, Hel-sinki. The safety properties of crushed LWA are excellent even with a very low layer thickness and the material feels sufficiently load-bearing underfoot.

The use of crushed LECA LWA is also supported by its availability in 1 m³ bags, which means that the material can be added in smaller quantities if necessary during normal maintenance work in the play area. The product is always of consistent qual-ity and retains its soft properties even in winter, when it does not harden and freeze in the same way as the safety sand prod-ucts commonly used in children's playgrounds.

The LECA safety surface will be subject to industry-standard HIC tests in autumn 2020, when the structure's shock-absorbing capacity will be tested. The functionality of the solution will be monitored for its freezing, durability and possible dustiness in dry weather and in possible new test sites.

LECA® HYDRO: THE PLANT WATER MANAGER

Leca® Hydro is a natu-ral product consisting of cracked LECA® LWA granules, designed for application within hor-ticulture and garden-ing. When mixed with soils and substrates, it lightens the texture and maximizes water storage and retention capacity. It is available in Portugal, in 10 litre bags.

The first home is located in a natural environment of Sintra, Portugal.

ORGANIC HOUSES: A CONCEPT OF ECOLOGICAL CONSTRUCTION WITH NATURAL MATERIALS

PORTUGAL ***Organic Houses combine the most advanced German and Austrian technology with the virtue of natural materials. Six hundred bags of Leca® Dry were used to insulate the floors of the first home in the complex, located in a natural environment of Sintra, Portugal.***

Organic Houses is a family housing project developed in collaboration with Mareines Arquitetura, one of the most well-known sustainable architecture studios. Green Heritage built the Organic Houses prioritising dry construction methods with a range of natural materials, including Leca LWA. A choice that helped reduce the energy demand for heating in winter and cooling in summer, making the homes more sustainable.

Cross Laminated Timber structure

The construction system adopted by Green Heritage - a Portuguese specialist in bio construction - is based on Pombaline-style wooden structures, also known as Cross Laminated Timber (CLT). The entire structure of the houses is made of wood from Austria and Germany, using CLT throughout the whole project. “There are thousands of examples of build-

ings with timber frame structures in Europe that are over 50 years old and still perfectly habitable", states Jorge Van Kriken, head of Green Heritage. "We create houses that last for several generations that are earthquake resistant and offer greater thermal comfort," he adds.

Fast construction supported by BIM

The construction of these homes is supported by BIM (Building Information Modelling), that enables to build a project virtually and evaluate how it behaves. This possibility of simulation results in faster and more secure execution, without needing to hire skilled labour. "We were able to visualise a house construction down the nearest millimetre. BIM is much more than a graphic presentation: it creates a pre-construction", Jorge Van Krieken explains.

Leca® Dry: thermal insulation and easy application

The quality of insulation is a key aspect of the Organic Houses. To this end, the floors were filled with Leca Dry, a lightweight and dry expanded clay aggregate with a residual moisture content under 1%. Apart from being a natural product in harmony with the concept of ecological and dry construction, its ease of application and level of thermal comfort it provides for homes gave Leca a significant competitive advantage as the selected material.

Leca® Dry is a lightweight and dry expanded clay aggregate with a residual moisture content under 1%.

Six hundred bags of Leca® Dry were used to insulate the floors.

Project information

Construction: Organic Houses family homes.

Location: Galamares, Sintra, Portugal.

Owner and constructor: Green Heritage - EcoHomes.

Architecture studio: Mareines Arquitetura.

Leca product: Leca® Dry

Kvernstua will be a whole little community close to nature in Nittedal.

RELIEVING THE PRESSURE OVER A NEW AND INNOVATIVE CAR PARKING FACILITY

NORWAY ***The main problem for the designers was to find a suitable solution to hide traffic from Kvernstua in Nittedal. To achieve this, the rural community is getting an underground car park, and Leca® light weight agregate (LWA) was specified to relieve surface pressure.***

"It's a silver bullet scenario. The material drains and insulates, and will significantly reduce the strain on the roads," explains Svein Olav Barikmo. The Leca Sales Engineer is talking about the Leca pellets that are being delivered to Kvernstua in Nittedal, where AF Gruppen is initially building 186 apartments.

In tune with nature

One or two kilometres away from the new homes, you are in the popular recreational area of Lillomarka and the forests of Nordmarka. Barely a kilometre below is the shopping centre, city hall and national road 4. The Ørfiske River, which previously supplied water to the powder mill in Nittedal, runs around three sides of the project.

The result is a residential development that is being marketed as in tune with nature. When homes are built in a former recreational area, nature trails must be preserved. A ski track and a new footpath are being built. The homes will have large balconies facing the surrounding countryside and 2.40-metre-high windows to accommodate natural light.

Parking on four levels

For this development a key point of design was ensuring traffic disappears. This new development will allow traffic to drive into the hill instead of the residential area, and there are lifts straight up from the car park to the apartments to all seven planned blocks.

"There will be four floors of underground parking," explains AF Gruppen Project Manager Jon Olav Mo. "The car park is below all of the apartments, but on different levels, due to the sloping ground conditions.

Mo describes the whole area as a single entity, with shared access, water and sewage facilities and stormwater management, and a shared pump station and drainage basin. The first construction stage comprises of four blocks, the second with three new blocks, whilst an additional four terraces of houses are also planned.

"We will build outdoor play areas, walking trails with a gravel surface along the river and footpaths and cycle paths with a bridge over the river. The development will be home to around 250 families – there'll be a whole little community out in the country," he explains.

Blown into place

Leca LWA will be pneumatically blown in around the walls of the un-derground car park.

"Naturally this is below ground level. We need the Leca to relieve the pres-sure on the wall; to reduce the earth pressure on the buildings. Leca® LWA is easy to use and contains natural draining properties, which means that we can have both the drainage layer and fillers in the same layer. So when we are going down into a con-struction pit and need to go round corners, it's really great to be able to blow the pellets in," confirms Jon Olav Mo.

He originally planned to use around 1,000 cubic metres of Leca LWA, but now expects to use 1,500 cubic metres by the time they are finished.

Project information

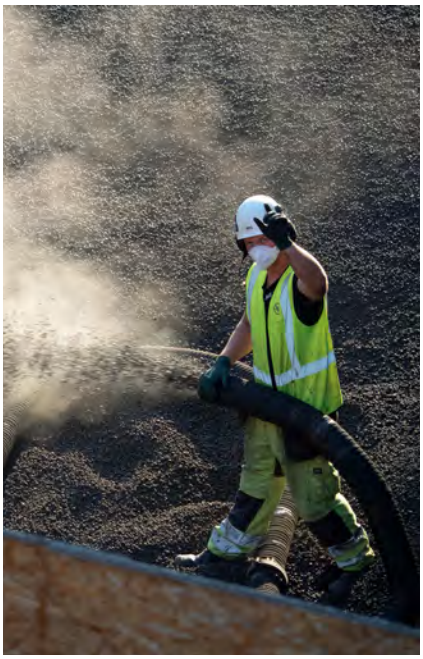
Project: Kvernstua in Nittedal – seven blocks with 186 apartments covering 38–195 cubic metres, with four terraces of houses planned in the next stage.

