EDITION | **2025**

KELLER INSIGHT

WELCOME TO THE TEAM
Meet Regina – Hungary's First Female Piling Rig Operator

ENERGY EFFICIENCY ON THE CONSTRUCTION SITE
Energy Efficiency on the Construction Site Is More Than HVO100

KELLER SEN ON THE ROAD
Find Out Where to Meet Us in Person in 2026

KELLER

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AREAS AND DEPARTMENTS

MASTHEAD

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INTERNATIONAL

Continuing Education and Knowledge Transfer **in Engineering**

One of the main responsibilities of the engineering colleagues is to carry out geotechnical calculations as part of the planning for special foundation works. To meet the challenges of complex construction projects, ongoing professional development and technical exchange with other experts are essential.

Alexander Zöhrer, Keller SEN

A key format for this knowledge transfer is the annual two-day Designers Meeting, where all structural engineers from the various regions of the Business Unit come together. The focus is on exchanging information about new regulations and internal design guidelines, discussing complex projects, and receiving updates on ongoing research and development activities. This creates a platform that promotes both the quality of engineering work and communication among colleagues.

In addition, specialised courses are held on specific topics with support from external experts. One example is the workshop on design using the Finite Element Method, conducted by experts from Graz University of Technology. Regular participation in national and international technical conferences also broadens knowledge and provides opportunities to discuss particularly interesting construction projects or insights from development initiatives with fellow professionals.

Beyond acquiring knowledge, sharing it is also a key responsibility within the engineering field. Notably, engineering colleagues contribute to external lectures and training programmes at numerous universities both in Austria and abroad. These sessions cover topics such as foundations, excavation pits, contaminated site remediation, soil dynamics, and the associated special foundation engineering methods in a practical manner. Presentations as part of the Drillmaster course and the Wellmaster training programme are also included.

Another important component is participation in Keller's internal training events. One such example is the Keller Academy Advanced, a three-day, product-line-focused training course designed to efficiently convey the company-specific theoretical and practical expertise required by site managers. Furthermore, insights gained during the annual site manager and product line meetings are shared with foremen, technicians, and site managers.

Breaking Barriers as **Hungary's First Female Piling Rig Operator**

Regina Juhász,
Pilling Rig Operator

At Keller Hungary, we are immensely proud to introduce Regina Juhász, a true pioneer who has made history as the first female piling rig operator in Hungary. Regina's journey is nothing short of inspiring – a story of resilience, determination, and the steadfast belief that no obstacle is insurmountable for a woman with ambition.

Regina's path to becoming a piling rig operator was far from straightforward. She became a mother at a young age and faced the challenges of raising her child alone. While working tirelessly as a factory employee, she never lost sight of her aspirations. She was determined to build a career that would offer a better future for herself and her child.

In 2018, Regina took a bold step by obtaining her heavy machinery operator's licence, setting her sights on a career in an industry traditionally dominated by men. Where others might have been discouraged, Regina was driven by the conviction that she could succeed in a field where few women had ventured.

The turning point came when she joined Keller Hungary. Recognising her potential, we were committed to supporting her ambition. We offered Regina the opportunity to train as a piling rig operator – a role that demands precision, expertise, and resilience.

Under the guidance of Keller's experienced team, Regina undertook rigorous training to become Hungary's first female piling rig operator. This specialised programme equipped her with the skills and confidence to operate some of the most advanced and demanding equipment in the construction sector.

Today, Regina is not only a highly skilled operator but also a trailblazer in the Hungarian piling industry. Her achievement is groundbreaking – not just for her personally, but for the sector as a whole. It highlights the importance of creating opportunities for women in technical professions and the value of inclusive workplaces.

Regina's story is a testament to what can be achieved when talent is nurtured and supported. Keller is proud to have been able to be part of this process, providing the resources and mentorship she needed. As Hungary's first female piling rig operator, Regina shows that with perseverance, passion, and the right support, anything is possible.

We are delighted to have Regina as part of our team and look forward to seeing her continue to excel. Her story is remarkable – and it's only just beginning.

Accident Prevention Only Knows One Direction – Forward

How Do We Prevent Accidents at Keller?

The health and safety of our employees are at the heart of everything we do. Our goal: everyone should return home safely at the end of the working day. This promise is firmly embedded in our corporate culture. To meet this commitment, we rely on regular training sessions, hands-on workshops, and targeted initiatives that strengthen and reinforce safety awareness in everyday work.

Martina Rückenbaum, Keller SEN

Digital support for greater safety on site: Daily Site Briefings with InSite

The use of our group-wide software InSite plays a key role in our safety strategy for daily site briefings. This tool accesses relevant project data directly from our project management system, Keller Dynamics, creating a seamless link between office, site management, and construction site.

The aim is to communicate and document safety-relevant activities in a structured manner as part of daily site operations – both towards site management and the teams on the site.

By identifying potential risks early, InSite not only enhances safety awareness but also supports informed decision-making in day-to-day operations.

The result: a significant reduction in accidents – ideally leading to complete prevention.

Toolbox Talks: Learning from Near Misses and Incidents

Toolbox Talks are among the most proven formats for strengthening safety awareness directly on site.

Insights from near misses or actual incidents are regularly reviewed, prepared, and communicated to teams in a clear and visual format.

These short, practical discussions take place directly on site and serve to reflect on specific situations, make risks tangible, and influence behaviour sustainably. Every incident – whether minor or serious – becomes a valuable learning opportunity for all.

Through regular repetition and proximity to everyday work, Toolbox Talks play a crucial role in sharpening safety awareness and fostering a culture of mindfulness.

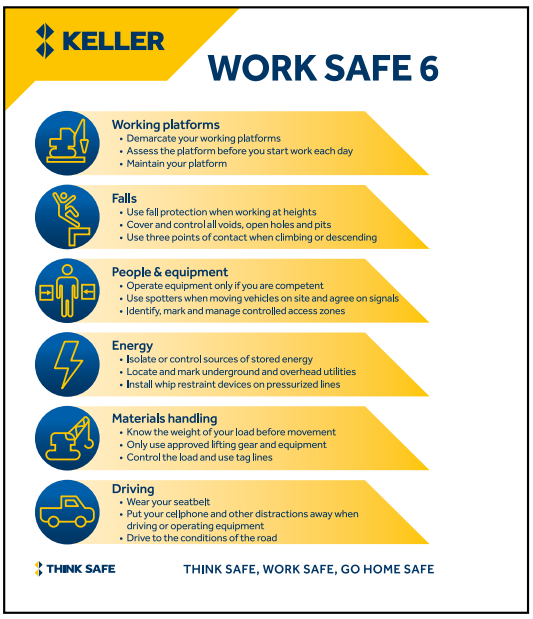
Group-Wide Initiative 'Induction'

Another key element is the group-wide initiative 'Induction', launching at the end of 2025.

Selected HSEQ professionals will be trained in advance to become certified trainers. These trainers will regularly conduct sessions – both for new employees within their first six months and for existing colleagues.

The core of the training focuses on the 'Work Safe 6' – six key risk areas particularly relevant to our daily work. The programme is complemented by the practical format 'A Day in the Life of a Keller Employee on Site', which realistically conveys typical hazard scenarios and further sharpens safety awareness.

This initiative helps build a strong safety culture that operates across all levels – preventive, practical, and sustainable.



Global Keller Initiatives: United for Greater Safety

Initiatives such as 'Global Safety Week' or the recently successful worldwide 'Safety Stand Down' on 2 July highlight our shared commitment to safety – across countries and business units.

It is therefore extremely important to us to annually recognise individuals who show exceptional dedication to safety on our construction sites.

These group-wide and global actions are far more than symbolic gestures. They demonstrate that our commitment to accident prevention is not just lip service, but lived practice. Through targeted activities, open dialogue about safety risks, and shared learning from experience, we create a strong global safety awareness.

2023 **GLOBAL SAFETY WEEK**

Don't learn safety by accident

Such initiatives not only strengthen the culture of mindfulness but also unite us in a common goal: Zero Accidents – Worldwide.

Not to forget!

'STOP WORK AUTHORITY (SWA)' is a central element of occupational safety, giving all employees the right and responsibility to immediately stop work if an unsafe situation is identified. This principle applies regardless of position, experience, or hierarchy – safety always comes before productivity.

Last but not least: Audits as a key to continuous improvement

Audits are an essential part of our HSEQ strategy. Without regular reviews, there is no foundation for assessing the current status and initiating targeted improvement processes.

Whether through group-wide programmes or at the Business Unit level – regular inspections and audits are firmly embedded in our operations. They are not only conducted to check standards but above all to identify and implement improvement opportunities.

We see audits not merely as control measures, but as vital tools for development. They help us detect weaknesses early, optimise processes, and continuously improve the safety and quality of our work.

Sustainable, Economical, Forward-Looking – **Energy Efficiency on the Construction site – More Than Just HVO100**

In times of rising energy prices and growing demands for climate protection, the issue of sustainable construction is becoming increasingly important. Construction sites, where energy consumption is traditionally high, offer numerous opportunities for reducing CO_2e emissions – far beyond the use of alternative fuels.

Thomas Kirchmaier – Keller SEN

HVO100 TANK IN SÖDING, AUSTRIA

HVO100: A first step, but not the last

The use of HVO100 (hydrotreated vegetable oil) as a substitute for fossil diesel is a promising approach. This synthetic fuel significantly reduces CO_2e emissions while also cutting AdBlue consumption by around 50%.

HVO100 is therefore making an important contribution to decarbonising construction site operations – but the potential for savings is far from exhausted.

Efficiency starts with the choice of equipment

An often underestimated lever is the choice of machinery used. Energy-optimised equipment and dimensioning tailored to requirements – adapted to ground conditions, drilling depth or jet grouting diameter – ensure that no more energy is consumed than is necessary. This means that a significant contribution to resource conservation can be made as early as the construction site planning stage.

Intelligent power supply: battery packs as key technology

Electrical devices are on the rise – not least because of their high efficiency. But they bring new challenges with them: the start-up current is significantly higher than the power requirement during operation. Power generators must therefore be designed for these peak loads, which often leads to oversizing. The result: unnecessarily high diesel consumption during normal operation. The solution can be the targeted use of battery packs to cover peak loads.

This allows a smaller, more efficient generator to be operated. A practical example was provided by a vibro construction site in Graz-Seiersberg, Austria, where two battery packs support the generator – with impressive results: between 70 and 100 litres of diesel were saved per shift.

Electric compressors: efficiency even with auxiliary units

The potential of electric drives is also evident in compressed air generation. Even when electric compressors have to be operated via an additional power generator, they are more efficient overall than their diesel-powered counterparts. The reason: electric motors are the most efficient drive technology with the highest efficiency. At the construction site in Horn Arrivée (Switzerland), see p. page 20 , the use of electric compressors

BATTERY PACKS FROM EMOST

significantly reduced fuel consumption – another further proof of the effectiveness of intelligent energy saving measures.

The first use of these new solutions leads us to the realisation that sustainability on the construction site does not begin with fuel. It encompasses the entire energy infrastructure. By choosing HVO100, selecting energy-efficient equipment and integrating modern power supply concepts such as battery packs, you can not only reduce CO_2e emissions but also significantly lower operating costs. A win-win situation for the environment and your business.

GRAPHIC:
Case studies on fuel consumption within the scope of Scope 1

Electricity From the Salzach – **Keller's Contribution to the Stegenwald Power Station**

With the completion of the new power station by Verbund and Salzburg AG scheduled for 2026, we take this opportunity to reflect on the year 2023 and offer insights into our work on this project.

Dominik Struber – Keller Grundbau, Eben im Pongau
Franz Rathmair – Keller Grundbau, Linz

Challenges and excavation pit design

The turbine house and the two weir fields are being constructed within an excavation pit approximately 65 x 60 metres in size and up to 15 metres deep. A technically sealed excavation pit support was therefore planned and executed, constructing the pit wall with spaced bored piles with jet grouting columns , along with a deep lying jet grouting slab.

To clearly represent the complex geometry and individual components, the excavation was designed in 3D using Revit. The data stored in the Building Information Model (BIM) also formed the basis for the execution of works and was supplemented with as-built data from the construction phase to produce a consistent execution model by the end of the project.

Structural calculations were carried out using two modelling approaches: an analogue GGU calculation and comparative analyses of double-anchored sections using Plaxis 2D. The excavation was divided into four zones with varying depths, and a 3D weight model was used to account for the arching effect of local depressions.

Execution of works

Construction commenced in spring 2023. Due to the low-water period in winter, the aim was to complete the excavation by autumn. This required a tight construction schedule involving up to five equipment units (two jet grouting systems, two piling rigs, one sheet pile unit), some of them operating in day and night shift

Bored piles

Cased bored piles were drilled down to 30 metres using both grab and Kelly methods. To meet accuracy requirements, all piles were re-measured at the starting points using GPS, and the borehole deviation was recorded at several depth intervals using a Jean Lutz system and then incorporated into the as-built planning. Deviations were consistently within the expected range, approximately 0.5% of the drilling depth.

