gruner

MAILING. 30

FOCUS ON

DENSIFICATION

ROCHE SITE, BASEL: BUILDING 2
LIMMATTALBAHN RAIL LINK, ZURICH
CONTROLLING EMISSIONS

MAIL**ING.**30

DENSIFICATION

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COVER TITLE
In the 20 m deep excavation pit for Building 2 on the Roche site in Basel.

PUBLISHING DETAILS
MAIL**ING.**, the Gruner customer magazine, 30/2019 edition, issued once annually **Address** Gruner Ltd, Gellertstrasse 55, CH-4020 Basel **Authors** rempert: text, redaktion, konzept; Gruner staff **Editor** Gruner Corporate Communications **Design** Projektbüro Martin Tuch **Print** Effingermedien AG **Images** Gruner, unless otherwise stated

DEAR READER

PULLING TOGETHER

Every week sees an estimated three million people worldwide move from the country into the city. This concentration process raises a range of issues relating to housing, infrastructure, mobility, energy and sustainability in general. At the same time, digitalization offers new solutions to these problems. New services can be provided and existing ones delivered more quickly, efficiently and comprehensively. The list of novelties is long – from smart homes, big data and optimized energy management to infrastructure for autonomous driving and shared mobility.

As a holistically minded engineering and design company with employees from a wide range of disciplines, Gruner is well positioned to advise clients on these issues and offer future-proof solutions. At the same time, our primary interest is not in smart technologies, but in people. When we are mandated to perform building physics calculations or act as site managers in station extension projects or dam refurbishment schemes for carbon-free energy generation, our constant aim is to create safe, comfortable, livable and sustainable environments.

Autonomous vehicles and waste disposal systems fitted with sensors may still be at the pilot project stage. But our company boasts a 150-year-plus track record of delivering solutions, such as these, that offer benefits today while anticipating the needs of tomorrow. The method developed by Gruner for simplifying the stabilization of excavations (page 7) is a good illustration. After all, whenever you build high, you must also build deep. Where space is in short supply, we even adopt unconventional solutions for installing resource-efficient building services systems (page 9). And, naturally enough, we are always glad to help ensure that densification goes hand in hand with comfort and sustainability (pages 12/13, 14/15).

It is precisely our shared commitment to developing forward-looking solutions that makes Gruner's employees pull together. The new management and organizational structure introduced in mid-2019 has put the focus on clearly segmented, market-oriented organizational units (pages 22/23). Our future aim is to further hone our ability to translate market demands into convincing solutions.

I look forward to our next communication.

Yours

Olivier Aebi

CEO Gruner

ROCHE BUILDING 2, BASEL

On tiptoes, stretching up high

The evolution of the F. Hoffmann-La Roche site in Basel, Switzerland, stands as an exemplar of successful densification. The pharmaceuticals group's development strategy provides for the completion of ten new buildings by the end of 2023. The challenges posed by the highly sensitive and already densely developed site for the Gruner team are illustrated by Roche's second high-rise project, Building 2.

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New buildings on a constrained site: Visualization of the future Roche site in Basel with Building 2 in the center.

The ten new schemes scheduled for completion by 2023 represent a key phase in Roche's renewal and expansion program for the building stock at the Basel site. The new facilities comprise the two high-rises, Building 1 and Building 2, plus an additional eight office and laboratory blocks. Gruner was involved from the very start. In the wake of the successful collaboration on Building 1, the Geotechnical Engineering department of the business unit Structural Design North-Western Switzerland, was also entrusted with the structural analysis and design of the excavations and foundations for Building 2.

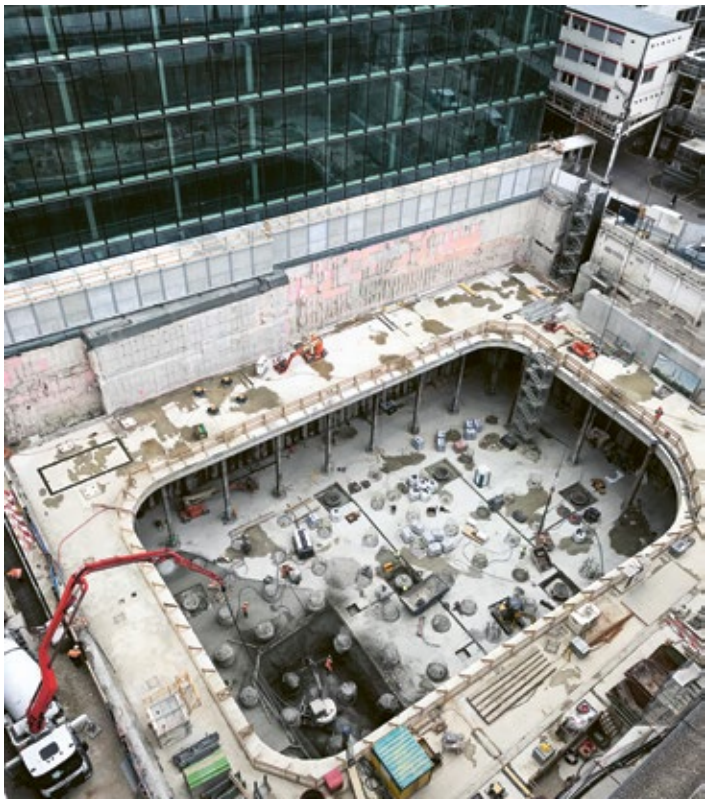
Heavy loads and sensitive surroundings

With a height of 205 m and a weight of 180,000 t, Building 2 will be 27 m taller and 20,000 t heavier than Building 1. However, Switzerland's soon-to-be tallest high-rise will occupy a smaller footprint than its neighbor amid a highly sensitive location. Vibrations during the excavation works and the risk of settlement due to the high weight were among the challenges to which the business unit Structural Design North-Western Switzerland, Geotechnical Engineering had to find innovative solutions.

Bracing slab – purpose-designed solution for pit

To retain the 20 m deep excavation pit, the project team opted for a secant pile wall, a construction easily adaptable to existing geometries. Moreover, as its installation generates only negligible vibration, the impact on the surrounding development was minimized.

A rather unconventional technical solution was adopted to brace the excavation: a one-meter-thick horizontal concrete diaphragm with a large opening was incorporated at mid-pit depth. The combination of bracing slab and reinforced pile wall eliminated the need for anchors on both the northern and western sides. Indeed, the implemented solution allowed the total number of anchors to be limited to 150 – far fewer than the 490 needed for Building 1, where geometric factors precluded a similar solution. Upon completion, the bracing slab will form part of the building.



A horizontal concrete diaphragm at mid-pit depth helped to achieve a significant reduction in the anchor requirement.

In line with the predictions and calculations, the adopted excavation concept with secant pile wall and partial top-down construction proved very robust with low deformation. Both the basement retaining structure and the neighboring buildings exhibited only minor deformations of max. 1 cm.

PRF – valuable know-how gained from Building 1

A piled raft foundation (PRF) solution was specified for Building 2, as for Building 1. The PRF monitoring regime for the first high-rise delivered valuable measurement data that helped to tweak the simulation technology and were used to configure the Building 2 PRF for maximum time and cost savings. Roche thus benefited from the results of its previous investment in Building 1. The PRF monitoring process will provide valuable feedback for the design of other high-rises in molasse subsoils.

Secant pile walling – a solution readily adaptable to existing situations – was used to retain the 20 m deep pit.

PILED RAFT FOUNDATION (PRF)

The piled raft foundation is ideal for accommodating high loads such as those imposed by the two Roche high-rises. It is a composite structure comprising raft, i. e. slab-on-grade, and foundation piles. For the normal load case, 75 % of the high-rise loads are taken up by the piles, with the remaining 25 % transmitted through the raft to the subgrade by contact pressure. By contrast, in case of an earthquake, the much stiffer reaction of the subsoil allows a higher proportion of the loads to be accommodated via the raft contact pressure.