Construction client: Øie Eiendomsutvikling.

Main contractor: AF Gruppen.

Ground and outdoor works: JR Anlegg.

Product: Leca® Iso 10-20.



The pellets drain and insulate as well as reduce the load on the walls.

Construction Site Manager Svein Harald Øyhus waiting for the first Leca delivery of the day in the morning sunshine.

When you're working in steep terrain and need to get the Leca pellets down into a construction pit and round corners, it's ideal to be able to blow them into place.

Kindergarten several years after the completed works.

CREATING A NEW KINDERGARTEN DEVELOPMENT WITH POOR GROUND CONDITIONS

POLAND ***Construction on low-bearing land is always a big design and construction challenge. Such a problem arose when building a kindergarten in Pełczyce. Leca® lightweight aggregate (LWA) helped to solve this problem.***

Space for creating new facilities are becoming more and more expensive as the availability of land is reducing. Today it is often discovered by potential developers that there are only unattractive plots of land remaining on the market, where no developers wish to invest in construction or can only accommodate small buildings.

Furthermore, soil conditions are not always controlled before purchasing an investment site, often meaning that after purchasing the land for the construction for a new development, sometimes ground work issues are inherited and the foundation costs for a development can often exceed original budgets.

Correcting poor ground conditions

There are several ways to resolve this type of problem. The first way is replacing the existing soils. However, this is not always possible and cost-efficient, especially when the thickness of low-bearing soils can range from a few to several meters in depth. Another method includes developing foundations on piles, columns, etc. And again this is also not always possible to achieve without facing significant engineering issues. For small developments, the cost of preparing suitable platforms for drilling rigs, piling machines, equipment delivery costs and the piling itself often and significantly increases the investment costs.

Foundations on lightweight aggregate.

Project information

Facility: Kindergarten

Location: Pełczyce

Investor: Pełczyce Commune

Project: PPKZ Monument Conservation Design Studio - Szczecin

Aggregate: Leca LWA 8 / 10-20 R

Quantity: 1480 m³

Alternative proven foundation solution

In recent years, many geotechnical structures have been built on land with low load bearing capacity. However, many specifiers have combated this common issue through laying a lightweight aggregate like Leca lightweight aggregate (LWA) infra 8/10-20 mm. This offers engineers with an average bulk density of 320 kg/m³ and after compaction and with the correct moisture conditions, it does not exceed 500 kg/m³. Therefore, the re-layering can be up to 2-3 times lighter than the original weak soil.
Typically, in order to build a facility on such ground, only part of the weak soil can be removed. The significantly reduced weight of the expanded clay laid on peat that has been consolidated over many years allows the subsoil to be loaded with the structural and functional load required from the facility under construction.

Kindergarten on peats

Using this principle in Pełczyce in south-west Poland on a ground dominated by peat and silt and the groundwater level at a depth of 0.7-1.3 m, a 0.6 m-thick "pillow" was made from Leca LWA, wrapped in a geotextile. Filling was reinforced with geogrids on which footings could be created. In order to reduce the weight to the substrate, space was accommodated between the benches at a 0.7 m thickness, and this was also filled with Leca LWA. As part of these works, weak soil was removed at a depth of only 1.4 m. The groundwater level was temporarily lowered, and after the completion of the works, the lower part of the filling was in line with the groundwater.

Leca LWA can also be used as a lightweight and load-bearing material - minimising the filling for projects with difficult ground conditions and also in the construction of roads, railways, reservoirs, etc.

Laying the first layer of Leca LWA.

The tree is a replica of the largest living mammoth tree.

Project information

Client: Randers Regnskov

Design and execution: ScenArea

Leca® product: Leca® 10-20

MAMMOTH TREE FILLED WITH LECA® LIGHTWEIGHT AGGREGATE (LWA)

DENMARK ***In the tropical zoo, Randers Regnskov (rainforest), a major redevelopment has begun. Over the next few years a large outdoor area will be transformed – from a place locked in history to something representing the future.***

This development is planned to take place over several parts, and Hyænesletten (the hyena plain) is the first to be completed. On Hyænesletten there is, amongst other things, a copy of the largest living mammoth tree, which measures approx. 10 meters in diameter. The tree is hol-low and a staircase leads up to a platform where one can enjoy stunning views of the area. Just below the platform is a layer of Leca LWA. The cavities in the construction itself are also filled with Leca LWA.

The company behind this new development, and the rest of the stunning landscape, is ScenArea, who specializes in landscapes for zoos and theme parks. One of the design-ers from ScenArea is Helge Bregnhøj-Olesen. Helge says, that he was well acquainted with Leca LWA, so when they needed a lightweight material that could distribute the pressure from the platform over a larger area, Leca LWA was specified. Furthermore, when the platform is full of people, it will exert a heavy weight onto the structure, so

The Leca® LWA was pneumatically delivered by blowing truck.

applying Leca LWA allows for an even distribution of pressure over a larger area.

Fits to the surface

"When we build our models, we typically start by building a core out of reinforcement mesh, then they are formed with a finer metal mesh and finally they are coated with shotcrete," Helge says. Therefore, the surface is seldom completely flat, and here the Leca LWA was ideal, as they easily fit to the surface while you can make a flat surface that you can continue working on.

"Leca LWA is easy to work with, and it would be both more expensive and more time-consuming to fill up with concrete. The LWA was pneumatically blown to where the material was required, and we could finish with only 15 cm of concrete on the top. So it was a quick and good solution."

"I had previous experience of Leca LWA and had seen that it could be pneumatically delivered. After a bit of searching on the internet, I came to the conclusion that it would be the best solution for us," Helge says.

Helge also says that they have previously used Leca LWA, and he therefore knew about the product and its properties – where during the construction of Randers Regnskov 25 years ago, a small amount of Leca LWA was used to make, amongst other things, a light ramp. The whole area is on bog soil, so you have to think about the weight, so you don't risk settlement damage.

Under the staircase and the platform you will find Leca® LWA.

The large common courtyard is beautiful but also functional due to it's storm water detention reservior.

SIMPLIFIED AND TIME SAVING DETENTION SOLUTION FOR COURTYARD

SWEDEN ***In the courtyard of a new residential development in Gothenburg, Sweden, it was decided from the beginning that a detention reservoir would be installed. Changing materials in the reservoir would prove to be a smart move by the contractor HTE Produktion.***

The Swedish housing companies Poseidon and Egnahemsbolaget formed a partnership with Skanska to build new apartments. Together they have built 249 homes in an area that has been named Makrillen, which directly translates into 'Mackerel' in English.

Water Detention Properties to Delay Storm Water

The new residential block has a large common courtyard facility for its resi-dents. This is where Leca LWA can be located. HTE Produktion was responsible for all groundworks for the project and Mathias Henriksson works as the site manager at the company.

"In the courtyard, a detention reservoir had been designed to delay storm water. It was built with an insulation board at the bottom, macadam and geotextile on the cover, and then gravel at the top. A solution that we knew would be time-consuming because it included so many different steps," says Mathias Henriksson.