Jet grouting works

The required diameters of the jet grouting columns and the necessary drilling grid in the slab were determined based on local geology, drilling depths of up to 30 metres, and anticipated deviations. The columns between the piles were constructed with variable diameters of 1.4 to 2 metres, depending on depth. For the staggered sealing slab, columns with a diameter of 3.6 metres were constructed in a uniform triangular grid of 2.5 x 2.7 metres.

All production-relevant data was recorded electronically, evaluated, and graphically displayed. Borehole survey results for the columns were also represented and analysed in a 3D as-built model. Horizontal cross-sections through the model enabled the identification of critical areas or defects, allowing additional columns to be arranged.

Anchoring works

All temporary anchors heads (9- and 10-strand) were located below the groundwater level. Anchors in the second layer had a water table difference of up to nine metres. To ensure proper installation and grouting against water pressure, the feasibility of a drilling method using an external hammer and drop-off crown in densely packed gravel was examined and implemented. Despite water ingress, all anchor tests were successful, achieving test forces exceeding 2,000 kN. Anchor lengths were approximately 30 metres, with 12 metres allocated for the grouted bond length.

Key to the success of this work was careful planning, a coordinated construction process, continuous monitoring of execution, erosion stability of individual components, and an adapted water management concept

'Modern' special foundation work...

...offers, through its proven methods and now standardised digitalisation and quality assurance, the ability to successfully realise even highly complex construction projects.

Solving such complex tasks is usually most effective when the entire project team – client, planners, consultants, contractors, and site supervisors – work together.

PROJECT INFORMATION:

Client:
Gemeinschaftskraftwerk Verbund und Salzburg AG

Contractor:
Ing. Hans Bodner BaugesmbH Co KG

Geotechnical Consultant:
GDP ZT GmbH

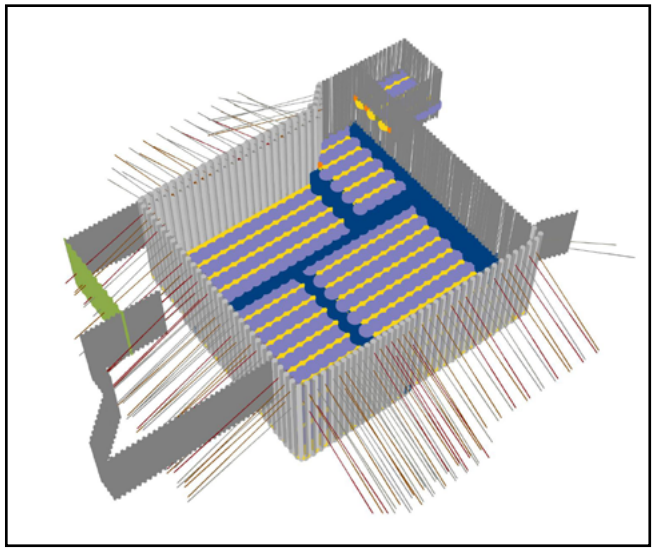
Structural Engineering:
Keller Grundbau // Review: GDP ZT GmbH

Scope of Works:
2,630m bored piles 1180mm
13,600m³ jet grouting (deep JG slab and columns between the piles)
3,800m temporary anchors

Timeline:
April – October 2023

Despite sometimes adverse weather conditions, a flood event, unexpectedly difficult anchor installation, and increased effort for residual water management, the schedule was met, and the construction pit was handed over for the start of concreting at the end of September 2023.

GRAPHIC
3D Revit model of the construction pit



ISTA3- I25 Maria Gugging – **Excavation Support by Means of a Shotcrete Anchor Wall**

In the heart of the Vienna Woods, the Institute of Science and Technology Austria (ISTA) continues to expand with the construction of the new I25 building. The project requires extensive special foundation works, including an excavation pit down to 38 metres deep, supported by anchor walls, bored piles, and soil nail walls.

Katharina Zach-Hammerl / Jovan Milošević – Keller Grundbau, Wien

As part of the third development phase, the I25 building – comprising laboratories, offices, and an underground car park – is being constructed in Maria Gugging. The project is challenging, both architecturally and geotechnically. Keller Grundbau, in a joint venture with Gnant GmbH, is responsible for securing the excavation, which reaches depths of down to 38 metres.

The construction site lies in a geologically complex zone characterised by so-called Flysch formations – a sequence of sandstones, siltstones, and claystones interspersed with loess and clay layers. These formations are prone to landslides, making the slope location particularly sensitive. Additionally, the presence of hillside water complicates the situation and requires high demands on excavation support and monitoring.

The support design includes a combination of following methods:

- Anchor wall made of reinforced shotcrete with strand anchors for back anchoring
- Soil nail walls for smaller height differences
- Spaced bored pile walls with shotcrete infill and anchor beams with strand anchors
- Where feasible, open-cut slopes were used

In total, approximately 27,800 linear metres of anchor drilling (around 760 anchors), 6,000m² of shotcrete surfaces, and 460m of bored piles were installed. Three types of strand anchors were used – temporary, semi-permanent, and permanent – depending on the required service life and corrosion protection standards. During excavation, around 200,000m³ of earth material was removed.

Due to the significant influence of groundwater on the stability of the excavation support, particular attention was paid to water management. The soil contains substantial interlayer water, which is pumped out via wells. For this purpose, dewatering wells were placed around and within the construction site. Additional

drainage boreholes and drainage mats behind the shotcrete wall prevent the build-up of water pressure.

Construction was accompanied by the Observational Method, supported by an extensive monitoring programme:

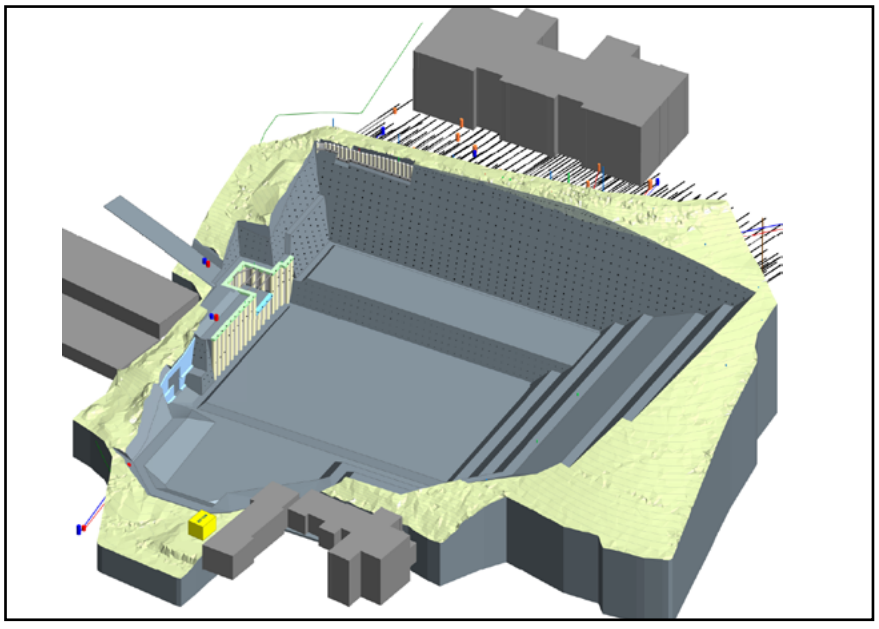
- 77 digital load cells
- 9 inclinometers to monitor structural and slope movements
- Geodetic surveying with a high-precision fixed-point network
- Vibration measurements in neighbouring buildings

Measurements are taken weekly, analysed, and compared with forecasts from finite element modelling. In the event of deviations, predefined alarm and countermeasures are triggered, such as increased monitoring frequency or additional safety measures.

In addition to geodetic monitoring of the installed anchor and bored pile walls, special attention was paid to adjacent buildings. The nearby gas pipeline was also closely monitored as part of the programme.

Furthermore, 3D modelling was used for planning and documentation. The excavation support was designed in three dimensions, allowing potential clashes with existing structures to be identified and avoided during the planning phase. This digital approach significantly improved coordination between planning, execution, and monitoring.

GRAPHIC:
3D model of the construction pit



PROJECT INFORMATION

Client & Contractor:
Lower Austrian Provincial Real Estate Company GmbH, represented by the Office of the Lower Austrian Provincial Government, Department of Building and Property Management

Project Management:
JV VIVITimmo GmbH Delta Managing & Consulting Engineers GmbH

Lead Planner / Excavation Concept:
ATP Wien Planungs GmbH / 3P Geotechnik

Site Supervision:
TDC-SKD GmbH

Geotechnical Consultant & Support:
Dipl. Ing. Walter Müller / Geostatik – DI Mario Johannes Pototschnik

Structural Engineering:
Katzkow & Partner GmbH / Keller Grundbau

Scope of Works:
approx. 27,800m (760 pieces) strand anchors
approx. 6,000m² shotcrete
approx. 460m bored piles (DN 120cm)

Timeline:
September 2024 – September 2025

Work on the excavation pit began in September 2024 and was completed in September 2025. The excavation is one of the deepest in Austria in such challenging ground conditions. Thanks to close cooperation among all project stakeholders, a safe and efficient solution was developed. Together with the on-site team, we demonstrated once again that even demanding tasks can be reliably executed within tight schedules.

This project not only contributes to the expansion of a globally renowned research institution but also showcases our expertise in specialist foundation engineering—particularly in managing complex ground conditions and ensuring the safety of structures and neighbouring properties.

Power Station Imst-Haiming – **A12 Motorway Crossing**

The expansion of the Imst-Haiming power station stage aims to reuse water already processed by the Prutz-Imst power station for energy generation via an approximately 14 km long underground headrace tunnel. The A12 motorway crossing is necessary for reintroducing the water into the River Inn.

Tobias Molitor – Keller Grundbau, Innsbruck

PROJECT INFORMATION

Client:
TIWAG-Tiroler Wasserkraft AG

Contractor:
JV Innstufe Imst-Haiming

Geotechnical Consultant:
Geotechnik Henzinger

Design & Structural Engineering:
TIWAG-Tiroler Wasserkraft AG

Scope of Works:
Secant bored pile wall
Jet grouting slab

Timeline:
July – November 2025

PRODUCTION OF PILES IN THE SOUTHERN CONSTRUCTION AREA

The construction lot for the A12 motorway crossing involves closing the gap between the outlet of the headrace tunnel and the inlet into a surge basin, then the water is returned to the Inn. Keller is responsible for the special foundation works. In the first phase, a secant bored pile wall is constructed as excavation support, connecting to the bored pile wall built under the motorway in 2023, both to the north and south. To maintain the critical path of the construction schedule, the areas north and south of the motorway are worked on in parallel.

In phase two, the crossing is excavated using conventional tunnelling techniques and serves, during the construction phase, as an underpass and direct connection between the two construction areas for site traffic. This also significantly shortens the distance for transporting the excavated material from the tailwater basin to the disposal site.

To convert the underpass into a channel to transport the water from the tunnel in the final state, further excavation down to the groundwater level is required. For this, a deep jet grouting slab is constructed from the construction level. Since a part of this work must be carried out directly beneath the motorway, a height restriction of approximately five metres applies, necessitating the use of a small drilling rig.

Felbermayr Headquarters in Styria

A Solid Foundation for a Strong Future – Ground Improvement for the New Branch

The project site is located on the grounds of a former soil excavation landfill in the Seiersberg-Pirka industrial area. A conventional shallow foundation was not feasible. Therefore, ground improvement was carried out using a combination of vibro concrete columns and vibro stone columns.

Fabian Mikulik – Keller Grundbau, Söding

On approximately 50,000m², the new branch of the renowned transport and lifting technology company is being constructed, comprising an office building, a warehouse, two vehicle garages, and a new workshop.

Due to the challenging geological conditions of the site – situated on a former excavation landfill – targeted soil improvement was necessary. As an alternative to the originally tendered gravel columns, a more cost-effective solution was proposed: founding the highly loaded column bases of the precast halls using vibro concrete columns, and improving the overall ground using vibro stone column techniques.

Given the partially very high surface loads (up to 110 kN/m²) caused by the wide range of heavy-duty vehicles, a precise and load-adapted layout of the stone columns was essential.

PROJECT INFORMATION

Client & Contractor:
Felbermayr GmbH

Geotechnical Consultant:
Geotechnik Tauchmann GmbH

Structural Engineering:
STATIK Raffelsberger & Koch ZT GmbH

Architect Engineer:
Benesch/Stögmüller ZT GesmbH

Scope of Works:
Approx. 1,700 vibro stone columns
Approx. 1,200 vibro concrete columns

Timeline:
April–June 2025

By combining these two methods, it was possible to address the site-specific constraints economically and sustainably. With the use of two vibro rigs, the tight schedule – aligned with fixed deadlines for subsequent contractors – was successfully maintained.