Building dimensions

Weight
180,000 t

Length
59 m

Width
32 m

Height
205 m

Stories
50

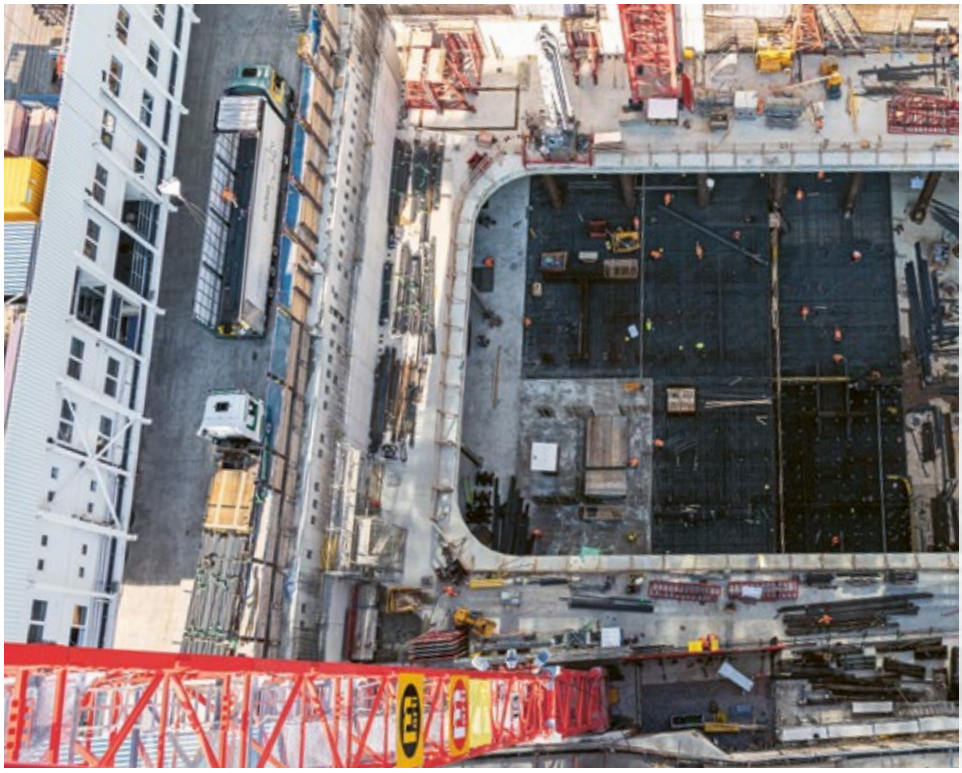
Employees able to use Building 2 as a home base
3,400

Excavation pit

Number of piles for secant pile wall
204

Anchors
152

Large bored piles of 1.5 m diameter and 18–28 m length
104



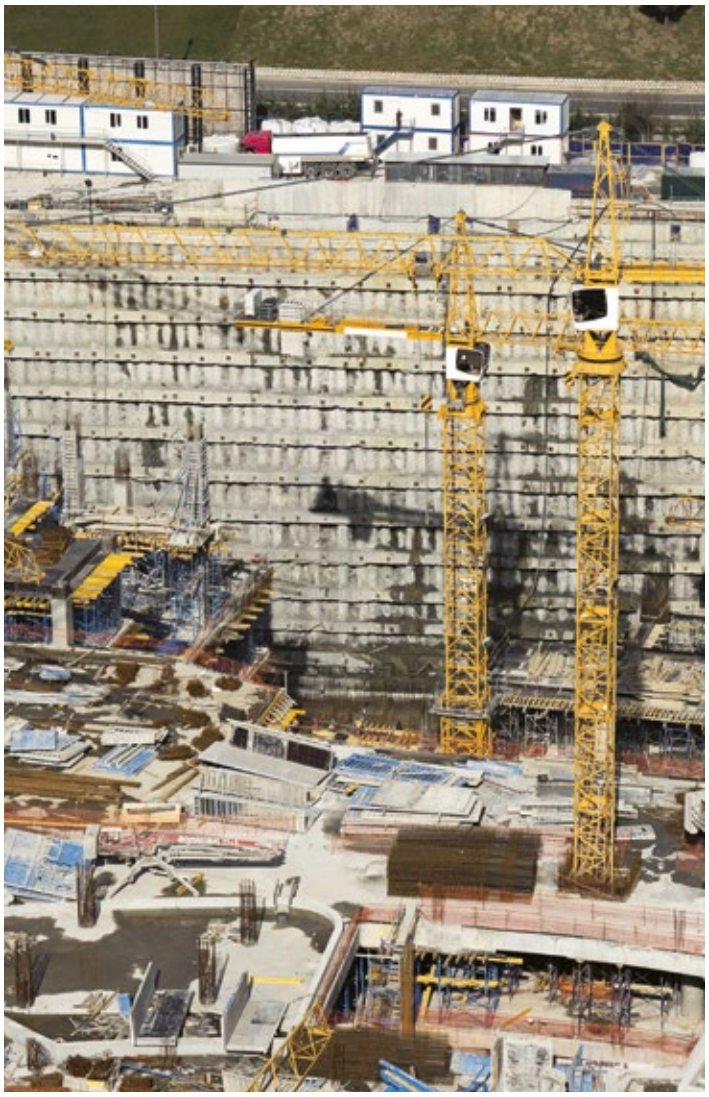
Although Building 2 will be taller than Building 1, various optimizations achieved time and cost savings on the foundations.

2 QUESTIONS
STEADY ADVANCES IN HIGH-RISE CONSTRUCTION

Laurent Pitteloud, building high has become something of a fashion in Basel since the 2000s. What has been the general development of high-rise construction in Switzerland?
Our country has experienced three distinct phases. The 1930s were influenced by the (381 m) Empire State Building. Switzerland's first skyscraper, the (68 m) Tour de Bel-Air in Lausanne, built in 1932, was inspired by the American model. During the second phase, in the 1960s, high-rises were primarily built to meet housing shortages. In the 2000s, the (105 m) Exhibition Tower in Basel and the (126 m) Prime Tower in Zurich heralded the use of densification to combat urban sprawl.

Roche's 205 m Building 2, destined to become Switzerland's tallest high-rise, is a project in which Gruner has been heavily involved. Do you also develop your expertise by studying the experiences gained in other cities and countries?
We constantly seek to hone our expertise and make a point of examining the results of projects at home and abroad. As President of the SIA's Swiss Geotechnical Engineering Association, I work with my fellow board members to advance our profession and disseminate knowledge in this field. To this end, we organize semi-annual conferences with speakers from Switzerland and other countries. The foundations of the world's tallest high-rise (1,007 m) have been among the topics covered. Negative examples, such as the Millennium Tower in San Francisco, with settlement exceeding 0.4 m, are equally instructive and clearly demonstrate the potential risks.

LAURENT PITTELOUD
Head of Design, Structural Design
North-Western Switzerland,
Geotechnical Engineering



At Gruner, we can minimize tedious and error-prone tasks by using automation. This allows our engineers to concentrate on more interesting matters and, in some cases, also go easy on the project budget. With the help of mathematical optimization algorithms, it is also possible to autonomously identify particularly advantageous solutions.

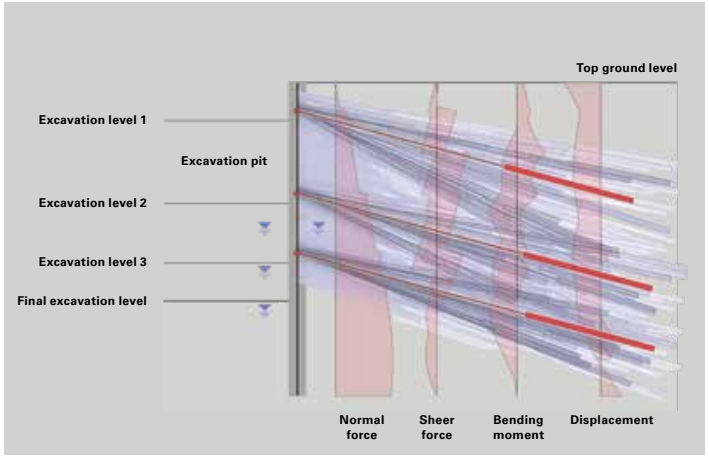
As well as lots of exciting stuff, project work at Gruner frequently includes repetitive tasks. In geotechnical engineering, for example,this involves adjusting the height and inclination of anchor positions for excavation shoring as part of structural analysis checks. If the heights and inclinations are chosen skillfully, a lot of money can be saved and the construction program can be significantly optimized. These adjustments require a large number of anchor heights and inclinations (plus associated values) to be manually modified in the structural analysis program. The calculations need to be performed and the results checked against the numerous results of previously investigated combinations. Not only is this process tedious, but it is also very error-prone. Similar repetitive tasks exist in many places at Gruner, for example in the fields of structural analysis, building services, geometric design and BIM. If there are more than a certain number of these tasks, it often makes sense to automate them. For example, a solution was created for the above example of excavation shoring that automated the entire model optimization process, including the calculations and analysis. The heights and inclinations of anchors are independently modified using mathematical optimization algorithms, thereby enabling the cost per running meter of shoring to be minimized (objective: cost optimization).