Instead HTE Produktion presented a solution with Leca LWA., which they believed would save them time in the project and provide an advantage in terms of execution.

HTE Produktion has established ex-perience of working with Leca LWA. Since they knew that the material, because of its porous internal structure, can retain and thus delay water.

It was proposed as an alternative solution. By installing a 30 cm layer of Leca LWA, they were able to achieve the same insulation value as if they had used an insulation board such as EPS.

Making up time when faced with delays

Changing the material turned out to be a good decision. Due to, among other thing - bad weather and delayed deliveries, the project was delayed for several weeks.

"We lost six weeks during another stage of the project. But we managed to catch up, thanks to the fact that we chose to work with Leca LWA," says Mathias Henriksson.

It was possible to make up time largely due to the fact that the material can be pneumatically blown out with one of Leca's blowing trucks. In only one day, HTE Production had a third of the courtyard done. After the lightweight aggregate had been blown into place, the material was compacted with a vibration plate.

Using Leca® LWA made the installation easier.

"We think that Leca's material is very easy to work with and compactable in a different way than other conventional materials on the market."

Project information

Project: Kvarteret Makrillen, storm water detention reservoir

Developer: Poseidon and Egnahemsbolaget

Contractor: Skanska

Subcontractor: HTE Produktion

Architect: Arkitekthuset

Leca product: 700 m³ Leca® Infra 10/20

Since they material could be blown out the subcontractor managed to catch up with the time schedule.

The park is centrally located in Helsinki.

FLOURISHING PARK IN THE HEART OF HELSINKI

FINLAND ***A new parking garage and entrance turned Kivelänkatu park in Töölö into a new green space in Helsinki.***

Text: Dakota Lavento
Images: Markkinointiviestintätoimisto Kuulu Oy

Built smoothly by YIT in Töölö, the underground carpark which can accommodate 800 cars is located next to Mannerheimintie, nestling partly between two large hotels, Scandic Park Helsinki and Crowne Plaza. The entrance to the garage is on the Töölönkatu side, at Kivelänkatu Park.

The new Kivelänkatu Park was partly built over the car park and partly next to it. Its ramps and other structures were adapted to fit into the park environment. The rock area was left untouched. The park was designed by VSU Landscape Architects/Landscape Architect Minna Raassina. The new park was constructed by Hyvinkään Tieluiska Oy. This consisted of laying the soil, planting the grass areas and laying the paving. Construction of the park began in August 2018, and it was completed in December.

Interesting and challenging site

Tiina Partanen from Hyvinkään Tieluiska, who supervised the construction, said that the Kivelänkatu Park is a unique area. "The environment in such a central Helsinki location is interesting in itself. Although the park is new, old elements were retained, such as the trees providing shade at the corner of Kivelänkatu and Töölönkatu. We also planted new trees along the street."

"A variety of plants were introduced into the park. Since the park is partly 'wild', new plants were chosen that could blend in beautifully with the surroundings. Azaleas and rhododendrons are perfect for the park area, and stonecrops look great on the rock."

The new Kivelänkatu Park was partly built over the garage and partly next to it.

The substrate over the structure is Tieluiska's own Torpanpiha Kattopuutarhamulta (special soil for rooftop gardens), to which crushed Leca LWA (3–8 mm) and crushed brick have been added to improve water retention and porosity. Through combining Leca LWA, the Torpanpiha Kattopuu-tarhamulta soil weighs only 780 kg/m³, while normal sandy soil weighs around 1,000 kg/m³. This significantly reduces the load on the structure.

Plants bloom in Leca® LWA substrate

Juha Liukkonen, who is in charge of product development of substrates at Tieluiska, says that the company has been working on rooftop substrates for a long time. "It was obvious to us from the beginning that we would be using Leca LWA on our rooftop substrates. This improves the composition of the substrate. An additional benefit is that plants and vegetation can use the properties found within Leca LWA for better growth, which would not be possible with materials such as expanded glass."

"Leca LWA can make the substrate sufficiently lightweight, whilst retaining ideal water retention and permeability properties."

Weight limit requirements during construction

The substrate on the Töölö parking garage entrance and structure could not be installed by conventional means. "Normal machines could not be used on the structure, owing to weight limitations. Torpanpiha Kattopuutarhamulta soil was brought in with conveyor belts, and a range of smaller machinery was used to spread it," says Tiina Partanen.

Torpanpiha® Kattopuutarhamulta (special soil for rooftop gardens) contains crushed Leca® LWA and crushed brick.

Project information

Location: Helsinki, Finland

Client: Töölönkatu parking garage Ltd

Turnkey contract: YIT Rakennus Oy

Landscaping contractor: Hyvinkään Tieluiska Oy

Landscape design: VSU Landscape Architects/Minna Raassina

Leca product: Leca® LWA (crushed) 3-8 mm in Torpanpiha® Kattopuutarhamulta

When developing a new solution for pipe trenches a full-scale test were executed.

INTERVIEW

Municipal visions drive change

Stockholm Vatten och Avfall is Sweden's largest municipal water and sewerage company. Within the business unit responsible for the network - sustainable innovation and development work is being executed. Innovations that can then be used by other municipalities in Sweden, across the Nordic region and internationally.

Text: Malin Pumplun
Photo: Malin Pumplun and Caroline Hanner

The business unit, Ledningsnät Material (LM) at Stockholm Water and Waste works with material and technology supply for maintenance and investment activities on drinking water pipes and waste and stormwater pipes.

– For thirteen years, I have been involved in reasoning why things break down and what we can do about it to make the products of the future more sustainable. I have a clear vision of what we should aim for and my job is to ensure that we have the skills and resources to carry out the vision, says Kenth Olsson, unit manager.

Kenth has been at Stockholm Vatten och Avfall for 28 years and worked within operations and maintenance. He knows more than anyone else that it is a complex job to manage an underground facility.

– I would say that being a manager means keeping track of history and looking at the current situation to be able to predict future solutions. It is down to us, as the managers, who hold that competence - we do not only repair pipelines, we also look at what the needs are for now and in the future, says Kenth Olsson.

The water and sewerage industry is facing major and costly challenges at the same time as demands from politicians and the general public are increasing. The changes are around sustainability issues, increased demands on water quality, but also financial challenges and priorities regarding maintenance and the transition to circular resource flows.

– I will run future development projects on behalf of the organization to find new effective solutions for the challenges that exist in our business. It can be about sustainability issues to build pipelines with a long life span - up to 150 years - to get cost efficiency in our projects, says Dinko Lukes, Water and Sewage Engineer at Stockholm Vatten och Avfall.

Dinko Lukes comes from a research background where he has worked with polymeric materials in different capacities. At Stockholm Vatten och Avfall, he has worked for six months and his skills have been a very welcomed addition to the organization.

Compared to our closest neighbours, the business unit (LM) has a slightly different mindset; the perspective is broad, whilst the competence is highly specialized.