In line with our company's sustainability strategy, the concrete required for the vibro concrete columns was produced on-site using a mixing plant developed by Keller. This significantly reduced transport distances and CO_2 emissions. Additionally, we tested battery storage systems for our power generator to further optimise energy consumption during the construction phase **see also article on p. 8–9**.

The ground improvement works were completed on schedule to the satisfaction of all project stakeholders and now form the foundation for the new location.

Residential Quarter viéno

Load-Dependent Deep Foundation for a New Residential Development With 513 Units in Vösendorf

In Vösendorf, BUWOG is developing a new residential quarter on the site of the former Alvorada coffee roasting plant. Prior to the actual construction work, and in close collaboration with the main contractor, a test field was used to examine and optimise the deep foundation using ductile driven piles.

Christoph Januskovecz – Keller Grundbau, Vienna

In July 2023, a year and a half before the start of actual construction, the 'Residential Quarter viéno' project – then still known as 'WHA Alvorada Estate' – commenced for Keller Grundbau. In close cooperation with the future main contractor, Strabag AG, and the geotechnical consultant GB-ZT GmbH, test piles were installed on the construction site in Vösendorf for static load testing. The aim of the test field was both to demonstrate the suitability of ductile driven piles as a deep foundation method and to gain insights into optimising pile loads and execution lengths.

To this end, alongside the test field developed jointly with GB-ZT GmbH, which applied various static testing schemes using the bidirectional Pile-HAY-Proof System® (HPS), an extended site investigation was carried out using exploratory piles. The findings from the HPS load tests regarding external load-bearing capacity – separating tip resistance and shaft friction components within the same test – were used in the subsequent project development process to optimise the deep foundation

EXCAVATORS WITH PILE DRIVERS
for the deep foundation using ductile driven piles

PROJECT INFORMATION

Client:
BUWOG Group GmbH
Contractor:
Strabag AG
Geotechnical Consultant:
GB-ZT GmbH
Structural Engineering:
Retter & Partner ZT GmbH
Scope of Works:
Deep foundation with ductile driven piles, Pit support with SIKUL piles
Timeline:
2024 – 2025

solution. This involved both the static design in terms of pile load utilisation and adjusted pile spacing, in collaboration with the structural engineering firm Retter & Partner ZT GmbH, and economic optimisation concerning construction time and costs.

Environmental impacts on local residents and nearby infrastructure were evaluated in advance through monitoring measures conducted during the test field phase, including noise level and vibration measurements.

In summary, the test field in 2023 successfully demonstrated the suitability of ductile driven piles as a deep foundation for the Residential Quarter viéno project and yielded valuable insights. By opting for load-adapted driven piles instead of the originally planned bored pile foundation, the residential development benefited from a cost-effective solution and additional advantages such as reduced concrete and steel consumption (including a lower CO_2 footprint), elimination of surplus excavation material requiring disposal (lower costs and less construction-related traffic), a flexible execution system using small-scale equipment (related to specialist foundation scales), and the ability to continue construction works directly without further reworking (beneficial for construction timelines).

Moreover, this system allows the deep foundation to be adapted on-site to local ground conditions, which is particularly advantageous given the site's previous development and usage. The majority of the piling work (ten out of eleven buildings) was successfully completed between November 2024 and the end of May 2025, with two production units operating at times. The foundation for the final building was carried out in late autumn 2025 due to construction scheduling. In total, approximately 1,950 ductile piles were constructed for the entire project. In addition to the load-adapted deep foundation, Keller's special

CONSTRUCTION OF THE PIT SUPPORT
using SIKUL piles

product 'SIKUL pile' was used for excavation support, with CFA piles installed in the southern corner of the site to secure the existing wall.

The Residential Quarter viéno project exemplifies successful collaboration among all project stakeholders – particularly the geotechnical consultant, main contractor, structural engineer, and specialist foundation company – resulting in an optimal and bespoke solution for the investor.

HPS LOAD TESTS IN 2023

End of Tourist Season – **Peak Season for Us**

SITE SETUP AT HOTEL FLIANA, ISCHGL

As in previous years, the day following the end of the tourist season marked the starting point for special foundation works at several hotels in Tyrol. Leading the way were Hotel Fliana in Ischgl and Alphotel Tyrol in Ratschings. These two projects highlight the typical challenges of hotel expansions in alpine regions.

Devid Wolfsgruber – Keller Grundbau, Innsbruck
Matthäus Plaikner – Keller Fondazioni, Brixen

Tight schedules, challenging geology, and at times difficult spatial constraints characterise many hotel expansion projects in the Tyrolean Alps, where building land is scarce and valuable. Unexpected issues with existing structures are a constant companion, particularly as long-established establishments have often undergone multiple extensions and renovations.

A prime example is Hotel Fliana in Ischgl. Several months in advance, the complex construction project was conceptualised and planned with all stakeholders. The aim was to construct an additional basement level beneath the existing one. After discussing all possible approaches, the Soilcrete method was ultimately chosen to take the loads of the partially nine-storey hotel and transfer them downwards beneath the new basement. To achieve this, walls and columns in the existing basement, with a restricted ceiling height of approximately 2.5 metres, were temporarily underpinned. On the mountain-facing side, an excavation support system using the jet grouting method had been installed around 25 years ago for the original hotel structure, which now had to be underpinned to allow excavation of the new basement. Foundation columns were constructed to bear the temporary loads during construction. The extremely tight construction schedule, spanning from May to November, combined with the region's notoriously difficult geological conditions, posed a challenge for the entire team. Each column had to be pre-drilled due to relatively hard and large boulders or even erratics. To maintain the strict timeline, two jet grouting units operated in parallel, working in day and night shifts over several weeks. Despite surprises related to all these challenges, increased wear due to soil conditions, and equipment failures, the Soilcrete works were completed on schedule, allowing excavation to begin as planned by our client.

At Alphotel Tyrol in Ratschings, several hurdles also had to be overcome to realise the extension of the existing structure and the construction of a new swimming pool. A particularly creative solution was needed to access some drilling points, as the available width in the existing structure was just a few centimetres – too narrow even for our smallest drilling rig. We therefore developed a concept in advance to drill the boreholes from the roof, after core drilling through the intermediate floors. Following a structural assessment of the ceiling and clarification regarding the crane's outreach, a light and flexible drilling rig was used to execute the works from the roof. Simultaneously,

KB0-5 ON THE ROOF OF ALPHOTEL TYROL, RATSCHINGS

a second rig was positioned in the basement, which completed the remaining points under restricted ceiling height. Similar to the Ischgl case, the presence of boulders repeatedly caused troubles, which were occasionally overcome by switching to an alternative hammer drilling system. Additionally, the structural engineer specified supplementary columns in a previously unconsidered part of the building, which became necessary due to last-minute changes. We were able to adapt our work sequence to carry out this necessary additional work while still adhering to the original schedule.

EVERYTHING IS POSSIBLE AT ALPHOTEL TYROL:
Cleverly executed despite limited space

PROJECT INFORMATION

Client:
Hotel Fliana Ischgl

Contractor:
HTB Baugesellschaft m.b.H.

Geotechnical Consultant:
Geotechnik Henzinger & Partner ZT GmbH

Structural Engineering:
Aste Weissteiner ZT GmbH

Scope of Works:
approx. 3,450m Soilcrete columns

Timeline:
May – June 2025

Client & Contractor:
Alphotel Tyrol GmbH

Geotechnical Consultant:
Geo3 – Bürogemeinschaft für angewandte Geologie

Structural Engineering:
Ing. Gianluca Cordani

Scope of Works:
approx. 560m Soilcrete columns

Timeline:
May 2025

Horn-Arrivée – **Sustainability During Special Foundation Works and Consistent Reduction of CO_2 Emissions**

In Horn on Lake Constance, a former industrial site is being transformed into a residential quarter. The heterogeneous ground conditions demand innovative construction methods and a high degree of flexibility. Alongside a solid foundation, environmental awareness is a key focus: using the vibro stone column method – a resource-efficient technique employing natural raw materials – the project's carbon footprint is being sustainably reduced. A flagship example of climate-conscious special foundation works.

Timo Ackermann – Keller-MTS, Regensdorf

Following the demolition of the old industrial facilities, the soil underwent extensive remediation over recent years. For the planned residential buildings, solutions were needed that would provide stability even on challenging ground while remaining environmentally friendly. Traditional methods involving bored concrete piles would have required significant material and energy, resulting in high CO_2 emissions and costs.

Instead, a proven ground improvement method – the vibro stone column technique – was chosen. This approach replaces bored pile works with compacted gravel or crushed stone columns that stiffen the soil and generate significantly lower CO_2 emissions. The greatest advantage: only natural, locally sourced materials are used, and the use of steel and concrete is kept to a minimum.

Across an area of over 18,000 square metres, nine residential buildings with four to five storeys are being constructed. Particularly noteworthy: more than 86,000 metres of vibro stone columns were constructed in just eight months using two vibro rigs. This is one of the largest projects of its kind in Switzerland.

The construction took place under challenging ground conditions. The soil consists of sandy deposits and clay-rich lake sediments, complicated by previous and ongoing construction and remediation activities.

Keller focused on one important question: how can special foundation be carried out in the most climate-friendly way?

Several innovative approaches were adopted:

- **Locally available materials:** The gravel for the columns was sourced from the region, reducing transport distances and emissions.
- **Alternative fuels:** Instead of conventional diesel, over 90% of the site's fuel was HVO100 (Hydrotreated Vegetable Oil). This biofuel can reduce CO_2 emissions by up to 85%.
- **Efficient machinery:** Modern, low-consumption equipment

A STRONG TEAM WITH GREAT PERSEVERANCE

PROJECT INFORMATION

Client & Contractor:
Mettler Entwickler AG

Geoechnical Consultant:
Andres Geotechnik, St. Gallen

Structural Engineering:
Wälli AG, St. Gallen // Keller-MTS AG, Regensdorf

Scope of Works:
86,000m vibro stone columns

Timeline:
November 2024 – August 2025

was carefully selected and continuously monitored during operation. An electric compressor was also tested, delivering further savings.

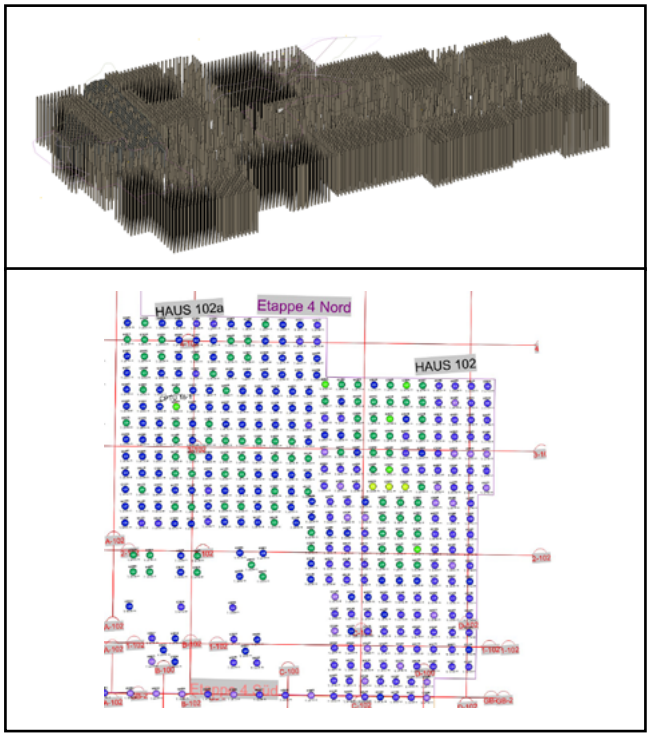
The numbers speak for themselves

While conventional diesel use would have generated around 760 tCO_2e, the use of HVO100 and other optimisations reduced emissions to approximately 490 tCO_2e – a saving of 36%. The switch to alternative fuels and reduced transport had the greatest impact.

The Arrivée project in Horn demonstrates how modern construction can be carried out with respect for the environment and climate protection. The key is to consider sustainability from the beginning, evaluate technical alternatives, and base decisions on solid data. Experience from this project highlights that innovative approaches are not only ecologically beneficial but also economically viable. Although HVO100 costs around 20% more than fossil diesel, this deficit was largely offset through intensive fuel monitoring and targeted equipment replacement.

The deliberate use of natural building materials, alternative power sources, and digital monitoring makes a real difference and sets a benchmark for future construction projects – so that sustainable construction becomes the new normal, even in special foundation works.

GRAPHIC
KSDM Support



WORKING ALONG THE VERTICAL EXCAVATION PIT EDGE

'Paulay 33' and 'Louis the Great' Projects – **How Keller Digs Deeper in Budapest**

Urban construction in Budapest frequently necessitates innovative geotechnical solutions to address confined spaces, heritage constraints, and complex soil conditions. This article presents two recent case studies: a jet-grouted retaining wall beneath a historic courtyard and a multi-technique foundation system on a restricted corner plot. Both projects underscore the adaptability and precision essential for safe subterranean works in densely built environments.