PRINCIPAL BENEFITS OF AUTOMATION AND MATHEMATICAL OPTIMIZATION

- Reduces repetitive tasks, less prone to errors
- The technology can be applied to any part of the construction industry
- Supports the regular workflow and makes life easier for the project engineers
- Utilizes the existing software environment
- Uses mathematical optimization algorithms to find solutions automatically (e. g. cutting costs or also reducing material consumption)

EXCAVATION PIT OPTIMIZATION

Efficiency boost in the excavation pit



Cross-section of the excavation pit.

DR. JÖRG MEIER
Digital development, Structural Design North-Western Switzerland, Geotechnical Engineering

FULL REFURBISHMENT, BADENERSTRASSE 170/172, ZURICH

Precision in tight spaces

The global trend of migration into towns and cities is also evident in Switzerland. New homes and offices are being built despite the existing spatial constraints. How can this best be achieved with minimum nuisance to neighboring residents? As illustrated by the Badenerstrasse 170/172 refurbishment project in Zurich, smart solutions and well-organized site logistics are the key.

Among the most important factors behind efficient site logistics is an intelligent site setup, says Peter Andreas Grete, architect and Zurich Branch Manager for Gruner General Planning. "This includes a concept for routing material shipments to and from the site as well as parking provision. Decisions then need to be taken regarding other site- and project-specific factors: the location of staff, material and office accommodation units, access and safety concepts, and the on-site distribution of materials. The latter may require the use of lifting equipment, such as cranes, facade hoists or even existing elevators. Of crucial importance are the precautions taken to permanently guarantee the safety of all people on site – e. g. building workers, design team members or visitors – and in the immediate vicinity, such as neighbors or pedestrians. According to Suva (Swiss Accident Insurance Fund), the annual number of accidents on Swiss job sites still exceeds 50,000 in the structural and fit-out trades alone. The obligatory collective safeguards, which include scaffolding (mandatory on building construction projects for fall heights exceeding 3 m), guard rails and safety nets, can thus prevent tragedies.

Coordination at various levels

After a concept addressing these issues has been drafted, the next step is to consult the authorities. "The possibility of using public space and associated charges need to be clarified," Grete points out. "In urban areas, attention must also be given to the road lighting and any overhead power lines for trams: after all, you can't just dismantle street lamps or overhead lines." The rule of thumb is, of course, to comply with the municipal regulations and bylaws, and adapt the concept on a case-by-case basis.

Focus on the space situation

Site-specific assessments also involve logistical calculations. Take the example of a planned delivery of 1,000 windows, with each truck being able to carry five items. This would necessitate 200 journeys. In such cases, organizing trouble-free transportation to and from the site, and coordinating this with the work program is far from easy – particularly in urban centers, where space is in short supply and traffic congestion a big problem. Here, a detailed analysis of the space situation and scrupulous planning are essential. "With the refurbishment in Zurich, finding a solution proved fairly simple," explains Grete. "We only needed structural concrete for a small part of the project, so very little formwork was used. Storing formwork panels can otherwise take up a lot of space." Grete's team is currently acting as lead designer for the refurbishment of two office buildings at Badenerstrasse 170/172 in Zurich, which are owned by a global leader in corporate consulting and auditing.

CHF 105 m project on track

Built in 1984, the two blocks take the form of framed structures with a distinctive facade featuring exposed-aggregate-concrete cladding panels. A story was added and a bridge link inserted between the two buildings in around 2000. The present project, with a price tag of CHF 105 m, involves stripping back the buildings to the shell. The full-scale refurbishment became necessary due to the building's failure to meet present-day demands in terms of energy use, working environment and various other criteria. The interior and facade will be completely renewed in line with contemporary requirements and regulatory standards. At the time of the interview (October 4, 2019), work was in full swing, with parts of the demolition and structural works already completed. Installation of the first building services had commenced and the facade units were being prefabricated.

SITE LOGISTICS OF A DIFFERENT KIND

Gruner was mandated to provide lead design and site supervision services for the refurbishment of the Pfauen theater in Zurich. In this building, space was so constricted that some of the works required highly unusual solutions, such as airborne support. Helicopters were deployed both to remove the old heating and ventilation components, and to deliver and install their replacements. However, precision was not only needed for the flying and crane operations, but also in terms of timing. In such extreme cases, the site logistics need to be planned down to the last minute to ensure that everything is ready when the expensive helicopters arrive.

Wholesale refurbishment instead of new-build: Gruner employees from various business units have joined forces to create state-of-the-art office accommodation and a pleasant working environment at Badenerstrasse 170 / 172 in Zurich.

Business units working in tandem

"25 Gruner employees are working on the project as part of the lead design team," says Grete. The business unit Building Services Bern is responsible for the heating, ventilation, cooling and plumbing systems, Structural Design Zurich for the statics, Building Services Zurich for the electricals and building automation, and General Planning Zurich / Basel for the architecture and overall management. Gruner's services also extend to fire safety and building physics." Under the management of a design-and-build contractor, the approx. two-year construction phase (summer 2019 to fall 2021) is currently on track. All the better, as Grete sees it, given the crucial importance in his profession of carefully scheduled and realistic work planning. This can often be a challenging task, especially on large projects at prominent sites, such as the densely developed street-front location on the Badenerstrasse in Zurich. Such projects require careful coordination to accommodate all relevant factors together with a clear focus on the project objectives. Similar care is required during design, in tailoring the refurbishment concept as closely as possible to the existing building fabric.

Urbanization trend continues unbroken

Having now topped the 400,000 mark – compared to 360,000 in 2000 – Zurich's population is increasing more rapidly than predicted by the statisticians and continues to grow. At the same time, it is undergoing something of a rejuvenation as young people move in, start families and build houses. The ever tighter spatial constraints are posing increasing problems for site logistics. As the featured project shows, Gruner has the key to well-organized and successful site logistics. Incidentally, the reader may wonder why the client opted for comprehensive refurbishment instead of a new-build solution. The answer is that both buildings contain basement parking spaces. The municipal authorities would not have approved equivalent parking provision for a new-build project. Refurbishment schemes, on the other hand, are subject to a statutory retention guarantee. Such foresight once again underscores Gruner's ability to deliver customized solutions.

THE EVER TIGHTER SPATIAL CONSTRAINTS ARE POSING INCREASING PROBLEMS FOR SITE LOGISTICS. AS THE FEATURED PROJECT SHOWS, GRUNER HAS THE KEY TO WELL-ORGANIZED AND SUCCESSFUL SITE LOGISTICS.

PETER ANDREAS GRETE
Zurich Branch Manager,
Gruner General Planning

LIMMATTALBAHN LIGHT RAIL AND AFFOLTERN TRAM LINKS

Improved quality of life through traffic reduction

Until the end of the year numerous trees will be planted and the track will be partially vegetated.

Regions with high development potential are set to experience a sharp rise in population and employment in the coming years. Even today, the transport infrastructure in densely populated cities and conurbations is reaching its limits. Projects such as the Limmattalbahn light rail and Affoltern tram links set out to provide long-term relief.