Stockholm Vatten och Avfall works widely for sustainable solutions for the entire water and pipes collective.

– LM as an organization is completely unique in the Nordic region, as we work with the entire organisational chain; from technical procurement, accident investigations, innovation projects concerning water and sewage pipes, staff training and material supply via our own warehouse. In addition to this, LM collaborates with various municipalities via the collaboration organization 4S, in which the largest municipalities are involved. There is no equivalent to LM in any other municipality in the Nordic region today, says Kenth Olsson.

As a capital, Stockholm is at the forefront when it comes to sustainability. Stockholm Vatten och Avfall works wide-

Dinko Lukes och Kenth Olsson in front of a model that was developed for a culture festival in Stockholm that shows the waters way through the city.

ly for sustainable solutions for the entire water and pipes collective; they must be environmentally sound, economically favorable and socially responsible. You also look at the ethical values in the production stage.

– We have a new environmental policy document from the city of Stockholm and we are probably the only water and sewer organization in Sweden that has its own sustainability unit, with the task of phasing in the city's policy in the business. This is a challenge, but it means that we have an increased dialogue with manufacturers, for example. This entails new sustainability solutions that can then be used by other municipalities later on, says Kenth Olsson.

The City of Stockholm's vision is to become the world's most sustainable city, and the organization's sustainability department works intensively with the goal, from the big issues to the lower end issues.

– If you look beyond water and sewage issues and look at the whole city, sustainability is all around us and is growing. For example, exciting questions such as how to recycle materials when creating new products. We feel it is always possible and future requirement to move forward, says Dinko Lukes.

The key to success lies in the fact that together we create successful collaborative projects around the future opportunities with the products.

Sustainability is very much about knowledge; ten years ago, an environmentally friendly product often meant that it did not perform as well as the conventional one, but had less of an impact on the environment. Today, instead, products are being developed that are better from several different perspectives, while at the same time offer sustainability.

To find innovative solutions, they look at other cities and countries - for example Portugal, which conduct successful sustainability work - and they also collaborate to push sustainable innovation.

– We have very good collaborations in Sweden between the water and sewerage organizations in the municipalities, as well as with our industry association Svenskt Vatten. About ten years ago, a number of municipalities needed to investigate and research PE pipes and accessories. Then 4S was formed which conducts research and whose purpose is to provide a basis so that their development money is used in the right way, says Kenth Olsson.

Stockholm Water and Waste also runs fairs, such as the much-appreciated and well-attended Stormwater fair.
– The challenges of stormwater are very interesting. At the fair, we can highlight innovative technology and give our own and others' views on what lies ahead. It is an additional way for us to reach out with our work, but above all to have a dialogue, says Dinko Lukes.

It takes time to change production and develop a product in order to make it more durable and sustainable. It also requires a long-term mindset. Therefore, Kenth Olsson and Dinko Lukes are looking at the possibility of creating diverse collaborators. These can be manufacturer organizations and industry organizations to help to develop standards - tackling the pipe owner's needs in order to produce better and more sustainable products for the future.

– We want to phase in new types of options in the production process. We are the users and work with the sustainability requirements, and the manufacturers create the products we use. That is why we work to improve the dialogue with the manufacturers; The key to success lies in the fact that together we create successful collaborative projects around the future opportunities with the products, and that we constantly look five, ten years ahead and capture what needs to change, says Kenth Olsson.

When it comes to manhole covers and related products to that, they have collaborated with two major manufacturers where they have emphasized that the goal is a cost-effective product - not necessarily the one that is cheapest to buy. With the traffic volumes to which the products are exposed, it is important that they are durable, so you do not have to do maintenance as often. The collaboration has resulted in a product that is more sustainable than the previous one and thus is more cost-effective in our traffic environment.

Another project is a collaboration with Leca Sweden, which Stockholm Vatten och Avfall has been working on for the past year. Together, they have developed a completely new principle solution for lightweight aggregate around pipe trenches.

Pipe networks are often installed in less favorable ground conditions and it is important that maintenance is quick and that it is possible to restore in the same way. By using lightweight aggregate around the trench itself and heavier materials closest to the pipes, it will be easy for the employees at Stockholm Vatten och Avfall to open up and maintain.

Now we know that it is possible to use light filling around our pipes and by doing this we know that we get a safe pipe trench to perform our work in.

– Using light filling has been a problem. Today it happens that you refill with light filling without having any principle solution, which makes the maintenance of the pipes very unstable and complex. This challenge had become an ongoing issue for me until Leca and I collaborated - we joined our knowledge together and were able to develop this solution together, says Kenth and continues:

– Now we know that it is possible to use a light filling such as LECA LWA around our pipes and by doing so, we can create a safe pipe trench to conduct our work. Furthermore, we feel we have reached a solution that is tried and tested, making this a unique solution. Now it is a matter of finding a solution that can then be adapted to the local variations. But LECA LWA has found to be a solution that can significantly help us offering greater flexibility and greater ability to serve our city's needs, says Kenth Olsson.

CREATING EMBANKMENT STABILITY FOR THE PRINCES QUAY FOOTBRIDGE

UNITED KINGDOM ***LECA® LWA was specified as a fill material for Princes Quay Bridge in Hull, which filled a space which was 6 metres in height and was covered with a concrete pavement.***

Over 2000 m^3 of Leca lightweight aggregate (LWA) was specified for the new Princes Quay Footbridge in Hull. This 60 metre structure weighs 150t and was fabricated by SH Structures from the design concept by Matter Architecture, McDowell Benedetti and Arup.

Innovative design

This was designed to be a safe pedestrian crossing but also thanks to its phenomenal design, also acts as a great landmark in the city of Hull. Leca LWA was specified specifically for the embankment build development to support footbridge access paths.

Princes Quay Footbridge features a curved canopy that will provide shelter for users. SH Structures carried out the fabrication at its facility in Sherburn-in-Elmet and then assembled the bridge close to the site. It was then transported by self-propelled mobile trailer units to its final location across the A63.