Gábor Gajó – Keller Mélyépítő, Budapest

Urban development in Budapest often demands more than conventional construction practices. Confined sites, heritage buildings, and dense city infrastructure require highly specialised geotechnical solutions that stretch both technological and engineering expertise to their limits. Two recent projects, undertaken by our team in the heart of the Hungarian capital, demonstrate how modern foundation methods such as jet grouting, CFA piling, and shotcrete systems can be successfully applied in extremely constrained conditions. Each project presented its own unique set of challenges, yet both highlight the adaptability and resilience required to deliver complex underground works in a European metropolis.

Paulay 33 Project

In one of Budapest's oldest districts, our engineers were tasked with creating a watertight retaining system beneath a heritage-listed brick building. The scope involved constructing an enormous jet-grouted retaining wall, reinforced with anchors and designed to withstand excavation to a depth of more than eight metres.

The project site itself was highly restrictive: a 35 x 25-metre inner courtyard accessed only through a single three-metre-wide passage. Every delivery, machine, and material had to pass through this bottleneck, requiring meticulous coordination. Even the slurry pit for jet grouting had to be downsized due to soil handling and logistics.

Within this limited space, the team constructed 850 jet grouting columns, ranging in depth from four to 13.5 metres, and more than 75 anchors in two rows. Work commenced in 2023, but repeated site withdrawals, interruptions, and constant adjustments extended the timeline until early 2025.

PAULAY 33 COURTYARD

BELOW THE CITY OF BUDAPEST

PROJECT INFORMATION PAULAY 33

Client & Contractor:
Triholding Kft

Geotechnical consultant:
Józsa István

Design:
István Józsa, Keller

Scope of Works:
850 Jet grouting columns
75 anchors

Execution Timeline:
2023–2025

After completing the jet columns and anchors, excavation proceeded step by step. Sections were manually chiselled, then milled to a smooth finish so that the subsequent waterproofing could be installed seamlessly. Anchors were tensioned progressively as the excavation deepened. At around six metres, however, unexpected groundwater inflows appeared through the jet-grouted wall, threatening stability. With the natural groundwater table at -3.6 metres – over two metres above the excavation level – remedial measures became urgent. A subcontractor injected a two-component, swelling resin to seal the leakages, allowing excavation to continue safely.

Ultimately, the design depth was reached and handed over for superstructure works. Despite delays and challenges, the project significantly advanced the team's knowledge of jet grouting in urban heritage settings, proving the technology's flexibility when executed under exacting constraints.

Louis the Great Project

Not far from the heritage courtyard, another project demonstrated how multiple geotechnical systems can be effectively combined on a confined corner plot. Here, the objective was to build a temporary earth-retaining system for an underground parking garage, with the added complexity of protecting adjacent masonry buildings from settlement.

The solution integrated four techniques: CFA piling, jet grouting, soil anchoring, and shotcrete slope stabilisation. Reinforced CFA piles were first installed along the street frontage to support the pavement. Jet grouting followed, executed in successive stages directly beneath neighbouring foundations. Given the age and sensitivity of the neighbouring masonry, every injection was carefully monitored from the basements to prevent leakage through brick joints.

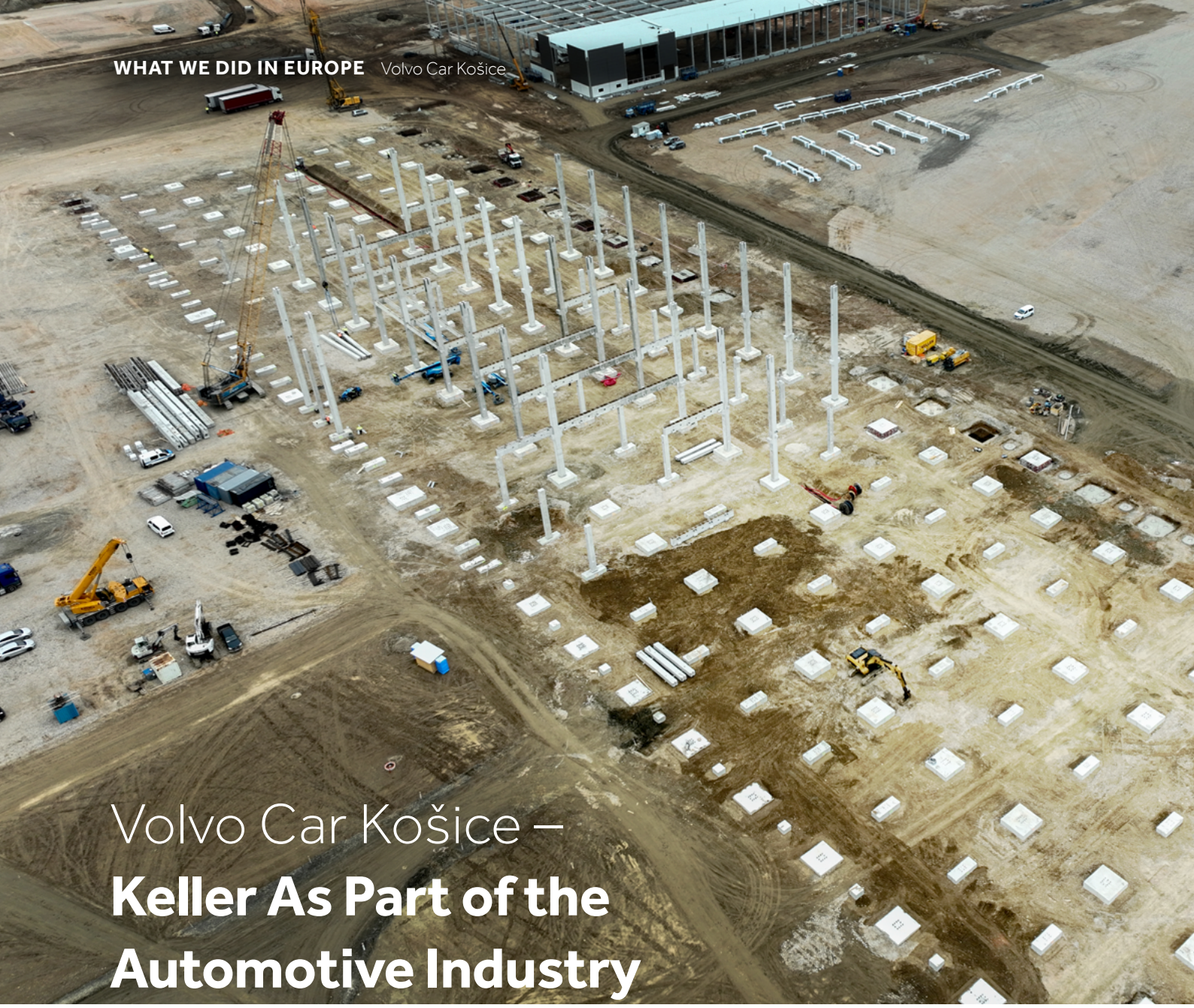
Once the perimeter stability was secured, excavation advanced to a depth of six metres. The retaining CFA piles were trimmed back, and a reinforced concrete capping beam was cast and anchored beneath the road to stiffen the wall. Excavation proceeded in stages, with shotcrete and steel mesh applied between piles after each stage to stabilise exposed soil. On the side where we had more space, a shotcrete retaining system with soil anchors was installed instead of piles, optimising space and efficiency.

Despite the site's modest size of just 800 square metres, four distinct geotechnical methods had to be carried out in close sequence. The absence of a permanent access ramp posed major logistical challenges: the only temporary entrance had to be shared by all subcontractors and relocated multiple times during the works. Careful scheduling and constant coordination were therefore critical. Nevertheless, the project was completed on schedule and to specification, proving the viability of integrating multiple foundation systems within a highly compact urban site.

Lessons Learnt from Budapest's Projects

Both projects underline the central challenge of urban geotechnics: delivering technical solutions within the narrow margins imposed by heritage protection, limited access, and dense city fabric. While one project required an extreme amount of jet grouting, the other showcased the synergy of combining piling, jet grouting, anchoring, and shotcrete on a restricted corner plot.

Each project required not only precise design and execution but also the ability to respond rapidly to unexpected conditions – from water inflows to logistical bottlenecks



Volvo Car Košice – **Keller As Part of the Automotive Industry**

The construction site is located in the Košice district, approximately 12 km south of the city of Košice and west of the village of Valaliky. For the automotive company Volvo, it was necessary to establish several halls over an area of approximately 300,000m². Due to the geological conditions, deep foundation using large-diameter piles was chosen. Upon completion, the individual halls will be used for the production of Volvo cars.

Erik Valašik – Keller špeciálne zakladanie, Bratislava

During the first phase of construction, the buildings for the following production processes were designed: Mega Casting & Machining, Blanking & Stamping, Body in White (Body shop), Paint shop (including buffer zones before and after painted bodies), Final Assembly, Battery Cell to Pack, Electric Axle Pre-Assembly.

The load-bearing structures of the individual buildings were designed using prefabricated reinforced concrete components placed on monolithic reinforced concrete foundations. Due to the loads that needed to be transferred and the geological conditions, the foundations of the buildings required deep foundation using large-diameter piles. Additionally, due to geological variability, CFA (Continuous Flight Auger) piles were selected.

Execution of Works:

The individual construction sequences were designed with foundation footings and deep foundations, which, considering the geological composition of the soil, transfer the loads from the proposed structures into load-bearing ground.

total length of piles installed was 11,707m. After the piles were completed, 332 rectangular monolithic reinforced concrete footings were constructed. The connection between footings and columns was achieved using PEIKKO anchors. The installation of these anchors had to be extremely precise to allow subsequent structural elements to be positioned correctly. The positional accuracy of individual anchors ranged from 3 to 5mm depending on the anchor type.

Subsequently, special foundation works were carried out on the **Mega-Casting** unit. In this phase, foundations were laid not only for the building's skeleton but also for the technology base – press and crane tracks.

A total of 229 piles were installed for this unit, with lengths ranging from three to 19 metres. The total length of piles installed was 2,871m. After pile installation, 67 rectangular monolithic reinforced concrete footings were constructed.

After completing works on the previous units, we continued with the **Propulsion Shop** and **Final Assembly** units. For the deep foundation of these units, large-diameter CFA piles of 900 and 1100mm were installed. A total of 449 piles were executed, with a total length of 2,777m – 1,501 metres for 900mm diameter and 1,276m for 1100mm diameter. Pile lengths ranged from three to 15 metres. After pile installation, 416 monolithic reinforced concrete heads of circular and rectangular shapes were constructed. PEIKKO anchors were not used on these units; instead, sockets were applied.

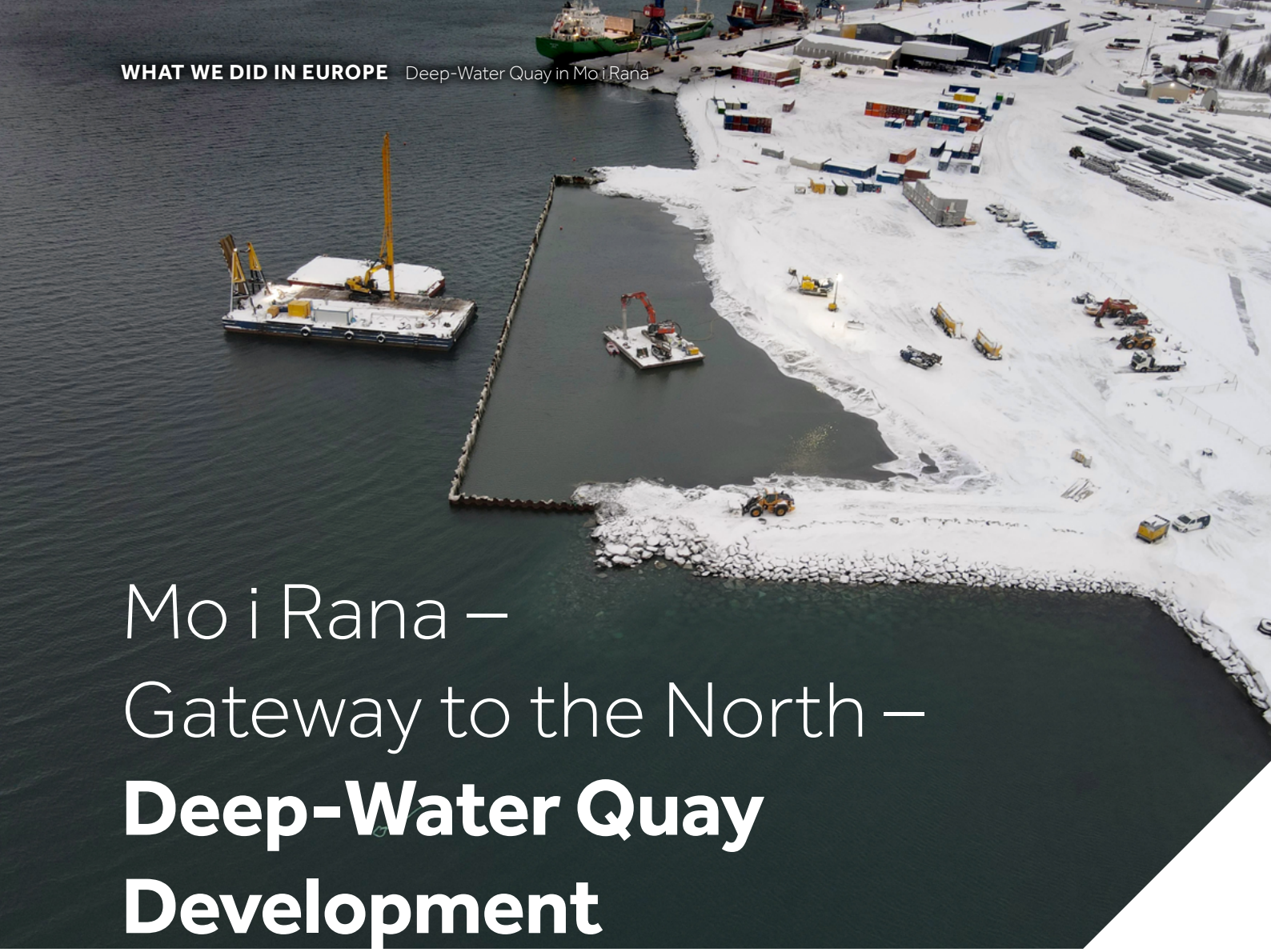
For the entire Volvo Cars Košice project, we executed 17,355 metres of large-diameter CFA piles. The total number of piles installed was 1,550 and 815 reinforced concrete footings were constructed.