The Limmattal ranks among those parts of the Greater Zurich Area with the greatest development potential. The Limmattalbahn is designed primarily to accommodate the projected traffic growth and thereby relieve the central urban areas. Construction work started in 2017. From 2022 onwards, the 13.5 km line will serve some 27 stations in six municipalities between Zurich-Altstetten and Spreitenbach-Killwangen. Working as part of an engineering consortium, the business unit Infrastructure Zurich, Brugg is involved in the technical design and was mandated by Limmattalbahn AG to supervise the works for packages 1 (Altstetten station to Hermetschloo) and 4 (Bachstrasse Schlieren to Urdorf/Dietikon municipal boundary).

First stage completed after intensive work phase

The last major gap in package 1b was closed during the summer holidays: an intensive construction phase saw demolition of the Farbhof turning loop in Zurich-Altstetten for the tram line 2 to allow its extension from the city boundary to Schlieren on the track of the future Limmattalbahn. The planning and supervision of the works for the various trades was so far the biggest challenge on this project. This is because the start and end deadlines were set in stone and allowed no margin for error. At the island job site, all civil engineering works, including utility mains, road construction, track installation and overhead lines, had to be tightly coordinated and completed within a six-week window. The rigorous three-shift regime demanded strict compliance with deadlines by the entire construction team and the meticulous coordination of site logistics.

Despite a number of hitches, the first stage was completed on time and as planned. The tram line 2 extension from Zurich to Schlieren has been in operation since September 2, 2019. Work on the second stage (Schlieren–Killwangen) followed on directly from the first.

Affoltern tram route: visualization of planned Einfangstrasse tram stop.

TRANSPORT OUTLOOK 2040 REFERENCE SCENARIO

A 25 % rise in passenger traffic, including a 51 % increase in public transport use – this is the prediction made by DETEC (in 2016) in its Transport Outlook 2040 reference scenario. The main drivers behind this trend, according to the forecast, are population growth (+28 %) and business (+46 %).

Site logistics are a major challenge on projects in densely populated areas.

The turning loop for tram line 2 had to be removed within six days …

… and the journey now continues to Schlieren on newly laid track.

2 QUESTIONS INFRASTRUCTURE PROJECTS IN DENSELY POPULATED AREAS

Thomas Vollenweider, densely developed locations impose additional difficulties on the design and implementation of infrastructure projects. What challenges arise?
Works to utility mains in urban areas are subject to severe spatial constraints. Coordinating the involved trades requires a significant effort on the part of the design team. A successful solution for us so far has been to hold regular "jour fixe" meetings with contractors, at which binding deadlines are laid down. Site logistics are a further challenge, along with the special provisions for traffic management during the individual work phases, as agreed with the responsible bodies.

Construction works can influence traffic flows. They cause noise disturbance and thus impair the quality of life of local residents. How do you communicate with those affected?
Local residents and property owners should be personally approached, be involved at the planning stage and receive timely notifications during the works. The basic information on the project is supplied by the client. We have notified local residents of noise-intensive operations and of night or weekend working times at the site. We have also participated in information events for the general public.

Fast and reliable link from Affoltern to city center
The business unit Infrastructure Zurich, Brugg is also handling a second project in a densely populated area: the Affoltern tram link. Once again acting as part of an engineering consortium, it has been entrusted with the design work for package 2. The VBZ (Zurich public transport authority) anticipates a 30 % increase in passenger volumes by 2030. The Affoltern tram link (line 11) is a key element in the VBZ's 2030 Network Development Strategy for expansion of the bus and tram system.

Affoltern lies in the north-western part of the city and, like the Limmattal region, offers major development potential. Even today, it is home to around 26,000 residents, a figure some 40 % higher than 15 years ago – and set to rise still further. The new tram route runs on its own line and is to be used by line 11. It provides an attractive connection to the city centre and offers sufficient capacity to accommodate the expected growth in demand. Work on the concept design, which builds on a feasibility study, started in March 2018 and is scheduled for completion at the end of 2019. Within the consortium, the business unit Infrastructure Zurich, Brugg is handling the civil engineering works including utility mains.

THOMAS VOLLENWEIDER
Project Manager and Chief Site Supervisor, Infrastructure Zurich, Brugg

INTERVIEW

KAI HITZFELD
Department Head Environment,
Infrastructure Basel, Environment

Impact of densification on people and the environment

Inward urban development has unavoidable implications for people and the environment. For instance, densely populated areas demand much closer attention to noise sensitivity issues. Although local residents are protected by regulations and guidelines, implementation of the associated measures is increasingly complex. Gruner's Environment team assists clients, architects and other designers by performing checks and preparing action plans.

Kai Hitzfeld, you are Head of the Environment department. Has the trend towards densification affected the order situation?
The environment plays an increasingly important role in the building application procedure. This, in turn, is fueling the demand for our department's services. The last five years have, for example, seen a steady increase in mandates for noise and air pollution control concepts for the construction phase. I suspect this has been prompted by complaints about noise emissions, dust and air quality. The higher the development density, the greater the disturbance to local residents from construction noise and reduced air quality, and the greater the impact on their quality of life.

Redevelopment projects in built-up areas often involve the demolition of old buildings. What happens to the existing contamination?
Pollution may indeed be a problem with older buildings and sites. Materials no longer used today, such as asbestos, wood preservatives and PCBs, are typically encountered in facilities built between 1950 and 1990. These contaminants require careful analysis prior to their proper removal and disposal. These tasks are very challenging and require in-depth know-how backed up by substantial practical experience – and that's where Gruner's contamination management experts come in.

Returning to construction noise control: your concepts promote compliance with the Guidelines on Building Noise issued by the Swiss Federal Office for the Environment (FOEN). What procedure do you adopt?
The foundations for effective construction noise and air pollution control to protect neighborhood areas are already laid at the design and planning stage. Our building noise concepts play a pivotal role here. Optimizing site organization and selecting the best construction methods are paramount. We use project-specific checklists and the existing project documentation to determine the applicable precaution levels and required action. Each precaution level calls for specific measures, as specified in the FOEN guidelines.

AIR POLLUTION CONTROL CONCEPT FOR ROCHE

The positive experiences with Building 1 prompted F. Hoffmann-La Roche AG to entrust the business unit Infrastructure Basel, Environment with preparing the air pollution control concept for the demolition of Building 43 and erection of the new Building 2. The aim is to ensure the smooth, proper and timely performance of the works. At the same time, neighboring residents and the environment require suitable protection against excessive air pollution arising from the site operations. To meet these demands, our specialists have developed mandatory project-specific recommendations for the client, design and contractor teams. Apart from planning certainty, the concept also offers the following key benefits: it lowers the risk of additional conditions on the building application, thereby simplifying project management, and promotes acceptance by local residents of the scheme and any associated inconveniences.

Are you involved in the implementation of the measures?
Once the building permit is granted, we are often mandated to supervise the works on site in respect of noise control and air hygiene. In that way, we can offer the client on-the-spot support in implementing the measures, communicating with local residents and liaising with the responsible agencies. We also, for example, provide awareness-raising training for construction workers.

One thing you need to know to determine the precaution levels is how noise intensive the site operations will be. Are the necessary values defined for all operations?
To prepare the concept, we do indeed need information on the noise intensity of the construction works. This will dictate the precaution level and associated choice of measures: limitation of working times, technical standard of the construction plant and so on. While the FOEN guidelines contain specifications for standard building procedures, nonstandard operations are not necessarily covered. The latter may therefore necessitate extended discussions with the authorities. As recognized specialists, however, we are granted ample freedom to make decisions on site – which, though welcome, also imposes responsibilities.

Building high is one possible response to the shortage of development land. What other options are exploited?
There is a trend towards high-density residential estates, mixed-use buildings and quarters combining homes and commercial premises, and apartment blocks built close to major noise and air pollution sources, such as heavily trafficked roads and railway lines. The resulting situations have a big impact on the quality of life of occupants and residents. Architects and other designers are now confronted with the near-impossibility of complying with the exposure thresholds without elaborate measures.