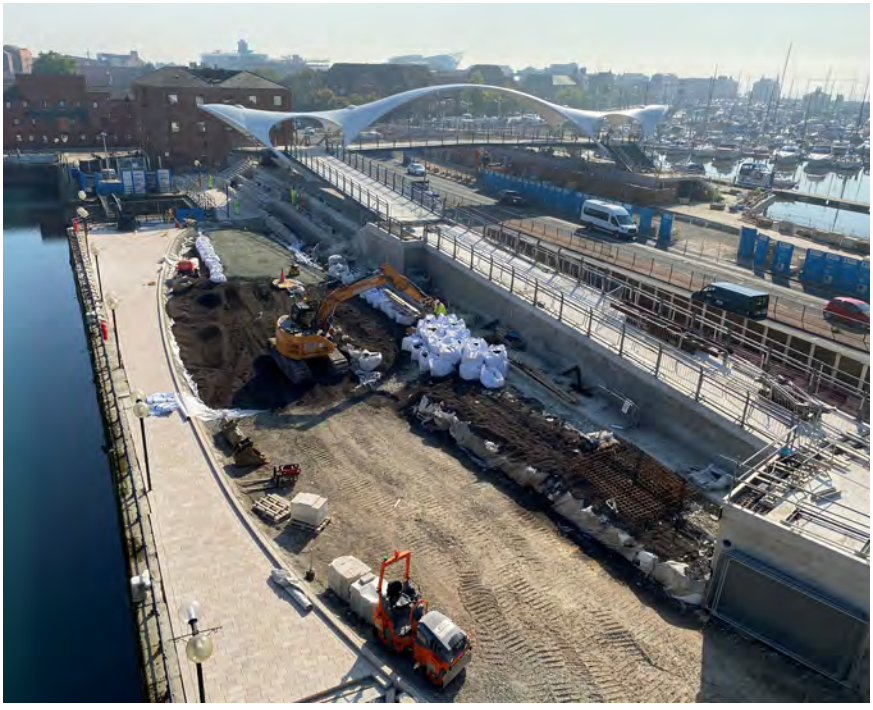
Increasing Stability

In this embankment, Leca LWA was specified as a fill material which filled a space which was 6 m in height and was covered with a concrete pavement, furthermore, a high strength polyester geotextile was used as reinforcement combined with a wrap-around solution for added stability.

The project's sub agent Interserve Construction Limited representative who worked closely on the development of this geotechnical structure, Adam Land, Sub Agent from Interserve Construction Limited, commented that "Leca LWA was specified due to its lightweight properties. Underneath our site are foundations to a demolished warehouse which is placed on a timber raft foundation / piles. The lightweight structures above were designed to avoid overloading the below foundations." The selection of Leca LWA was also confirmed through "its lightweight properties against traditional earthworks materials or fill."

New Leca® LWA experience

The use of Leca LWA was nothing new for the team, however the use of the



Leca® LWA was specified as a fill material which filled a space which was 6 m in height.

Leca® LWA was specified specifically for the embankment build development to support footbridge access paths.

material in a project like the Princess Quay Footbridge was new, "A couple of other members of the team had used it before, but only in more basic applications such as backfill at bridges etc. We used Leca LWA filled bulk bags to form our terracing shape and secure the material underneath."

Replacing Polystyrene Design Solution

The team went onto explain that Leca LWA actually replaced alternative solutions, "The original design was polystyrene and Balfour Beatty were involved with Arup and HE as ECI on this project. They changed to Leca LWA following discussions with the designer."

The project was completed successfully and within the timeframes planned, "We were pleased with the ease and speed of installation and furthermore, we have been happy with the service and advice provided by Leca from order stage through to construction and delivery."

Project information

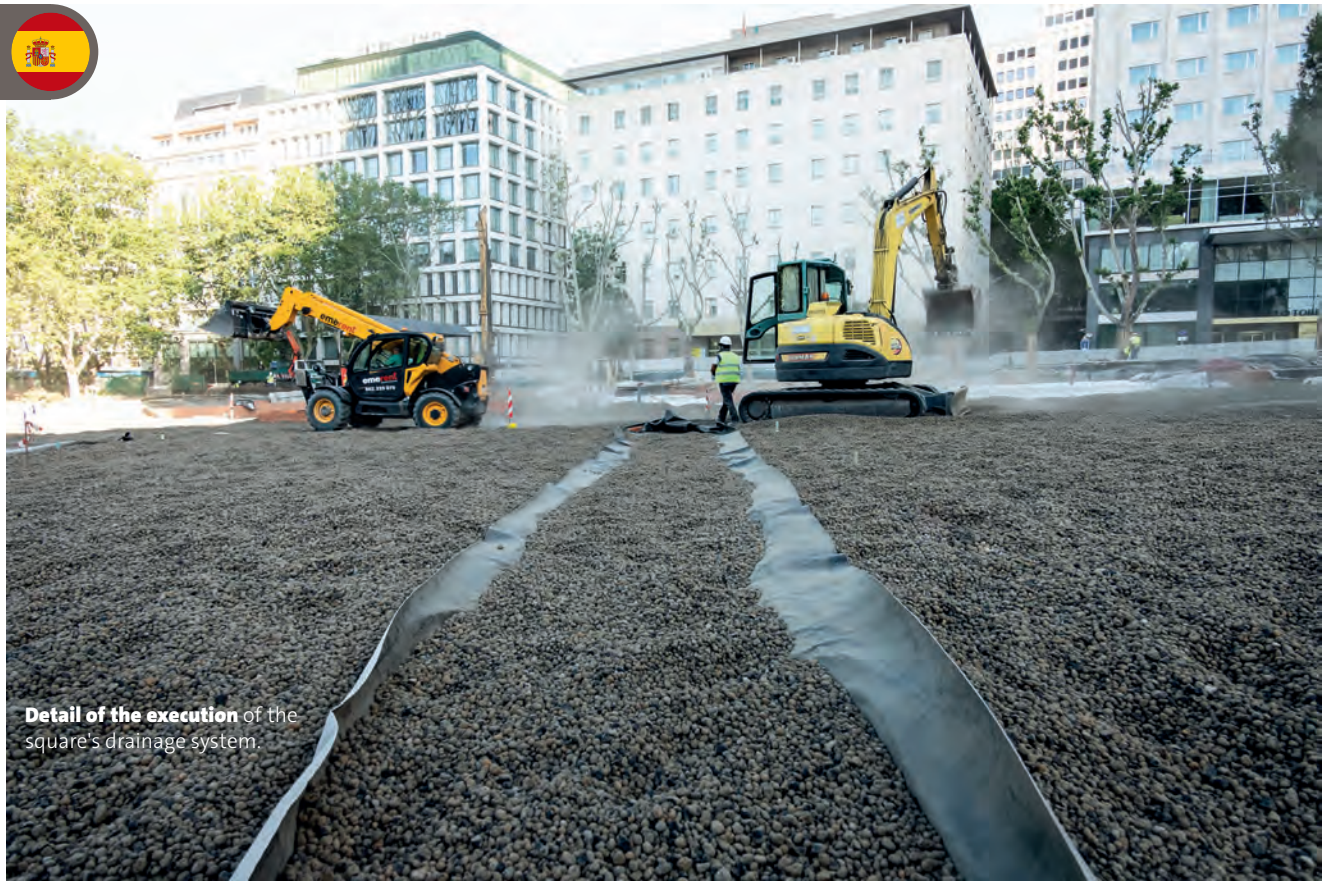
Client: Hull City Council

Contractor: Interserve Construction Limited

Design: Matter Architecture, McDowell Benedetti and Arup

Leca product: Leca® LWA 10-20 mm

The project was completed successfully and within the timeframes planned



Detail of the execution of the square's drainage system.