The special foundation works involved the execution of large-diameter CFA piles for four construction units:

- SO 120 Mega-Casting,
- SO 150 Paint Shop,
- SO 170 Propulsion Shop,
- SO 160 Final Assembly

The first works were carried out on the **SO 150 Paint Shop**. Initially, access roads and working platforms for drilling rigs and machinery had to be created to allow continuous operations.

For the construction of this unit, the special foundation works involved foundations on large-diameter piles and reinforced concrete footings. For the deep foundation, large-diameter CFA piles of 900mm were executed. A total of 872 piles were constructed, with lengths ranging from three to 19 metres. The



Mo i Rana – Gateway to the North – **Deep-Water Quay Development**

The objective of the project is to mitigate the risk of maritime accidents, enhance the capacity of port infrastructure, and improve accessibility for vessels calling at the terminals in Mo i Rana. Keller Geoteknikk AS was commissioned to carry out sheet pile wall installation, vertical drains, mass soil mixing, and piling works for the new deep-water quay development.

Dominik Gächter – Keller Geoteknikk, Oslo

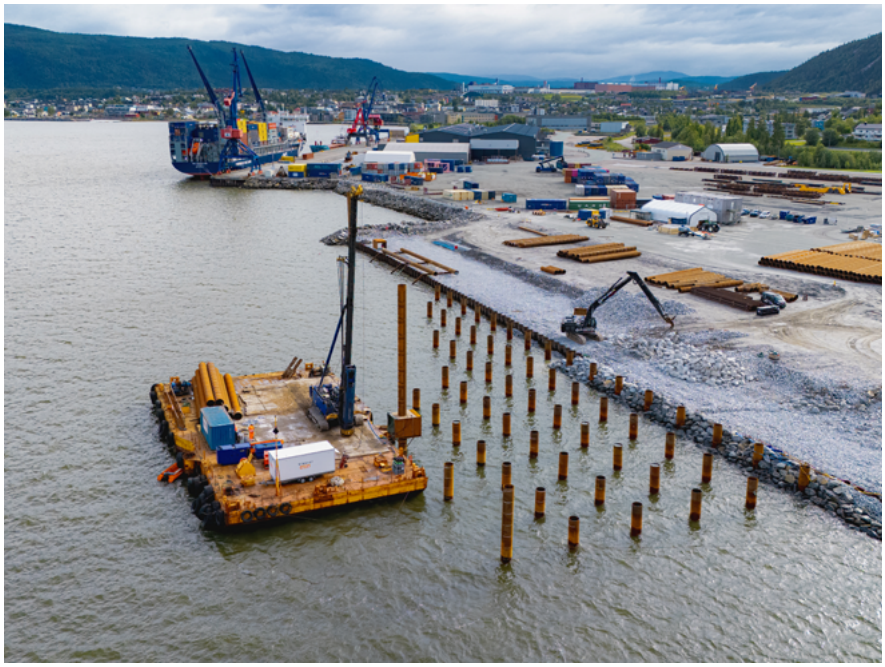
The Norwegian Coastal Administration's contribution to the project includes the installation of new navigation markers in the Ranfjorden fairway and dredging operations in front of the Toranes terminal. The aim of this initiative is to improve maritime safety and public access to the terminal.

The municipality of Rana is establishing a new publicly owned intermodal terminal with a deep-water quay at Langneset, adjacent to the Rana industrial terminal. The municipality's goal is to increase freight capacity, safeguard the competitiveness of existing industries, and support new business developments in the region.

Keller secured the contract as the sole provider in the Norwegian market capable of delivering all required geotechnical techniques in-house. Given the number of interfaces involved in constructing a new deep-water quay, Vest Betong AS deemed it advantageous to appoint a single contractor for all geotechnical works, thereby avoiding the need for additional coordination among multiple parties.

The geotechnical works were divided into several zones and techniques due to the presence of sensitive clay soils. To prevent underwater landslides during construction, several pore water pressure sensors were installed to monitor the impact of the works throughout the construction period.

Local fish breeding seasons prohibited any foundation works in the sea between February and May each year. All operations had to be conducted from floating barges, taking into account the 2.5-metre tidal variation. Our involvement in the project commenced with the installation of vertical drains in the landfill area, followed by the construction of a 20-metre-deep sheet pile wall. Completion of the sheet pile wall enabled the placement of contaminated soil dredged from the seabed in front of the Toranes terminal, located north of our project site. Using



PROJECT INFORMATION

Client:
Norwegian Coastal Administration and Mo I Rana municipality

Contractor:
Vest Betong AS

Geotechnical consultant & Design:
Norconsult AS

Scope of Works:
41,000m Vertical Drains
22,000m³ Mass Soil Mixing
4,500m² Sheet Pile Wall
7,800m Driven Steel Piles

Ausführungszeitraum:
June 2024 – November 2025

the mass soil mixing technique, the contaminated soil was stabilised to the required strength while simultaneously immobilising the pollutants. Blasted rock material was then used to fill the area to match the surrounding ground level.

Meanwhile, vertical drains were installed in front of the sheet pile wall, where driven steel tubes will form the foundation of the new deep-water quay. Due to water depths of up to 15 metres, Keller developed an underwater cutting device for the vertical drains to minimise waste generated when cutting above water level. Finally, closed-ended driven steel piles with a diameter of 914mm and a wall thickness of 16mm were driven up to 65 metres into the ground until the required bearing capacity was achieved. The works are progressing well and are scheduled for completion in 2025, enabling Vest Betong to begin placing the prefabricated concrete elements atop our piles.

We would like to extend our thanks to all parties involved for their excellent cooperation.

This project serves as a prime example of our ability to play a pivotal role in the development and execution of complex projects requiring multiple geotechnical technologies.

Strategic Flagship Project in Brno: **Construction of the MSKP Brno Multipurpose Arena**

The new multipurpose arena in Brno, with a capacity of 13,000 visitors, represents a major strategic undertaking. The investors include the Statutory City of Brno and the joint-stock companies ARENA BRNO, a.s., Brněnské komunikace a.s., and Teplárny Brno, a.s.

Jan Štefaňák – KELLER – speciální zakládání, Brno

The arena measures 151 x 108 metres at ground level and reaches a height of approximately 29.5 metres. The built-up area covers 16,470 m², with a total enclosed volume of 475,000 m³. The excavation pit is generally 8.50 metres deep, with local depressions reaching up to twelve metres. With dimensions of 210 x 110 metres, the perimeter is approximately 600 metres.

KELLER – speciální zakládání was responsible for the design and execution of the temporary excavation support and also carried out the foundation works using bored piles in accordance with an external design.

The geological profile begins with 1.5 to 2 metres of heterogeneous fill. Beneath this lies a roughly 3.5-metre-thick layer of liquefied Quaternary gravel terrace, locally interspersed with coarse sand. Below this are over-consolidated Neogene clays with a firm to predominantly firm consistency, containing occasional lenses of Neogene sand. The groundwater level is located 2.8 metres below the surface.

Prior to the design phase, the available information on soil conditions was supplemented by CPT tests and laboratory investigations commissioned by the client and carried out according to Keller's design.

At the client's request, the temporary excavation support was designed as a top-down system, serving as a single-sided lost formwork. The exposed wall surfaces were finished with sprayed concrete, with the front face offset by five centimetres from the new structure.

To prevent groundwater ingress into the excavation, a technically watertight pile wall was designed. This consisted of a diaphragm wall made from Deep Soil Mixing (DSM) elements arranged in two rows. The base of the diaphragm wall was designed to penetrate at least one metre into the Neogene clay layer. The ground surface beneath the wall base was reinforced with a minimum of 15cm of shotcrete.

The bored piles for the support structure had a diameter of 880mm and were spaced at intervals of 1.9 to 2.2 metres. In a typical cross-section with an excavation depth of 8.50 metres, the embedment depth of the piles below the excavation base was three metres. Anchors at the first level were drilled through the diaphragm wall, while those at the second level were installed via core drilling into the bored piles.

The construction method involved producing the diaphragm wall using the RG18 rig with triple paddles, followed by installation of the bored piles using BG36 and BG33 rigs. The foundation piles were constructed from the working platform used for installing the first-level anchors. The deepest borehole for a pile with a diameter of 1,500mm and a length of 26 metres reached a depth of 36 metres.

In parallel with the excavation works, the surfaces were cyclically smoothed and shotcrete was applied up to the final excavation level. Three large drilling rigs (BG33, BG36 and SR75) and two smaller rigs (Klemm KR806 and KR801) were deployed simultaneously. At peak times, up to 26 Keller employees were present on site. Including subcontractors, up to 35 personnel were working concurrently.

The implemented support solution was cost-effective, environmentally friendly and sustainable. By replacing the originally planned Soilcrete sealing with Deep Soil Mixing, the construction process was simplified and the disposal of suspension was avoided. All works were completed within the agreed timeframe. With this successfully completed project, Keller has once again confirmed its reputation as a leading special foundation contractor on the Czech market.

PROJECT INFORMATION

Client:
Statutarstadt Brno, ARENA BRNO, a.s., Brněnské komunikace a.s. a Teplárny Brno, a.s.

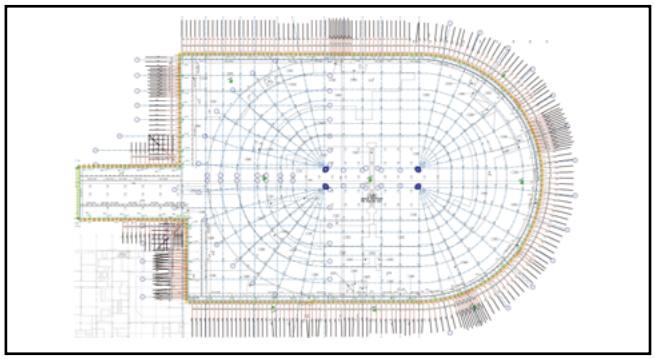
Contractor:
HOCHTIEF CZ a.s.

Design:
KELLER – speciální zakládání s.r.o.

Scope of Works:
Excavation support: **3.2km** of bored piles, anchored with **4.8km** of temporary anchors
900 lamellas (Ø-length 5.30m)
4,100m² shotcrete
Foundation: **8.1km** of bored piles (Ø 880–1500mm)

Execution period:
October 2023 – March 2024

GRAPHIC:
MSKP Brno Design



Project Condémines – **Excavation Pit with Strutting System in the Heart of the City**

A rarely used excavation support method in Switzerland was used at the Condémines construction site in Sion: excavation support using hydraulic activated struts. This solution was necessary as it was not allowed to install anchors beneath adjacent plots, together with the constraints of a confined urban location.

Clément Boehler – Keller-MTS, Vétroz

PROJECT INFORMATION

Client & Contractor:
Bativa SA

Geotechnical consultant:
SD Ingénierierie

Design:
Keller-MTS SA

Scope of Works:
510m vertical drillings Ø323mm
520m² shotcrete
40 tons of wailing beams & struts

Ausführungszeitraum:
April–July 2025

ARIAL VIEW OF THE EXCAVATION SUPPORT

Situated at the edge of the property, the excavation walls cover an area of 520m², with depths ranging from six to 7.5 metres. The soil comprises silty gravel, with no groundwater present. The excavation concept proposed by the engineer was optimised by our in-house design department . The Berlin wall is supported by HEM 180 and HEB 200 profiles, with a maximum length of 12 metres. Vertical drilling was carried out using a down-the-hole hammer with Ø323mm casing, executed by our Casagrande C7 XP single-head drilling rig.