Isn't compliance with exposure thresholds a key condition for obtaining the building permit?
Yes, noise surveys must always investigate two aspects: the impact of the surroundings on the project and the impact of the project on the surroundings. Which means that different exposure thresholds need to be met. Our experts from the Building Physics, Acoustics department support clients, architects and other designers as early as the design phase by performing the relevant noise control verifications and preparing the associated concepts. To facilitate the definition and monitoring of noise attenuation measures, Gruner employs state-of-the-art measurement, calculation and modeling methods as well as its own purpose-developed monitoring system.

To what extent do these concepts influence the architecture?
Our concepts often have an impact on the architecture. With new-builds, constructional noise control features, such as unopenable windows, sound-insulating facade assemblies, location of stairwells on the road or railway front, can be designed into the concept from the start. Retrofitted noise control measures in existing buildings are far more elaborate and expensive. Our task ultimately amounts to reconciling creativity with the need to meet the exposure thresholds.

"EVEN AT LOCATIONS ALREADY EXPOSED TO HIGH LEVELS OF ROAD TRAFFIC NOISE, NEW-BUILD PROJECTS ARE STILL SUBJECT TO STRINGENT COMMERCIAL AND INDUSTRIAL NOISE THRESHOLDS. NONPROFESSIONALS OFTEN FIND THIS HARD TO UNDERSTAND."

Kai Hitzfeld on the legal practice of not assessing different noise types jointly

GUIDELINES AND CONCEPTS FOR PROTECTING PEOPLE AND THE ENVIRONMENT

Guidelines on building noise, air quality and construction traffic
The Swiss Federal Office for the Environment (FOEN) has issued guidelines on both building noise and air quality on construction sites to promote full and consistent compliance with the relevant statutory regulations. The guidelines distinguish between precaution levels A, B and C (noise) or A and B (air quality), and define variously stringent requirements in terms of the specified, non-exhaustive checklist of measures. Equally pertinent are the construction traffic guidelines containing provisions on air pollution from construction vehicles. www.bafu.admin.ch

Building noise concept, Basel
In Basel, the noise control agency of the Environment and Energy Office requires a building noise concept for all projects subject to an environmental impact assessment, with case-by-case decisions taken for other projects. The concept specifies how the FOEN building noise guidelines are to be implemented during the construction phase of a particular project.
The individual steps are as follows: clarification of noise sensitivity of surrounding area, determination of noise intensity of site operations, description of work programming (night-time and weekend working etc.), determination of precaution level and required measures, specification of responsibilities.

Air pollution control concept, Basel
In Basel, the Air Hygiene Office of the two Basel cantons requires an air pollution control concept for major job sites. The concept specifies how the FOEN air quality and construction traffic guidelines are to be implemented during the construction phase of a particular project.
The individual steps are as follows: determination of specific emissions for construction traffic, description of organization during construction phase (responsibilities, tasks and control), determination of precaution level and required measures.

Buildings

3

Apartments

146

DHEs and heat pump — **Heating**

100 %

Solar collectors — **Hot water**

31 %

Biogas

14 %

DHEs and heat pump

55 %

Ecopower — **Electricity**

100 %

Rooftop solar collectors – the Stöckacker Süd estate is run entirely on alternative energy.

STÖCKACKER SÜD, BERN

A model

2,000-watt-certified site

Urban development in Switzerland reflects the general trend towards densification. Apart from more space, replacement new-builds offer the crucial option of exploiting sustainable building services technology. The Stöckacker Süd residential scheme in the Swiss capital of Bern is an exemplary green project with certification as a 2,000-watt site.

ENERGY-PLUS: SUSTAINABLE DISTRICT DEVELOPMENT

The energy-plus district concept involves the application of energy-plus construction methods across an entire neighborhood. As the aggregate performance of all buildings is decisive, individual shortfalls can be offset and even historic landmark buildings integrated.

plusenergiequartier.ch

Top: Aerial view of the major job site in the Swiss capital of Bern.
Bottom: The site was previously occupied by small-scale apartment buildings.

As an energy-plus scheme: the Reichenbachstrasse housing development in Bern, with 100 apartments in four new-builds.

"WE ARE DELIGHTED THAT THE STÖCKACKER SÜD HOUSING DEVELOPMENT HAS BEEN AWARDED THE ATUPRIX 2018 BY THE AUSZEICHNUNG BERNER BAUKULTUR (BERN BUILDING CULTURE AWARD) FOUNDATION. IT UNDERSCORES THE HIGH QUALITY OF THE INTERDISCIPLINARY TEAMWORK BETWEEN ALL PROJECT PARTNERS."

MARC WÜTHRICH

As one of the first sites to be certified under Switzerland's "2,000-watt" energy efficiency scheme, the Stöckacker Süd residential development is a textbook example of eco-friendly energy sourcing. The building services installations run solely on alternative energy: most of the heating and hot water energy is supplied by a heat pump, 39 (100 m deep) downhole heat exchangers (DHEs) and 450 m² of solar collectors. The solar collectors alone meet the annual domestic hot water demand for nearly 100 apartments. Energie Wasser Bern's biogas network is used to cover the peak loads.

Monitoring of energy in use for recertification

Since 2017, the Gruner business unit Building Services Bern has been entrusted with monitoring the energy in use (heat, power and water consumption), including preparation of the associated annual documentation, to ensure compliance with the requirements for a 2,000-watt site. In-service recertification will take place for the first time in 2020 and then at three-yearly intervals. The support offered by Gruner between certification and recertification creates significant added value for the client, the trust for land and housing policy of the Bern city authority.

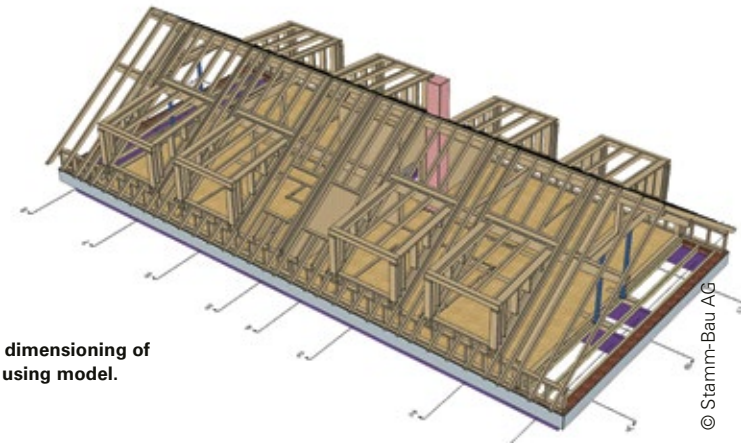
Reichenbachstrasse energy-plus residential development

The replacement new-build housing development at Reichenbachstrasse 118, a new project of the trust, goes one step further. Four new blocks with a total of 100 apartments are planned on the site of the former Engried nursing school. The project includes a range of measures for renewable energy use that will enable it to meet the target criteria for 2,000-watt-site certification. Two of the blocks are designed as energy-plus buildings and additionally fitted with a yield-optimized photovoltaic system. The Gruner business unit Building Services Bern belongs to the lead design team that won the project competition. Following design development and building application, Gruner's experts are now engaged in the preparations for the tendering procedure.

MARC WÜTHRICH
Head of Building Services Bern

Densification of built space

Refurbishment, alteration, heightening or horizontal extension? Timely involvement by the client or architect of Gruner's experienced Structural Maintenance team in the project development process will smooth the path for success from the very outset. Four variously complex projects illustrate the services and types of solution offered by Gruner.



© Stamm-Bau AG

Structural dimensioning of attic level using model.

HEIGHTENING, ALLSCHWIL

Additional apartments in attic

The client's brief called for vertical extension with a new timberwork attic story to create two additional apartments in a 1960s residential block. The existing roof structure was first removed to expose the uppermost floorplate. The dwarf and gable walls were then heightened and topped by a timber frame for the new attic. The Structural Maintenance team offers both specialist engineering know-how and many years of experience with timberwork structures. On this project, it was responsible for analyzing the load paths through the existing fabric, checking earthquake resistance and dimensioning the structural timber frame.