THE ESSENTIAL MATERIAL FOR AN EXCITING REVELOPMENT PROJECT

SPAIN ***Without a doubt, the Plaza de España (Madrid) is the most important square in the country. The redevelopment project of the triangle between the Royal Palace, Temple of Debod and Calle Princesa, unites these three tourist hotspots of great importance for the city, creating a unique environment that offers the citizens of Madrid and its visitors a great attraction.***

This new project by the Madrid City Council is a remodeling of the Plaza España environment that aims to unite several of the most representative monuments of the city such as the Royal Palace and the Debod temple. Previously, these spaces were separate and minimised the square's prominence within the city, but with this new design and new levels of the floors, it will unify the space for citizens and visitors. For this project, Bailén Street has been removed, becoming a greener environment – through reducing traffic emissions and without affecting the city's transport connectivity.

This ambitious redevelopment of the spaces required that all the areas were to be built at the same level and for this to be achieved, it required a depth increase of 1.5m over the Plaza España car park, which presented an overload to the existing car park - which was almost four times greater in depth than the original engineering designs from the 1960s.

Leca lightweight aggregate (LWA) is almost five times lighter than the overload created by natural soil, through this unique characteristic it became the ideal solution for this project. Along with this provision, it became a requirement that the new square could host different events such as concerts, and mass events with a huge footfall of people, this

meant that the design solution needed to guarantee specific mechanical resistance benefits. Both of which, would become possible through the specification of Leca LWA. Another important requirement was that this new development was to manage rainwater in a sustainable way. Again, Leca LWA was deemed a suitable solution as it could contribute to the drainage capacity of the square and offer a sustainable urban drainage system (SUDS) – allowing for the cleaning and filtering of the runoff water from rainfall- creating a system which could cleanse the water of impurities and filter better quality water into the sewage systems.

Over 6,000 m³ of Leca LWA was installed on the car park and was supplied in less than a month. This work required for the plaza development was completed in a very fast and simple way. The quality standards in the elevated discharge also benefited from reduced dust emissions for the local surrounding environment through the delivery of the material being made using totally enclosed trucks.

The project will be finished in the summer of 2021 offering an exciting new space for all Madrilenians.

Project information

Project: Remodelación de la Plaza de España y su entorno.

Costumer: City of Madrid

Engineering: Prointec

Constructor: FCC

Product: Leca® 10/20

Volume: 6.000 m³

Unloading of Leca® LWA in a truck of 75 m³ capacity.

The spreading and compaction of Leca® LWA in the 10,000 m² of the square.

The finished quay with a pavement above the Leca® LWA.

EXPANSION OF FISHERY HARBOR IN THE LIMFJORD

DENMARK ***The harbor of Oddesund is an important area for mussels in the inlet Limfjord, as its location is the perfect breeding ground. Therefore, it was decided to expand it, but the area was characterized with soft subsoil, which required more than traditional sand fill.***

In the Limfjord, a lot of fishing and breeding of mussels in particular takes place. In connection with these activities, there has been a growing need for more suitable ports for unloading close to the area where this mussel production takes place.

Oddesund Harbor is one of several small harbors in the Limfjord, where location in relation to mussel production is perfect. Here they chose to expand the small harbor with better quay facilities for just unloading mussels and to get better facilities for this activity.

Risk of settlement

In the preliminary studies, where geotechnical studies of the subsoil were made, the geotechnical drilling profiles showed that there was an abundance of soft subsoil present. In the design of the new quay, sand filling could not be used without having the risk of future settlement damage. The responsible engineer therefore chose to design the harbor quay using Leca

The harbor was expanded with a bigger quay area.

lightweight aggregate (LWA) instead of sand fill. In addition to utilizing the weight-reducing properties, the engineer also benefited from the draining properties of Leca LWA.

The water level in the Limfjord can vary a lot, depending on the tide, wind and weather. When using Leca LWA, as for this project, the drainage effect is significantly better than sand filling. This means that the water level behind the sheet pile wall can be drained continuously, so that it constantly follows the current water level in the harbor basin.

More benefits in Leca® LWA

The drainage effect and the light properties of Leca LWA contribute to reduced settlements and less load on the quay construction compared to the use of a sand fill.

The Leca LWA layer is wrapped in a geotextile to ensure that the many cavities between the Leca LWA are not filled with finer sand sediments from below, the sides and above.

For infrastructure projects such as this, delivery is easy, as the light filling is delivered by truck and tipped off directly into the excavation. Above the Leca-layer, they chose to construct a traditional road box with paving.

Project information

Client: Struer Municipality

Geotechnics: Andreasen & Hvidberg

Consulting engineer: Havnecon Consulting ApS

Contractor: Ivan Jacobsen A / S

Leca products: Leca® LWA

The contractor team ready to start the day.

Text: Dakota Lavento
Images: Kuvaaja Ville Honkonen Oy

COST-EFFECTIVE AND DURABLE LIGHTWEIGHT FILL FOR BRIDGE CONSTRUCTION

FINLAND ***A new underpass, which needed a lightweight fill at each opposing entrance, was built during the summer of 2019 on the Limingantie road in central Oulu.***

The busy road's safety improved considerably at Limingantulli, once construction of the road and the Rautionpolku underpass was completed in November 2019. Work on this small bridge construction site near a large junction proved to be challenging. The underpass was built over two stages, because two lanes were required to remain open in both directions at all times. The first part of the bridge construction was completed in the early summer, and the second in late summer.

Weak sub-soil required a lightweight fill

"The geotechnician pointed out that a lightweight fill was needed because of the thick silt clay layer where the underpass was built," says project manager Toivo Kämäräinen of Plaana Oy, who oversaw construction site planning. About ten metres of lightweight fill was required at each opposing entrance of the bridge, under the transition slab.

Due to traffic and the lack of space at the construction site, the bridge was excavated to half depth and cast. Once the bridge was ready, excavation to the final depth were made under the final bridge for pedestrian and cycling paths. "The lightweight fill was also necessary to prevent the soil from collapsing and sliding onto the pedestrian and cycling paths under the bridge," he explains.

The busy road's safety improved considerably.

The Rautionpolku underpass was completed in November 2019.

The soil research and foundation statement for the underpass bridge at Rautionpolku was drawn up by Lic. (Tech.) Sakari Lotvonen, head of design at AFRY Finland Oy.
Sundström Ab Oy from Pedersöre, who were responsible for the site's earthworks and specializes in both civil engineering and railway construction, implemented the lightweight fill with Leca LWA. A total of 2 x 700 m³ of Leca LWA was used at the site.
Leca LWA is an excellent material for sites like this, due to its durability and lightweight properties. “It is also cost-effective.” says site supervisor Tomas Sundström.
The fill layer of Leca LWA was covered with a supporting layer of crushed gravel for greater stability under the cast moulds of the transition slab.

Deliveries on short notice

Tomas Sundström said that the Leca LWA was delivered to the site from Leca Finland´s Kuusankoski plant at very short notice. To enable easy access, an intermediate storage place was made for the material on the construction site. The lightweight fill on the other side of the bridge was built in August. About a month was reserved for casting the bridge structures. Asphalt was laid between September–October.

An intermediate storage place was made for the material on the construction site.