The strutting system, hired from Groundforce, includes a primary level of hydraulic struts and corner bracing in the elevator shaft's deeper section. The components were dimensioned not to exceed 2.3 tonnes in weight, in accordance with the crane's lifting capacity for removal following the pouring of the basement's first slab. Earthworks and shotcrete operations were conducted under tight spatial constraints due to the struts, which limited manoeuvrability and required ongoing coordination.

Thanks to accurate planning and live surveying on site, the strut layout was adapted to suit the actual installation of the vertical profiles. The project was completed within the planned timeframe, and the system proved to be particularly flexible and quick to install. Up to now, no deformation has been observed following the installation of the strutting system.

SPAR Ljubljana – **Advanced Jet Grouting Ground Improvement Solution for the Foundation of a Logistics Centre**

The SPAR Slovenija d.o.o. distribution centre in Ljubljana has recently undergone a major expansion, resulting in one of the most modern and technically advanced logistics facilities in the country. The new building, situated along Letališka cesta, dimension of appr. 90m x 75m.

Davorin Lesnik – Keller Grundbau, Söding

PROJECT INFORMATION

Client:
Spar Slovenija d.o.o.

Contractor:
CGP d.d. Novo Mesto

Geotechnical consultant:
SLP Ljubljana d.o.o.

Review:
University of Ljubljana, Faculty of Civil and Geodetic Engineering

Scope of Works:
1,400 linear metres of jet grouting columns 130cm

Ausführungszeitraum:
June–August 2025

REAL-TIME
column geometry verification using Keller's Acoustic Column Inspector (ACI) system

Although ground conditions in the area generally permit shallow foundations, geotechnical investigations identified significant clay interlayers within the gravelly and sandy soil as well as conglomerate layers. These clay zones cause a risk of differential settlements beneath the planned structure. To mitigate this, Keller, in collaboration with SLP Ljubljana d.o.o., implemented an advanced ground improvement solution using large-diameter jet grouting (Soilcrete) columns, combined with a load distribution layer between the underside of the base slab and the top of the jet grouting columns to minimise adverse seismic effects.

The design required 386 jet grouting columns, each 1.3 metres in diameter and an average depth of 10.6 metres, about 4,100 metres columns in total. The aim was to stabilise and homogenise the foundation soil, ensuring uniform load-bearing conditions beneath the base slab, which was subject to uneven loads from the new logistics facility.

Keller used its Duplex two-phase jet grouting system, developed through in-house expertise, to form strong, impermeable columns even in challenging soils. This system ensured high execution precision and consistent quality control.

Quality control was reinforced through Keller's advanced electronic monitoring system, which recorded all execution parameters in real time. Additionally, three Acoustic Column Inspector (ACI) tests were conducted to verify column geometry and continuity. The ACI system, developed in-house and widely used internationally, confirmed parameters such as lifting speed, rotation rate, and water-cement ratio, providing full quality assurance and transparency.

In highly porous zones where the use of pure cement grout was intended to be problematic because of washout effects, we provided a solution adding sodium silicate via a specially developed in-house procedure to accelerate hardening and maintain column integrity.

Time efficiency was critical for SPAR's logistics expansion. Our optimised methods enabled design and third party review within one month, and execution carried out from mid-June to early August 2025. The Duplex system ensured rapid, high-quality installation of large-diameter columns, keeping the project on schedule.

The collaboration with the University of Ljubljana provided additional expertise and validated the implemented solution.

Wind Farm Green Breeze – **Foundation Piles for 16 Wind Turbines with a Total Capacity of 100 MW Located in Galați**

The global shift towards renewable energy has become a strategic priority in tackling climate change and reducing reliance on fossil fuels. Romania possesses strong wind potential due to its favourable geographical location, positioning it as a key player in the development of wind energy in Eastern Europe. For Wind Farm Green Breeze, the transfer of both vertical and lateral loads from the tower to the bearing soil necessitated deep foundations, executed using three distinct piling techniques.

Corina Dorofte – Keller Geotehnica, Bucharest

CJR Renewables is constructing a wind farm in the eastern region of the country, with an installed capacity of 100 MW.

The wind farm comprises 16 wind turbines, each rated at 6.2 MW and exceeding 200 metres in height. This considerable height generates substantial forces due to strong winds, which must be safely transferred to the ground. Additionally, the soil conditions are challenging, characterised by weak soils that are highly sensitive to moisture.

The foundation system design consists of a raft foundation with variable thickness, supported by 24 reinforced concrete piles with a diameter of 800mm and lengths ranging from 20 to 30 metres. The execution technology requires the use of polymeric fluid support. The foundations are consistent across all locations, with the only variation being the length of the piles.

The site falls within the major geotechnical risk category. The soil comprises medium sands interspersed with clay layers, overlaid by loess-like deposits. Groundwater was not encountered during geotechnical investigations for any of the wind turbines.

These soil conditions – loess without groundwater – led us to propose different piling techniques:

1. **Kelly drilling in dry conditions** was used where pile lengths exceeded 23 metres. To ensure vertical drilling, partial casing was installed for the first five metres.

2. For turbines requiring piles shorter than 23 metres, we opted for the **CFA (Continuous Flight Auger) system**.

3. Where soil strata included sand layers, the solution adopted was **Kelly piles with casing along the full length**.

A distinctive feature of the project was that all piles were designed to be injected with grout, applied at the base and along the lateral surface: 200m³ of grout at 50 bar was injected using pipes and valves placed along the reinforcement cage. This value engineering approach resulted in a 10–20% increase in bearing capacity.

Keller Romania's decision to employ three different technologies on this project was pivotal in securing the contract, as it significantly reduced both execution time and overall costs.

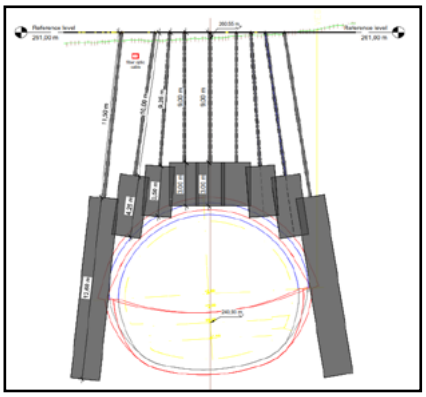
CONSTRUCTION OF CFA PILES
with the BG36

Branzoll Tunnel – **A Project for Traffic Calming and Enhanced Quality of Life**

By relocating the heavily trafficked SS12 state road underground, safe cycle paths and pedestrian walkways can be created in the village of Branzoll. Keller Fondazioni carried out ground stabilisation for the tunnel excavation using the Soilcrete method.

Stefan Nitz / Matthäus Plaikner – Keller Fondazioni, Brixen

GRAPHIC:
Support arch constructed using the Soilcrete method, designed via 3D modelling in Revit



The client for this complex construction project is the Autonomous Province of Bolzano – Department of Civil Engineering. The plan involves constructing a 702-metre-long tunnel (640 metres mined and 60 metres cut-and-cover), co-financed by the Development and Cohesion Fund. The new tunnel alignment runs largely directly beneath the existing state road, which is flanked almost entirely by residential and commercial buildings. The cover between the ground surface and the tunnel crown varies between two and thirteen metres.

The phenomenon of 'volume loss' posed a particular geotechnical challenge for the Branzoll Tunnel, due to the shallow cover over the excavation profile and the prevailing geology, which tends to promote surface settlement. Therefore, it was essential to prevent surface subsidence during tunnelling to avoid critical deformation of adjacent existing buildings.

To meet this requirement, Keller Fondazioni – Brixen office – was commissioned by the main contractor Strabag to carry out ground stabilisation using the Soilcrete method. The client designed the necessary static cross-section to be covered by the Soilcrete works. The layout and lengths of the individual columns were then planned in coordination with the designers using Revit software in 3D. This 3D model formed the basis for executing the columns with a diameter of 200cm. The installation parameters were verified in advance using an ACI range test (Acoustic Column Inspector).

During construction, new sections were added based on simultaneously executed settlement measurements, resulting in a total of eight construction lots with 1,037 Soilcrete columns and a total length of approximately 6,200 linear metres. Depending on the proximity and nature of adjacent buildings, the Soilcrete rows were either spaced apart or constructed tangentially. The construction supervision team – comprising EUT Engineering S.r.l., Valdemarin S.r.l., Bergmeister S.r.l., Pfeifer Partners S.r.l., and Plan Team S.r.l. – oversaw the process.

A major challenge in the project was the limited space, due to the required use of the large drilling rig KB6-3 and the stipulation that the road remain open to single-lane traffic. At particularly very constrained locations, night shifts were necessary, as full road closures were only permitted during night hours. Thanks to this flexible and adaptive approach, Keller was able to complete the project successfully within the specified timeframe.

Hustopeče Remediation – **Keller As Part of the Rescue Team**

On 28 February 2025, one of the largest tragedies happened in Czechia: a freight train carrying seventeen tankers of toxic benzene derailed near the Hustopeče nad Bečvou railway station. After derailing and overturning, the tankers caught fire and approximately 250 tons of benzene leaked into the air, the surrounding soil, and the water in a nearby pond. The chemical spill thus threatened the health of the population, the ecosystem, and water resources. The Czech Ministry of the Environment described the incident as the largest accident of its kind in the world. Clean-up work at the site was carried out only by specialised companies in cooperation with the Integrated Rescue System (firefighters) and the Czech Environmental Inspectorate.

Petr Svoboda – KELLER-speciální zakládání, Brno

But how does Keller fit into this picture?

The government launched a clean-up operation with specialised companies asked to help. One of those was KELLER-speciální zakládání, tasked with building an underground sealing wall to prevent contaminated groundwater from flowing further away from the accident site. First, on 10 March 2025, a test field was carried out to determine the feasibility of a wall made of Larsen VL 604 and 603 sheet piles.

The initial design was a sealing wall 180m long, serving only as an underground barrier against the direct flow of contaminated groundwater into a nearby pond. But as we progressed and the effectiveness of the dam became apparent, we extended the length significantly. The final version was a closed wall crossing the railway line twice at a length of 694.8m, for which 1,158 sheet piles with a width of 600mm were used.

The eight metres long sheet piles were installed from the surface of the existing terrain, connected into locks, through quaternary fluvial layers of clay and gravel, embedded in Neogene clay soil. Groundwater occurs in a layer of gravel approximately three metres below the surface. Because the wall is anchored into the underlying clay, it is technically impermeable.

An ICE RF20 vibro hammer on a Sennebogen 673E crawler crane was used to drive the sheet piles. In areas with low clearance, i.e. under high-voltage power lines or traction lines, a MOVAX SG-50V vibro hammer on a Liebherr 924 crawler crane was used. For faster wall installation, a DEMAG AC40 or DEMAG AC55 wheeled crane was used for site logistics. Between five and 11 Keller employees, including two subcontractors, operated the machinery. In accordance with the client's health and safety requirements, they all had to wear protective masks throughout the project, even on weekends while not working.

The area was initially declared a hazard zone, and then a danger zone until end of July 2025. The railway line is currently open, but the area is still closed to the public. Cleaning up the contaminated soil enclosed by a sealing wall will take

months. However, the measured benzene levels in the surrounding surface waters have been below the limit (50 µg/litre) since April.

Keller did a great job and got a lot of praise from everyone involved for being so helpful and accommodating. We have shown once again that we are a reliable, top-notch company and are proud to have responded quickly and flexibly to prevent what could have been an even greater environmental disaster.

PROJECT INFORMATION

Client & Contractor:
Railway Administration, state organisation, Regional Directorate Ostrava

Scope of Works:
1,185 Larsen VL603 and 604 sheet piles, 8.0m long

Execution period:
March – April 2025

Basin B101 – New Water Treatment Facility in Cornegliano Laudense

As part of the development of a new water treatment facility serving a gas storage site in Cornegliano Laudense (LO), located a few kilometres south of Milan in north-western Italy, Keller was commissioned to undertake a sensitive operation involving groundwater containment and excavation management for the construction of the underground basin 'B101'.

Alessandro Monteferrante / Matteo Ferraris – Keller Fondazioni, Verona

The client, Ital Gas Storage SpA, awarded after a private tender process the main contract to a joint venture between Sideridraulic Spa and Bertoli Costruzioni Spa. The facility is designed to treat wastewater generated during gas extraction operations, where water is extracted together with gas from deep underground storage wells, approximately 1,500 metres below the surface.

The most critical element of the project, the Basin B101, required a rectangular excavation pit with approx. 3,200m² (approximately 75 x 43 metres), and a maximum excavation depth of ten metres below ground level. The site is characterised by predominantly sandy soils with high permeability and a water table situated close to the surface (approximately -1.5 metres).