DEMOLITION / NEW-BUILD, BASEL

Demolition and new-build in tandem

The new Helvetia Versicherungen office scheme with residential component in Basel necessitated the demolition of five existing three-story buildings. A corner building to be linked to the new development was stripped back to the shell and comprehensively altered. Moreover, the new building's deeper foundations required underpinning of the retained fabric while, for reasons of earthquake safety, the existing party walls had to be replaced by concrete walls. The works were complicated by the close proximity of the neighboring buildings, road and historic city walls. To meet this challenge, the Gruner team adopted a soil nail wall and micropiling solution. The structural works are scheduled for completion in 2020. This project is a prime example of how Gruner's broad service portfolio enables it to deliver single-source solutions. Backed by three of its departments – Structural Maintenance, Structural Engineering and Geotechnical Engineering – Gruner is ideally positioned to meet all relevant demands.

Timber logs were used as props for the stripping and demolition works to the corner building.

Light-flooded, open-plan spaces can be created in older buildings through structural reconfiguration.

FULL-SCALE REFURBISHMENT, BASEL

Strip-out and refurb of historic landmark building
The owner family of a century-old duplex house, a masonry structure with timber joist floors, called for a full strip-out and refurbishment. Throughout the design and construction, the client and architect gave high priority to the aesthetic impact and to a sensitive treatment of the existing building fabric. The refurbishment covered, among other things, the kitchen, bathrooms and building services installations. Old items were replaced, new fittings added to the upper stories and attic, and steel beams inserted to strengthen the floors. At ground-floor level, an open-plan living/dining area was created by demolishing several walls and incorporating steel beams to carry the loads. The Structural Maintenance team was entrusted with the structural detailing and the supervision of works on site. The early involvement of Gruner's experts by the architect was certainly a major boon for the client.

SITE REDEVELOPMENT, BASEL

Feasibility study for major redevelopment
The headquarters of transport company Settelen AG was built on the fringes of Basel in 1907. In the course of the intervening century, a densely developed residential estate has grown up around the site. The company has therefore decided to relocate some of its facilities and redevelop half the site with housing. Architecture firm Burckhardt + Partner was appointed by Settelen AG to conduct an architectural feasibility study. Gruner contributed by undertaking an engineering assessment of the existing buildings and necessary alterations, complete with cost estimate. In framing its evaluations and recommendations at this stage of the project, Gruner's Structural Maintenance team drew heavily on its vast pool of experience. The resulting data have provided the architect team with useful arguments in their negotiations with the conservation authority regarding the historic landmark status of some of the site's buildings, which date from various periods. Where realistic solutions are needed, the Structural Maintenance team always endeavors to achieve these through constructive dialogue with the conservation authority.

As early as the start of the last century, the prestigious steel and glass barrel-vault roof provided a sheltered courtyard area.

SPITALLAMM DAM, GRIMSELSEE

The next once-in-a-lifetime project

The 90-year-old Spitallamm dam on the Grimselsee reservoir is a pioneering feat of engineering, dating from the early years of large-scale hydropower generation in the Swiss Alps. It is now being replaced by a new arch dam. Operator Kraftwerke Oberhasli AG (KWO) thereby seeks to ensure a reliable supply of locally sourced renewable energy for future generations. Gruner's energy specialist Stucky has been mandated to provide the design and technical detailing for this once-in-a-lifetime project.

Job site with existing dam at an altitude of nearly 1,900 m.

The Grimselsee reservoir was formed in the 1930s through the construction of two dams. At the time of its inauguration in 1932, the Spitallamm arch-gravity dam ranked among the tallest dams worldwide. The famous Hoover Dam in the USA, for example, was only completed three years later. The second Grimselsee dam, the Seeuferegg dam, located on the other side of the Grimselnollen promontory, was designed as a gravity dam.

Dam-building know-how

Stucky's expertise in the structural analysis and design of arch dams can be traced back to company founder Alfred Stucky. In 1920/21, as a young engineer working at the office of Heinrich Eduard Gruner in Basel, he was involved in designing Europe's first arch dam project on the Lac de Montsalvens. For this, Stucky developed a new analysis method for arch dams with horizontal and vertical curvature, which later earned him a doctorate from the ETH (Swiss Federal Institute of Technology) Zurich. Stucky set up his own engineering office in Lausanne in 1926, since which time dams – specifically arch dams – have been one of Stucky's core competencies. Although, nowadays, dam projects of this kind are only rarely implemented in Switzerland, Stucky's international operations have enabled it to steadily expand its knowledge and experience over the years. The company now ranks among the world's leading engineering practices for dam design, monitoring and safety.

Challenging site operations

For the new Spitallamm double-curvature arch dam project, Stucky collaborated closely with KWO in developing the concept design and a construction project eligible for approval. For the construction phase, Stucky provided support during tendering and is now handling the technical design. Work on the new dam, which will be erected immediately downstream from the existing structure, started in June 2019. The old dam will be retained and subsequently flooded. This will allow continued operation of the present facility throughout the six-year construction period. The high mountain location, at an altitude of nearly 1,900 m, poses severe logistical challenges for the works – if only because of the climatic conditions and spatial constraints. Construction will proceed seven days a week between May and October over a six-year period. Concreting for the approx. 114 m tall dam will start in 2021, following excavation for the foundations, and involve placing some 220,000 m³ of concrete.

The new dam is being built directly in front of the old one to allow continued use of the existing infrastructure. This imposes severe logistical demands on the works.

SITTERTOBEL VIADUCT, ST. GALLEN

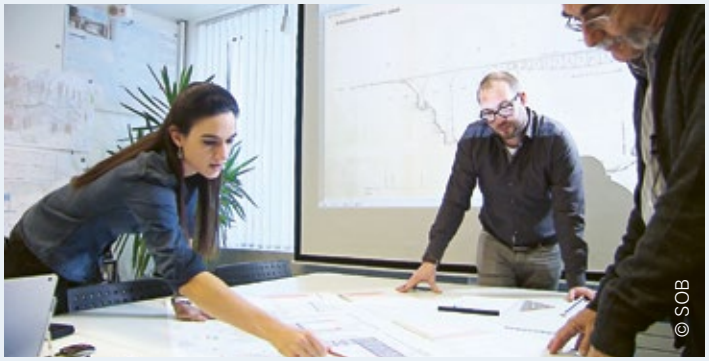
Monument and key transport route

The stone and steel Sittertobel viaduct on the SOB (Südostbahn AG) network was built between 1907 and 1910 and, rising to a height of 99 m, is Switzerland's tallest rail bridge. Now classed as a historic landmark structure and crossed every day by some 10,000 passengers, the viaduct is currently being made fit for the coming decades with Gruner's help.

The original cost of the viaduct 110 years ago ran to around CHF 1.5 million. At around CHF 15 million, the present renovation of the spectacular structure is likely to cost ten times more. But it is money well spent: given the resources available at the time of its construction, the viaduct project was an architectural and engineering tour de force. The rail bridge across the Sitter gorge near Gübsensee lake was last strengthened and repaired nearly 40 years ago. Now, a full-scale refurbishment is needed.

Long years of experience and supervision pay dividends

Gruner Infrastructure Eastern Switzerland has closely monitored the bridge's condition over a 16-year period, performed structural recalculations and promptly implemented any necessary temporary measures. The 2019 refurbishment project, on which Gruner Wepf AG, St. Gallen, was appointed as project designer for phases 21 to 33, marks the culmination of these long-term investigations and recalculations. In phases 41 to 53, the team from St. Gallen is now providing expert support for the SOB project and senior site management teams. The Sturzenegg tunnel rehabilitation is being handled by a third party. The track and overhead lines on the viaduct are being replaced. The ballasted decks on the side spans are being re-waterproofed and the ballast thickness increased. The steelwork of the inverted bowstring truss is being partially replaced or otherwise reinforced and the anticorrosion finishes renewed to ensure that the bridge can continue to accommodate the high loads.



Project engineer Sarah Bitterli with project manager Roman Schweizer.

For further information on the project and the historic engineering structures, please visit www.sob.ch

Work location at a height of nearly 100 m.