Project information

Client: City of Oulu/ Senior Construction Engineer Vilho Vanhatalo, Urban and Environmental Services of the City of Oulu

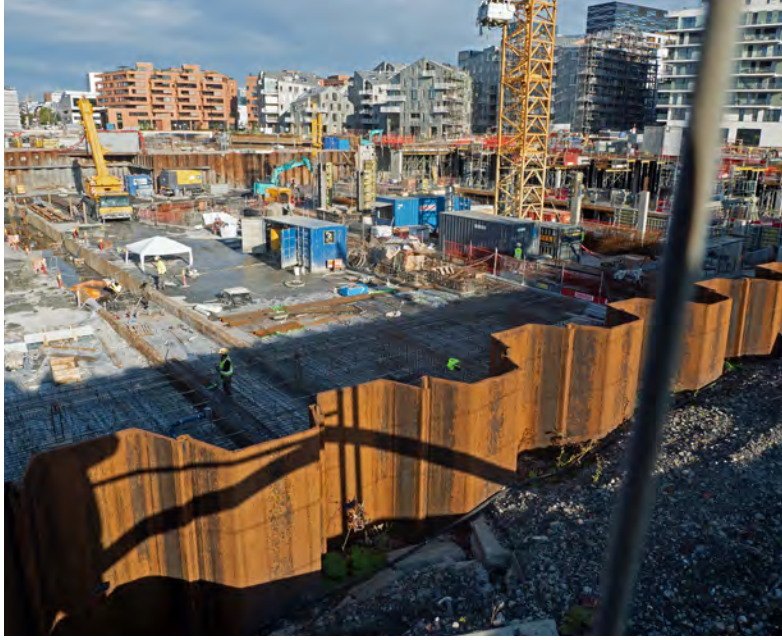
Contractor: Sundström Ab Oy/ Bridge by Seinäjoen Kiintorakennus Oy

Design: Plaana Oy, Project Manager Toivo Kämäräinen

Soil research and foundation statement: Pöyry Finland Oy, Licentiate in Technology, head of design Sakari Lotvonen.

Leca product: Leca® LWA 4–32 mm

The sale of the apartment building that AF Gruppen Site Manager Ola Hammer is working on was delayed due to the coronavirus outbreak, but things look brighter now.



The street weighs heavy on the construction pit that will become Clemenskvartalet.

PNEUMATIC DELIVERY OF LECA® LIGHT WEIGHT AGGREGATE (LWA) PREVENTS ROAD CLOSURE

NORWAY ***The ability to park their service vehicle 60 metres away and blow the Leca pellets into place meant there was no need for AF to close any of the main roads into Oslo city centre.***

"This was purely down to location and access. Leca LWA has the major advantage that you can just blow it in," explains Ola Hammer.

Heavy traffic on important street

Ola Hammer is AF Gruppen's Site Manager for the Clemenskvartalet project in the Norwegian capital. AF is currently finishing off the project for the basement floors – the contracts for the rest of the quarter have not yet been allocated.

The apartment building in Bjørvika will be a green oasis in the middle of a pulsating urban environment. "Pulsating", in part because the 35-metre-wide Kong Håkon 5.s gate passes just a couple of metres from the edge of the construction pit.

"The street is built on an insulation layer and is not piled onto the rock. This means that there will be settlement. There is enormous pressure on our pit – 130 tonnes every six metres," explains Hammer.

Avoided road closures

"That's why we have large bracing struts, 400-beams which can alternate within a slot to withstand the forces we cannot manage," he explains. The area from the wall of the building to the sheet pile has to be covered with a concrete roof, and the void below must be filled in.

"Closing the road would cost a lot of money, and there were no other practical access options. That's why we chose to blow in Leca LWA," explains Ola Hammer.

Another reason for choosing Leca was that the construction level was 2.80 metres under water. "It's an advantage that Leca LWA insulates, but it wasn't the insulating effect that we were looking for. What we really wanted was an easily accessible filler.

"Efficient logistics make construction easier for the design and building contractor," confirms Ola Hammer. Here we see the Leca pellets being effortlessly blown into place.

We have developed a water-repellent insulation externally, and then we simply add Leca LWA around the outside to fill the void."

60-metre hose

It proved to be a quick job, with the help of a 60-metre hose. "If we had back-filled with an excavator, we would have needed more time and space. Running two articulated trucks alongside each other, both blowing at the same time, it's a quick process," explains Hammer.

Leca Sales and Marketing Director Truls Børresen is delighted to have been awarded the Clemenskvartalet project. "The whole area is an exciting development, and this is a flagship development of the area," he explains.

"Naturally there are challenges due to the cramped construction site. People need to gain access, and the fact that we can blow the pellets in quite a long way to where the material needs to be placed, really makes the difference. Normally we can blow up to 80–90 metres," explains Børresen.

Project information

Project: Clemenskvartalet in Bispevika, Bjørvika in Oslo. 265 two-, three- and four-room apartments, commercial premises on the ground and first floors, two basement floors and a green urban garden.

Construction client: OSU (Oslo S Utvikling).

Main contractor: AF Gruppen.

Concrete: Eiqon Bygg.

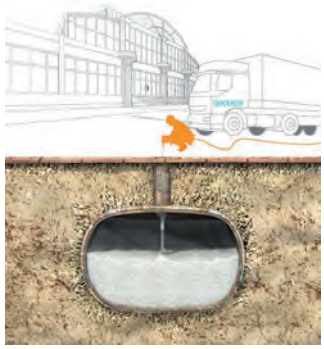
Product: Leca® Iso 10–20.

BORROWED MATERIAL PROTECTED HISTORICAL FINDINGS

When constructing an underground tunnel that will go through some of the oldest parts of a soon to be 400 year old city - there was no surprise that historical findings were made. Parts of Gothenburg's old city wall were found and to protect it temporarily from load related to the construction work, Leca Lightweight Aggregate (LWA) was used. But since the contractor only needed the aggregate for a short period of time, the material was transported back to Leca when the worked was finished. This setup made it possible to reuse the material later on for a completely new project.

Reuse is an important part of being sustainable. The simplicity of reusing the material is due to the fact that Leca LWA is a strong and durable material. It also resists external influences and chemicals. It can therefore be used again, and again. And again.

FILLING VOIDS QUICKLY AND COST EFFECTIVELY



Settlements in buildings and structures are common and their repair is often demanding and expensive. Settlement problems are caused by construction on weak soils, work errors and urbanization in general, as well as the problems brought by climate change. Settlements usually occur in buildings as cracks in plinths, walls, or floors, or settlements, sinkholes, railroads, parking lots, or even airport runways.

The Finnish-based company Geobear, has developed a geopolymer injection, which is more cost-effective and up to 10 times faster than traditional solutions. In the developed method, the deflection correction and the filling of the void do not require traditional excavation work.

Filling of voids can be accomplished with Leca lightweight aggregate (LWA) and injectable geopolymer. Leca LWA is the ideal solution due to its shape and lightweight properties. In this solution, a hole is made in the sunken structure, through which the set void is first filled with Leca LWA and then injecting geopolymer provides the required degree of filling of the space to be filled. The void is easily filled thanks to the round shape of the Leca pellet. The expandable geopolymer can also be used when a geotechnical project requires raising the structure to a specific desired level. In this case, no mechanical force is at work.