The original design required an excavation depth of up to 13 metres from the surface) as well as the construction of a temporary system to control hydraulic uplift. The system should consist of a 3m jet grouting sealing slab + 4m (void) +3m sandwich structure. The final structure, which included a four-metre-thick slab, then would have been able to ensure long-term stability against uplift, independent of the aforementioned consolidation measures.

Keller proposed and designed an alternative solution that significantly reduced both costs and project duration. The alternative solution suggested a single-level jet grouting sealing slab, supported by a combination of temporary and permanent uplift micropiles, integrated in the final structural concrete slab. Keller's revised approach reduced the foundation slab thickness by three metres, thereby decreasing the excavation depth. This also enabled optimisation of the lateral retaining structures, which were constructed using 60cm thick reinforced diaphragm walls, anchored at the top with a single level of temporary anchors.

Keller commenced on-site operations in May 2024, beginning with the installation of the bottom sealing slab using Soilcrete technology. The slab was three metres thick, with a maximum drilling depth of 12 metres. Following successful ACI testing, 532 Soilcrete columns with

MAXIMUM EXCAVATION DEPTH OF THE CONSTRUCTION PIT

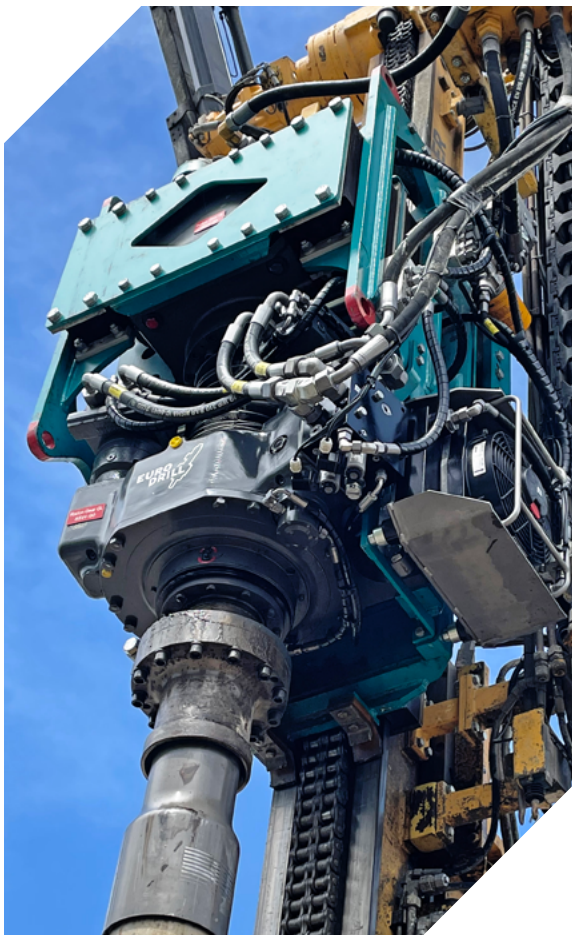
a diameter of 340cm were installed for Basin B101, utilising Keller's innovative KB-8 drilling rig.

Approximately one month after the jet grouting works began, construction of the uplift micropiles commenced. A total of 264 micropiles were installed, evenly distributed across the basin with a spacing of 320 x 320cm. Vertical anchor installation involved drilling to a total depth of 22 metres with a diameter of 190mm, using the Klemm KR806 drilling rig and RHV32 vibrating head. Drilling was performed from ground level, employing casing and sacrificial drill bits, and inserting D43mm 670/800" solid-bars measuring 14 metres in length. The micropile heads had to be set in a depth of eight metres, special execution methods had to be applied.

All works were monitored using procedures compliant with the Keller Site Data Manager (KSDM). Prior to micropile installation, tensile and pull-out tests were conducted on test anchors outside the basin, confirming the design assumptions (maximum design tensile force: 615kN – ULS).

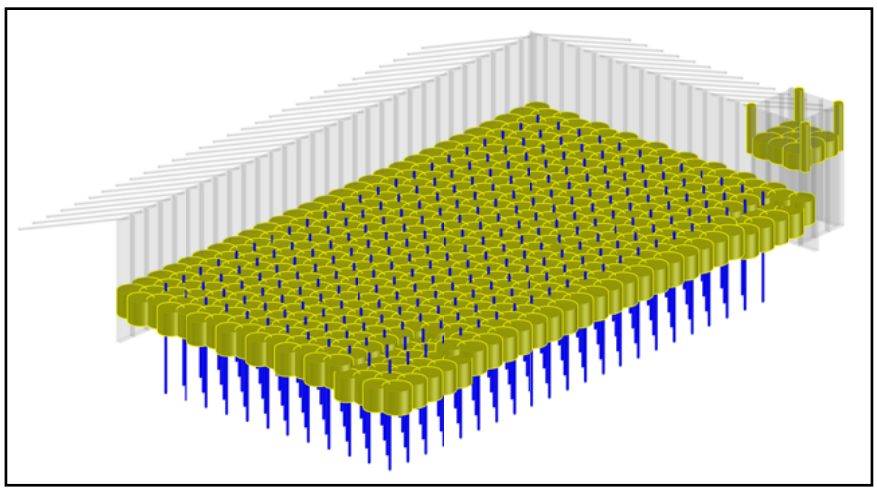
At the request of the client, 12 core drillings were carried out to verify the quality and continuity of tall measures, with fully satisfactory results. Laboratory UCS load tests were also performed, yielding compressive strength values exceeding the design reference parameter (3.5 MPa).

The works, supported by ongoing control and quality tests, were completed in early September 2024. Subsequent excavation works, finished approximately two months later, demonstrated the quality of the execution and the effectiveness of Keller's alternative solution.



VIBRATING HEAD RHV32

GRAPHIC:
3D model of the project



Keller at Conferences, Fairs and Career Days

Review of 2025 and Outlook for 2026

The year 2025 was an intensive and successful event year for Keller. Our teams were represented at numerous specialist trade fairs, conferences and career days across Europe – both as exhibitors and active speakers. Particularly noteworthy are our contributions at the EYGEC 2025 (European Young Geotechnical Engineers Conference) in Croatia, as well as at several regional and international specialist events such as the Christian Veder Colloquium in Austria, the World Tunnel Congress in Sweden, Zakládání Staveb in the Czech Republic, the 9th International Symposium for Geotechnical Safety and Risk (ISGSR), and Geoteknikkdagen in Norway.

Our involvement in European and international federations also deserves mention. For example, we were present with our own stand and ten participants at the DFI-EFFC* Conference in Bruges, Belgium.

Our colleagues showcased current projects, innovative methods, and new approaches in specialist foundation engineering.

Keller was also actively represented at job fairs and school events. In close collaboration with HR and Marketing, targeted initiatives were implemented to attract young talent, such as organising and providing informational materials for pupils and students.

*DFI: Deep Foundations Institute / EFFC: European Federation of Foundation Contractors

Outlook: Where You Can Find Us in 2026

Numerous trade fair and conference participations are already planned for 2026. Keller will be present at various local and international specialist events, including:

- Christian Veder Colloquium in Graz (Austria) tugraz.at/institute/ibg/events/christian-veder-kolloquium
- Baukongress (Austria) baukongress.at
- International Conference on Soil Mechanics and Geotechnical Engineering (Austria) icsmge2026.org
- Grundläggningsdagen (Sweden) grundlaggningsdagen.se
- Geoteknikkdagen (Norway)
- Zakládání Staveb (Czech Republic)
- And many more.

In addition, further career days at schools and universities within our Business Unit are planned, where Keller will offer exciting insights into the world of specialist foundation engineering as an employer.

Keller will therefore remain an active contributor to the European event landscape in 2026. Whether at trade fairs, conferences or career days – we look forward to engaging with partners, talents and industry colleagues. Visit us on site to learn more about our projects, innovations and career opportunities.

Meet Our Swedish Colleagues

In this edition, we're delighted to introduce two valued members of our international team: our colleagues from Sweden: Maira and Sami. Their expertise, dedication, and unique perspectives enrich our daily collaboration and play a vital role in the success of our projects. Join us as we take a closer look at their roles, experiences, and personal stories.

My name is Maira Slokenbergs Fernö and I have a Master of Science in Engineering from the Royal Institute of Technology.

What is your position at Keller Grundläggning?

For a year now, I have been the area manager for Stockholm at Keller. I come from rural Sweden, 100 km north of Stockholm. I have worked in the construction and consulting sector since 1988 with various tasks.

Why did you want to join Keller in the first place?

I am interested in geotechnical engineering and being close to production. I am also interested in supporting my colleagues and making them grow in their roles. It is also developing to work in a global company.

What was your first impression of the company?

There are many different nationalities with a lot of technical expertise. I like Keller's slogan local focus and global strength. There are a lot of opportunities in our area for many different projects in Sweden. There is great potential for future projects, which means a lot of calculations and bidding.

What have you learned about the company that has surprised you the most?

There is a lot of involvement and engagement in the projects and in the tendering, which is more than expected.

What steps do you take to ensure a positive and inclusive work environment?

It is continuous work to have good contact with my team, how the work is progressing, if they need support and that they have time for recovery. Training and development are other tasks that we discuss. This week we have had training in AB (general regulations) and AMA (regulations and technical descriptions) which are our work bibles in Sweden for contracts and technically, how work must be carried out.

What is your approach to continuous improvement and learning?

I love to develop and challenge myself. There is always something new to learn.

How do you spend your free time?

I like outdoor sports such as running, biking, hiking and cross-country skiing. My family is very important to me, my children, my husband, relatives and friends.

My name is Sami Ullah Raja, and I have been working at Keller for 18 years.

What is your position at Keller Grundläggning?

I currently hold the position of Regional Manager for Keller Grundläggning in Sweden, but started as a Site Engineer in Dubai.

What was your first impression of the company?

My first impression was how welcoming and collaborative everyone at Keller was. Even as a newcomer, I felt included and supported, which made me genuinely excited to be part of a team working on major development projects in the region.

What have you learned about the company that has surprised you the most?

What surprised me initially was the strong culture of trust and the sense of responsibility the company instils in its young engineers and managers. I was amazed by the abundance of opportunities to grow and take on new challenges. Keller invests in developing its people, which is incredibly motivating. People often ask me why I've stayed with Keller for so long compared to my peers, and my answer is always the same: This company has never made me feel the need to move elsewhere, thanks to the exciting opportunities it offers, the trust it places in its employees, and the exceptional contribution it makes to personal development. That says a lot about the company and its leadership.

How do you motivate yourself and ensure high performance?

It may sound cliché, but my motivation comes both from within and from my surroundings – focusing on how my work contributes to the bigger picture for the company, our people, and our clients. As a leader within Keller, I must ensure that our values are never compromised in pursuit of high performance. Striking the right balance is key to the long-term success of our business.

What steps do you take to ensure a positive and inclusive work environment?

Here at Keller Sweden, we are a rapidly growing business. When growth happens so quickly, it requires extra effort to maintain an inclusive environment. I make a conscious effort to actively listen and respect different perspectives, ensuring everyone feels heard. I also promote open communication and teamwork, which helps build trust. This creates a positive, inclusive space where ideas can flourish – and that's exactly what we strive for at Keller Grundläggning in Sweden.

How do you manage stress and maintain productivity under tight deadlines?

Tight deadlines are a given in our industry, and how one manages stress in such situations is what distinguishes a leader from a manager. Personally, I keep things simple by maintaining a solution-oriented mindset – focusing on what can be done rather than the pressure of the situation. By quickly identifying priorities and adapting as needed, I stay productive and ensure we meet deadlines with quality results.

How do you ensure that lessons learned from past projects are applied to future ones?

I make it a point to reflect on what went well and what could be improved at the end of each project. By documenting these lessons and sharing them with the team, we can apply them to future projects and avoid repeating mistakes. Importantly, the focus remains on future improvements rather than assigning blame within the team.

How do you spend your free time?

I enjoy travelling, hiking, and swimming. I try to fit at least one of these activities into my schedule – and ideally, combine all three when possible.

Summer Moments **in Norway and Austria**

This summer saw two special gatherings held at the largest yards in Norway and Austria. The event in Norway combined a conference with a celebration, while the Austrian get-together brought together current colleagues and former team members for a purely social occasion. Both events offered a lovely opportunity to reconnect, catch up, and enjoy each other's company in a relaxed setting under the summer sun.

Keller Geoteknikk AS Celebrates **Its First Summer Conference in Norway**

This summer marked a milestone for Keller Geoteknikk AS – our very first Summer Conference in Norway! The event brought together 70 employees at the Drammen Yard for a day of learning, recognition, and team building.

Alina Barysnikov – Keller Geoteknikk, Oslo

The morning began with a warm welcome and presentations on Keller's history, policies, HSEQ, and key projects such as Tangenvika, Moss Kransen, Mo i Rana, and Oppedal. Regional Manager Dominik Gächter shared the company's strategy and upcoming projects, emphasizing that our people are Keller's greatest strength. He also highlighted the importance of teamwork, adaptability, and pride in Keller's growing presence in the Norwegian market.