Complex statics within narrow timeframe

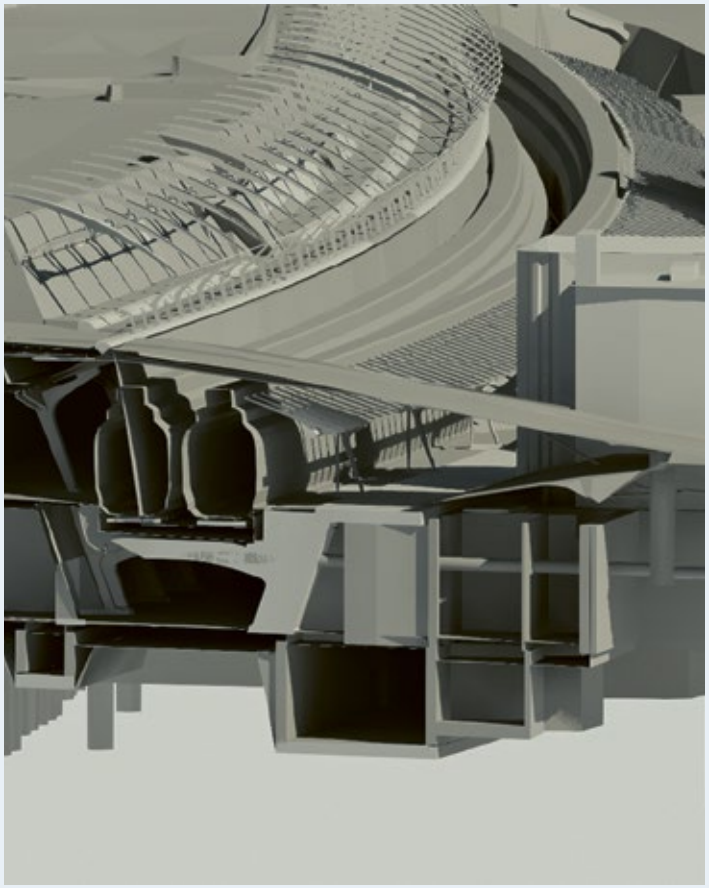
The structural complexity of the viaduct is not the only problem facing the project team. The exposed location and tight schedule for the refurbishment have posed additional challenges: the line between Herisau and St. Gallen Haggen was fully closed for five weeks during the summer of 2019. As the bridge is cut off on one side due to the simultaneous rehabilitation of the adjacent tunnel, a scaffold tower with goods hoist was fitted to bridge pier IV to provide an additional access point to the works. After the resumption of rail operations, this will also be used for the remaining works to the inverted bowstring truss. The refurbishment works will continue until spring 2021.

STADELHOFEN STATION, ZURICH

Refurbishment made simple

Overall view of existing urban fabric.

Switzerland's transport infrastructure is bursting at the seams. As the shortage of development space becomes ever more acute, new projects to relieve or complement our existing mobility infrastructure are subject to increasingly complex constraints. Faithful visualizations of the existing urban fabric increase the precision of refurbishment and remodeling schemes, as illustrated by the Zurich-Stadelhofen station project.



Cross-section through Zurich-Stadelhofen station.

Opened in 1991, the three-track Stadelhofen station in Zurich is slowly reaching the limits of its capacity. A fourth station track and a second Riesbach tunnel are planned to relieve congestion. As part of an engineering consortium, Gruner has been entrusted with various project tasks.

As there are practically no reliable 3D data on the present buildings and facilities, the business unit Infrastructure Oberwil was mandated to produce a survey of the existing development, in all its complexity and inhomogeneity, using a combination of terrestrial laser scanning (TLS) and tachymetric surveying. Performed under operating conditions, these surveys were used in conjunction with laser scanning data from 2017 for the station track to generate 3D surface bodies, which, in turn, served as the basis for a complete model of the existing fabric. The model replicates the open, contorted topography, all levels of the operating facilities, the retail units, mechanical rooms and storerooms, installation ducts, stairways and a wide range of specific features, as well as the bored pile walls with walings and the bridges over the track. This geo-referenced model is produced to an accuracy that provides a reliable basis not only for the concept design, but also for the detailed design, the plans for public display, the tendering procedure and, if required, for the technical design.

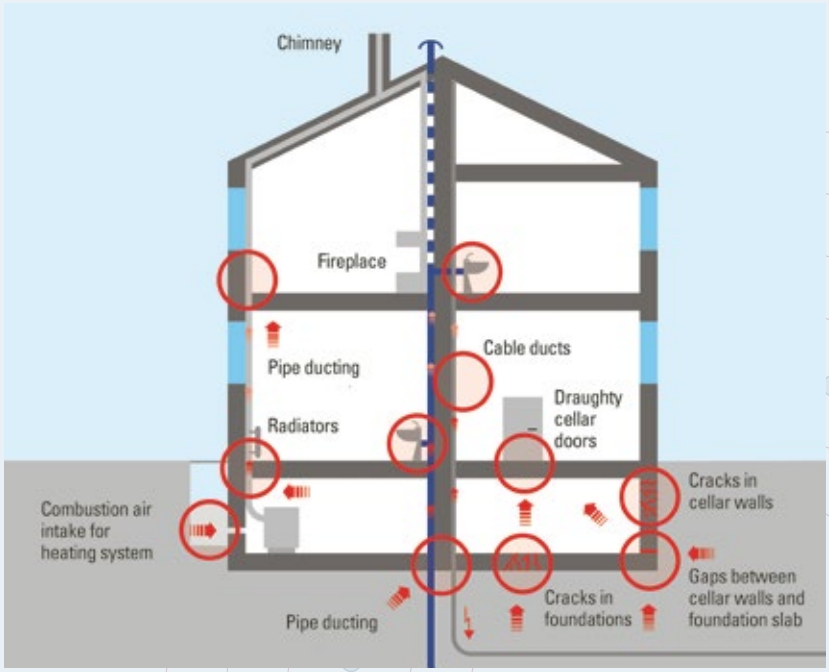
In the first step, Gruner performed a 3D laser scan of the indoor and outdoor spaces for later analysis in the office. Here, the point clouds obtained from various survey positions are combined into a coherent whole. This delivers a rotatable, virtual-walk-through 3D model in the panorama viewer. The viewer also allows determination of the heights, distances and angles from specific point clouds. The next step involves turning the point clouds into integral surfaces for presentation in a 3D model. This model offers a professional and economical means of generating of any required plan views and cross-sections. These can then be exported in DXF or another format for further processing, thereby laying a sound foundation for a successful project.

THOMAS SCHULER
Department Head Geomatics,
Infrastructure Oberwil

RADON – WHAT IS IT?

The gas from the deep

Radon is a natural radioactive gas that occurs in high concentrations everywhere in the ground as a product of uranium decomposition within rocks. Radon gas can seep into homes through weaknesses in the building envelope. It continues to decompose inside the building and the resulting products attach themselves to dust particles in the air. People then breathe these in and they reach the lungs, thereby directly irradiating them. Radon gas in homes is second only to smoking as the most frequent cause of lung cancer.



Why is radon suddenly an issue?
Until now, the problem has been underestimated globally. But new epidemiological studies show that radon is a health risk that should be taken seriously. Back in 2009, the World Health Organization (WHO) recommended reducing the threshold for radon in inhabited buildings.

Switzerland: On January 1, 2018, the reference value for the concentration of radon gas in inhabited buildings was massively reduced, from 1,000 Bq/m³ to 300 Bq/m³. It is anticipated that at least 100,000 buildings exceed this reference value and will need refurbishing over the next few years. With the new Radiological Protection Ordinance, preventative measures for protecting new buildings from radon will also become mandatory – and this requirement imposed on clients will also be integrated into the building application procedure.

Germany: The reference value of 300 Bq/m³ also applies in Germany, and preventative measures against radon will become mandatory from 2020 onwards.

Austria: There is no legally binding reference value for radon in Austria. Radon remediation work is recommended for levels of 300 Bq/m³ or over.

Radon consultancy and radon measuring
Radon occurs everywhere in the soil. It is not the soil type or the nature of the subsoil that is the determining cause for excessively high concentrations of radon in buildings, but the permeability of the building envelope. A single measurement can indicate whether a building is affected. Measuring radon levels is simple and cost-effective. It involves placing small containers called dosimeters, the size and shape of ant bait, in the building for three months during the heating season. In particular, radon should be measured in "at-risk" buildings such as those with dirt-floor cellars, with inhabited basement spaces or without basements, and tiered or hillside buildings. The concentration of radon diminishes the higher up you go in a building. So in an apartment block, the people living on the ground floor are more likely to be affected by radon than those living on the top floor.