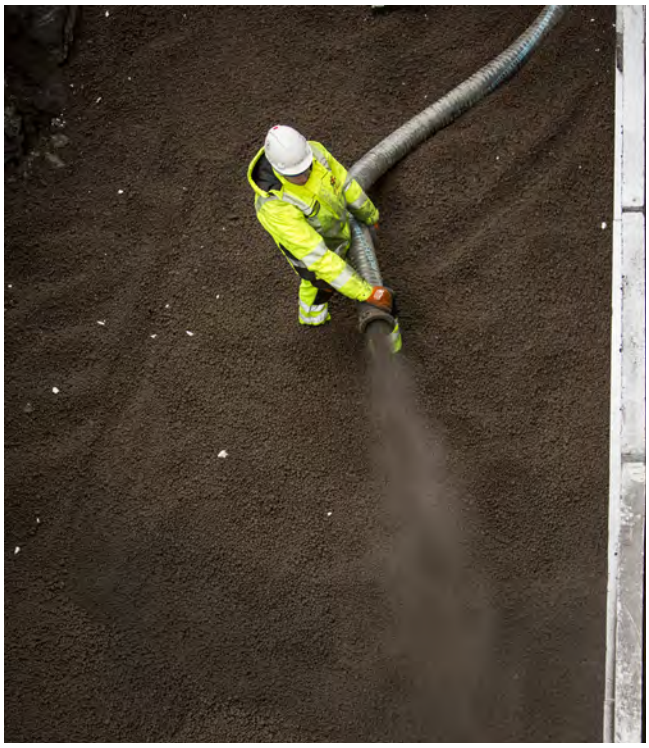
Compared to heavier materials, the lightness of Leca LWA does not cause any unnecessary extra load on the structure. Another advantage of the solution is that the work can often be carried out without disturbing the normal operation of the site. (More information: Geobear.co.uk.)

20x30 cm

A small window in the church tower allowed for the efficient loading of 140 m³ of Leca LWA to a height of 12.5 m. The window measures 20x30 cm and thanks to this window, the demolition of a section of the roof did not require the transport of bags with expanded clay through a narrow spiral staircase. A pipe for the pneumatic pumping of Leca LWA was pulled through the window. The diameter of the pipe with metal fittings is 18 cm and the window just allowed enough space for the pipe to be inserted through. For this job, Leca LWA provided thermal insulation to the church vault.

Approx 2500 m³

In a new lightweight fill structure on highway 12 in Lahti, Finland, around 2500 m³ of reused Leca lightweight aggregate (LWA) was specified and installed. The reuse of Leca LWA resulted in significant cost savings. At the same time, this offered environmental benefits, as the material of the dismantled structure did not have to be transported away, and more importantly did not require more material to be manufactured and trans-ported to the site.



1 m³/min

Our innovative installation method where we pneumatically blow the material into place is delivered with a speed of 1 cubic meter per minute when using a 30 meters long hose.

20 m

By adding extra hose to the pneumatic truck we are able to blow Leca LWA as high as 20 meters up. This allows us to deliver material exactly where the customer needs it immediately. No matter if it's needed on floor 1 or floor 8.

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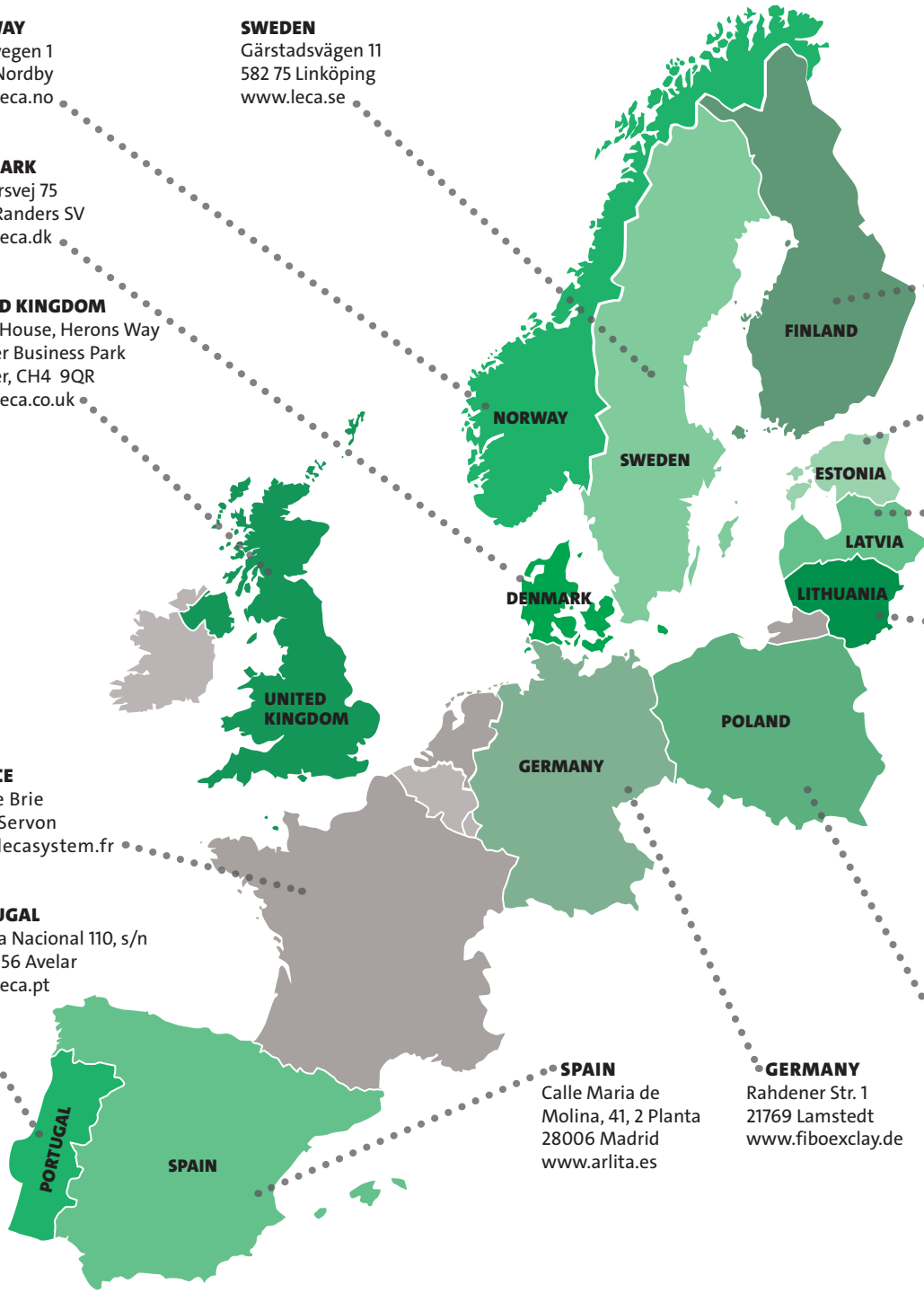

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