Long-serving employees with ten, 15, 20, and more years at Keller were also honoured with medals and special gifts in recognition of their dedication and contribution.

In the afternoon, the Drammen Yard transformed into a Wild West arena for

The Great Treasure Hunt, where teams solved riddles, followed maps, and raced for the treasure before enjoying a BBQ, drinks, cake, music, and dancing.

The conference not only celebrated achievements but also strengthened connections, proving that at Keller, hard work and fun go hand in hand. This first Summer Conference will be remembered as the day Keller Norway went from Hard Hats to Cowboy Hats – and as the beginning of a new tradition.

Summer Celebration 2025 in Söding – **A Celebration of Community and Recognition**

We are already looking forward to the Summer Celebration 2026 – with new stories, new faces, and the same enthusiasm for what brings us together.

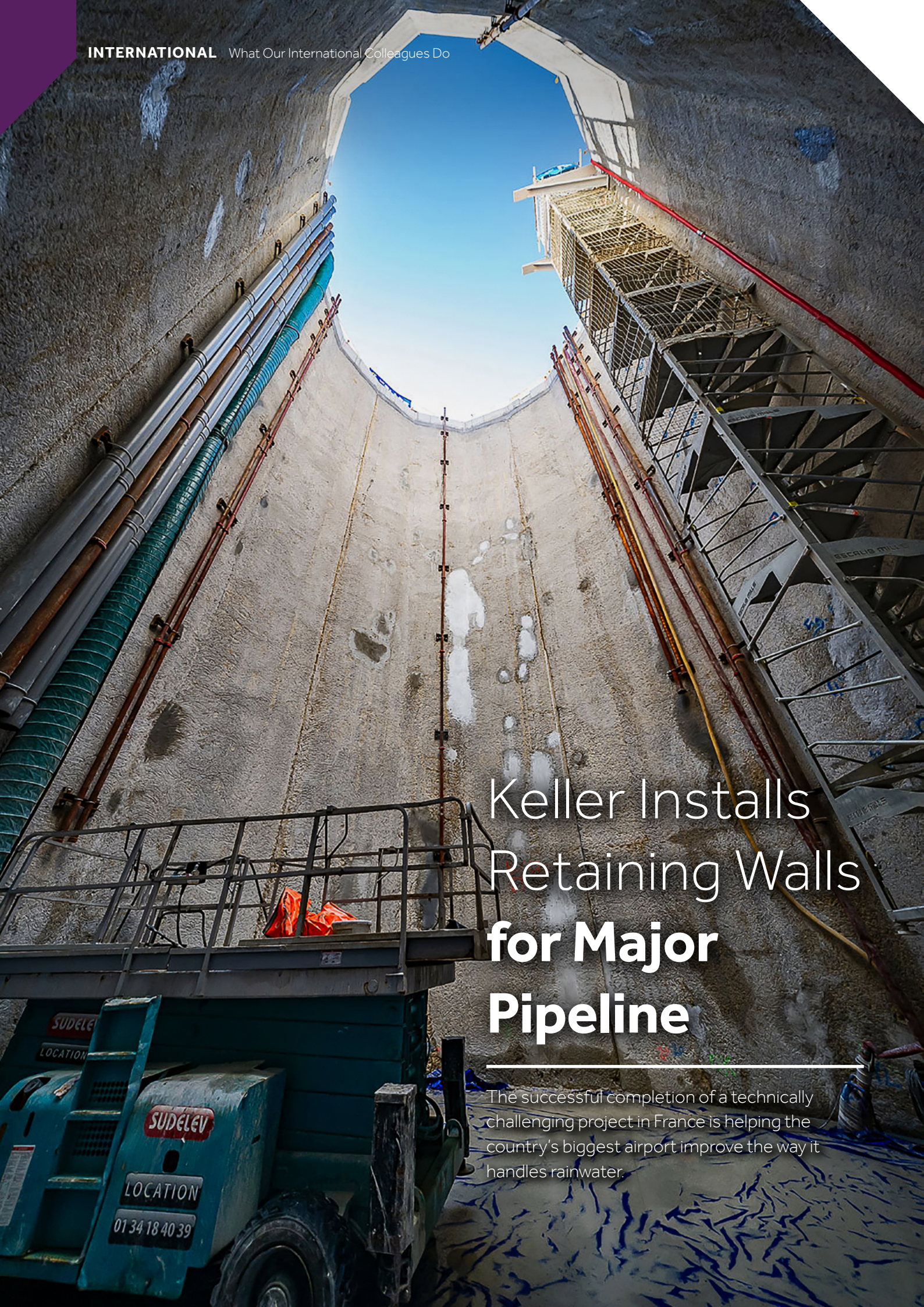
On 19 September 2025, Keller Austria hosted its traditional summer celebration at the yard in Söding.

Looking back with anticipation for the year ahead:
The Summer Celebration 2025 once again demonstrated the strong sense of unity at Keller Austria. With the introduction of the Safety Champion awards, a new chapter of appreciation was opened – a clear sign that we not only work together, but grow together.

Under late summer skies, more than 200 colleagues and former employees came together to celebrate, reconnect, and reflect on the year's achievements.

The event was a resounding success – marked by a vibrant atmosphere, warm reunions, and a varied programme. As is tradition, long-serving employees were honoured for their loyalty and dedication. This gesture of appreciation is a cornerstone of our company culture and was personally led by our Managing Director, Andreas Körbler.

A special highlight this year was the first-time recognition of our Austrian Safety Champions in this setting. As part of the Global Safety Week, six colleagues were celebrated for their outstanding commitment to safety. This recognition underscores how deeply safety is embedded in Keller's values – not merely as a requirement, but as a lived principle in our daily work.



Keller Installs Retaining Walls **for Major Pipeline**

The successful completion of a technically challenging project in France is helping the country's biggest airport improve the way it handles rainwater.

To improve drainage at Paris Charles de Gaulle international airport, the facility's operator, Groupe ADP, commissioned the installation of a pipeline to channel rainwater more than 9km to a treatment plant and then into the Marne river.

The project has been one of the largest of its kind in France, with the distance, water volumes and technical constraints making it a highly challenging one.

Critically, around three kilometres of the pipeline installation required micro tunnelling, so the client brought in Keller, with its extensive geotechnical expertise and experience, to help.

A flexible solution

Working closely with the client, Keller designed a retaining wall scheme, using both secant piles and a diaphragm wall, to support the excavation of five vertical shafts, including the main launch shaft for the tunnel boring machine (TBM).

The shaft for the TBM launch had an internal diameter of 9m and was constructed using a diaphragm wall – chosen for its ability to minimise soil displacement and limit water ingress. This wall reached depths of over 24m and had a thickness of 62cm.

The four remaining shafts, with diameters ranging from four to 5.5 metres and depths between seven and 8.5 metres, were constructed using a secant pile technique. These piles were implemented using the continuous flight auger method. Depths generally ranged from 10m to 11m with different concrete specifications depending on the role of the pile.

Overcoming challenges

Despite careful planning, the team faced several challenges during execution. As forecasted, the presence of compacted sandstone and limestone blocks at depths of 8m and 20m created resistance during excavation, requiring adjustments to drilling techniques.

Managing groundwater infiltration was another hurdle but was successfully mitigated through the precise execution of the diaphragm walls and careful monitoring of the bentonite's stability.

Throughout these challenges, Keller maintained strict quality control, ensuring the project met all standards. Only one of the wall panels experienced a slight deviation of just one per cent – completely normal given the ground conditions and within tolerance levels.

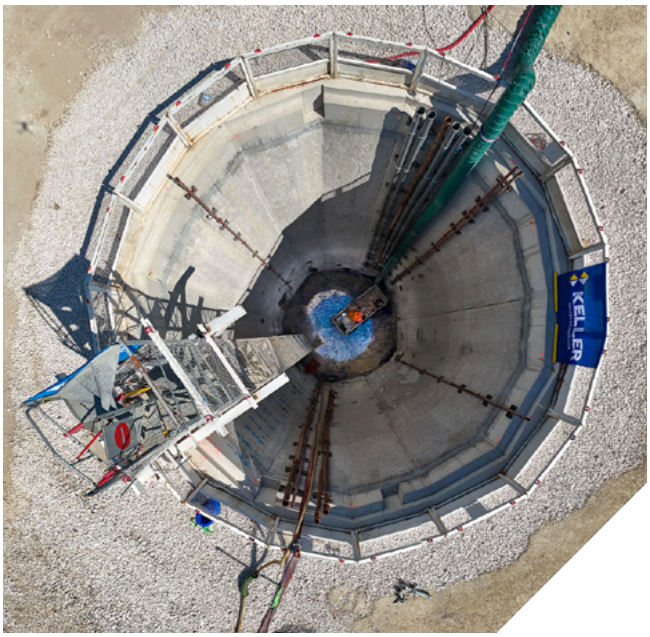
The works were successfully completed in a little over five months.

Quality control

"This project is more than just a pipeline. It shows the airport's commitment to a sustainable future and responsible water resource management," explains Kheireddine Dif, Senior Site Engineer. "Although it involved considerable challenges, our expertise meant we executed with precision while complying with all technical and environmental standards.

"We constantly carried out robust checks which validated the quality and durability of the work. The client was very happy with Keller and we were happy to be involved in such a critical infrastructure project."

Thanks to the techniques employed and rigorous inspections conducted throughout the construction, the quality of the completed infrastructure has been fully validated, ensuring its durability and reliability for years to come.



Keller and Austral **Team Up for Collins Wharf**

Keller Australia and sister company Austral Construction have again combined their expertise to support a prestigious residential project in a historic part of Melbourne.

Situated on a small strip of land in Melbourne's Docklands, between the Yarra River and Victoria Harbour, Collins Wharf is a unique residential development creating almost a thousand homes in the heart of the city.

The development, by Lendlease, will eventually comprise six luxury towers, the first of which – No1 Collins Wharf – was completed in 2019.

Having successfully provided the foundation works for No1, Keller was again selected for the neighbouring second and third towers, Regatta and Ancora, constructed by Hickory Group. Now, as then, the need for a combination of solutions meant Keller brought in sister company Austral Construction to offer a full turnkey solution, unlocking significant benefits.

A difficult place to build

"While this is a beautiful spot for a development, with views over the water and city, it's also very difficult to build on," explains Callum Woodley, Austral Construction Manager. "It's a narrow wharf with water on both sides and very deep soft soils, so there was considerable concern over soils being laterally displaced into the water."

Austral is a specialist in sheet piles and tubular steel piles. As the name indicates, tubular piles are open ended, so they don't displace soil as much as closed-end driven piles.

Taking the proven design for No1 Collins Wharf as a starting point, Keller worked collaboratively with the Lendlease from an early stage to develop and optimise the solution for the second two towers.

Because of the site's location, sequencing of works and logistics had to be well thought out to ensure a smooth operation and no delays. The Austral crew was on site first in July 2024, installing 140 sheet piles for stabilisation and the towers' elevator shafts. They came back in December for the 610mm

diameter tubular piles, eventually installing almost 100. These were positioned close to the edge of the site to prevent displacement, with each one installed in two sections to reach the bedrock 46m below.

Spreading the load

By this point the Keller team was hard at work on the main foundation piles, which included 187 continuous flight auger piles with diameters of 750mm and 900mm up to 45m, along with 98 precast piles.

"Just getting our equipment to the site was a challenge," explains Mats Wisniewski, Keller Project Manager. "It's a built-up area with lots of narrow, twisty roads, which meant we had to strip the rigs down much more than usual so they took a little longer to erect.

"Once on site there wasn't a lot of space as the site was just a very narrow strip of land, so that required a lot of coordination with our client, the Hickory Group. Due to the soft Coode Island silt, there were also some concerns about creating a stable platform that our rigs could work on.

"This was where Austral's unique Taree piling frame came into play. The beams the frame sits on were set up so that the weight of the frame was distributed evenly over the concrete pads and onto the platform close to the water. This ensured capacity requirements of the wharf were not exceeded."

Navigating the Dockland's past

In the early days of Melbourne, the wharf was where docked ships would quarantine. Keller came into close contact with this history as the team worked, running into numerous obstructions such as old ship chains and timber piles. Some of these could be removed, but others were too deep. This meant the crew had to be agile, making changes to the design and finding new locations for some of the foundations.

"Because Keller was the designer and we were all working together, it made the changes much simpler and quicker, minimising delays," says Callum. "If there had been an external designer or different subcontractors working on different elements, we would have ground to a halt every time we hit an obstruction, which would have been a headache for the client."

This illustrates one of the key advantages of using Keller for a project of this complexity.

"With Keller and Austral working together as one, we're able to offer a high-quality solution with multiple techniques that maximises operational efficiency," adds Mats. "As part of the same group, our values and approach to each project are completely aligned and that allows our clients to deal with just one single point of contact.

"The project has been a win-win for everyone and we're proud to have contributed to the redevelopment of this historic part of the city."

global strength and local focus