Radon remediation
Buildings affected by radon can be refurbished with some simple construction work. But because every building is different, the internal radon flows must be carefully analyzed before an individually tailored solution for radon remediation can be determined.

Gruner has a radon measuring office and, with Dr. Eva Bantelmann, a radon expert fully trained and certified by the Swiss Federal Office of Public Health (FOPH).

DR. EVA BANTELMAN
Radon expert, Infrastructure North-Western Switzerland, Environment

GRUNER WITH NEW ORGANIZATIONAL STRUCTURE

Gearing decisions more closely to customers

Gruner is a strong Swiss company with a long tradition: for over 160 years, the pioneering work of its employees has helped shape Switzerland's built environment – and, more recently, has done the same in many other parts of the world. Many distinctive buildings and much of Switzerland's present-day infrastructure testify to Gruner's expert services and the know-how of its workforce. Gruner's owners have a long history of close ties with the company, have invested a lot in its development and intend to continue doing so in future. They want Gruner to maintain its strength and independence over the next 160 years.

Strong growth

Gruner has grown considerably in recent years – not only through acquisitions, but also organically, thanks to the tireless commitment of its highly qualified employees who give their all, every day, to meet customers' high expectations, who contribute inspired solutions to design and construction problems in all fields, and who identify with their work and the company. Gruner also has many loyal customers throughout Switzerland and internationally.

The right static equilibrium is to a building what the right leadership and organizational structure is to a company. Since mid-2019, Gruner has adopted a new, agile structure that is in tune with the present company, its services and markets. At the center are the business units (BUs), which are clearly segmented and focused such that each has a specific competency for one market area.

Lean structures for even better teamwork

The BU heads have full entrepreneurial responsibility for their business and its development. At the same time, Gruner has a streamlined management team with the CEO, the CFO and the heads of the three new divisions – Buildings, Infrastructure and Energy – to which the business units are allocated. The division heads are responsible for the strategic orientation of the BUs within the division and support them in business development. They also foster productive collaboration between the BUs so that the best interdisciplinary resources can always be mobilized for any specific customer project.

Increasing customer focus

Introduction of the new leadership and organizational structure is part of Gruner's strategic reorientation. Building on its strong position in the Swiss market and international niches, the company seeks to gear its operations even more closely to customers and provide even more comprehensive support for their projects. At the same time, digital technologies will be used to expand its service portfolio and to boost efficiency and collaboration in service provision. This will be accompanied by other measures aimed at advancing the company and realizing its ambition of being: Inspirational – for outstanding results. Innovative – for the world of tomorrow.

Top-performing, market-oriented business units form the centerpiece of Gruner's new leadership and organizational structure.

Management of Business Area
Kurt Rau, Head of Buildings

Structural design Northwestern Switzerland, Geotechnical engineering
(Gruner Ltd)
Sandro Brunella

Structural design Zurich, Brugg
(Gruner Wepf AG, Zürich / Gruner Ltd)
Stefan Nievergelt

Structural design Central Switzerland
(Gruner Berchtold Eicher AG)
Stefan Aufdermauer

Structural design Eastern Switzerland
(Gruner Wepf AG, St. Gallen)
Markus Dierauer

Building retrofit Northwestern Switzerland
(Gruner Ltd / Gruner Lüem AG)
Roland Marty

General planning
(Gruner Generalplanung AG, Safety)
Lutz Wörner

Building services Basel
(Gruner Gruneko AG)
Andreas Schmid

Building services Bern
(Gruner Roschi AG)
Marc Wüthrich

Building services Zurich
(Gruner Gruneko AG)
Michael Reuteler

Fire safety, Building physics Northwestern Switzerland and Austria
(Gruner Ltd / Gruner GmbH, Vienna)
Jörg Kasburg

Fire safety, Building physics Zurich, Eastern and Central Switzerland
(Gruner Ltd)
Ralf Schnetgöke

Fire safety, Building physics Germany
(Gruner GmbH, Hamburg / Köln / Stuttgart)
Jörg Kasburg

BUILDINGS

CUSTOMERS

gruner
stucky

GRUNER WITH LOGO REFRESH

The Gruner logo with the distinctive arrow was originally entered in the Swiss Trademark Register in September 2000. Nearly 20 years on, concurrently with the launch of the new leadership and organizational structure, both the Gruner and Stucky logos have been refreshed.

While respecting the strong tradition, the revamped logos feature a more relaxed, contemporary typeface with a more dynamic feel. They are currently being introduced in all online and offline media.

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Thomas Ernst (President), André Bodmer, Christoph Ernst, Andres Gruner, Dr. Urs Rengel, Dr. Renzo Simoni, Philipp Simonius

Executive Committee
Olivier Aebi (CEO), Gérard de Montmollin, Kurt Rau, Reto Hagger, Stefan Mützenberg

Staff
- Legal, Insurance
- Corporate Communications
- Organizational Development

Integrated Management System

INFRASTRUCTURE

Management of Business Area
Reto Hagger, Head of Infrastructure

Infrastructure Western Switzerland
(Stucky Ltd)
Jean-François Wavre

Infrastructure Basel, Environment
(Gruner Ltd)
Michael Bont

Infrastructure Oberwil
(Gruner Böhringer AG)
Roger Schaub

Infrastructure Zurich, Brugg
(Gruner Wepf AG, Zürich/Gruner Ltd)
Markus Doessegger

Infrastructure Central Switzerland
(Gruner Berchtold Eicher AG)
Juri Schuler

Infrastructure Eastern Switzerland
(Gruner Wepf AG, St. Gallen/Zürich)
Christian Epper

Infrastructure Leipzig
(Gruner GmbH, Leipzig)
Thomas Wahl

ENERGY

Management of Business Area
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Hydropower, Dams
(Stucky Ltd, Stucky Caucasus Ltd., Stucky Teknik Eng. & Cons. Comp. Ltd)
Brendan Quigley

Hydropower equipment, T&D
(Stucky Ltd)
Yann Favrel

Energy German-speaking Switzerland
(Stucky Ltd)
Stefan Mützenberg

Energy Balkans
(Stucky Balkans d.o.o.)
Cane Cekerevac

Business Service Center
Gérard de Montmollin, CFO

Service Units
- Human Resources
- Finance, Controlling
- Information and Communications Technology
- Digital Business Solutions
- Purchase, Order and Logistics

SWISSBAU 2020

"Yard" — What you see is what you get

Visualization of "uptownBasel" Industry 4.0 development site in Arlesheim, near Basel.

In partnership with buildup, CRB, Debrunner Acifer and Raumgleiter, Gruner will be presenting the key features of the uptownBasel innovation project at the Swissbau 2020 construction trade fair in Basel. The aim is to demonstrate how various technical applications can be used to increase the competence of the "customer," i.e. construction owner, and simplify decision-making through the provision of transparent project information.

The show will focus on the real-life uptownBasel site that is serving as an "ideas laboratory" for the Swissbau Innovation Lab exhibition feature. The uptownBasel competence center for Industry 4.0 is being built on the approx. 70,000 m² Schorenareal site in Arlesheim (Canton of Basel-Landschaft). Work on the smart manufacturing hub, which will accommodate some 2,000 employees, is already in progress on what is currently the biggest job site in north-western Switzerland. The new factories will be completed and existing buildings converted by 2025. The modern facilities will be geared to the strict requirements for automated industrial production.

Better decision-making

With a focus on "Industrial processes and methods", the Yard show demonstrates how various technical applications can be used to increase the competence of the "customer", i.e. construction owner, and simplify decision-making through the provision of transparent project information. The aim is to actively involve customers or later users in the ongoing design process, respond flexibly to their needs and guide them as efficiently as possible through the entire design and construction process. To demonstrate specific "use cases", a fictitious (ghost) building was developed that can be repeatedly trans-

formed in line with requirements. On the basis of a full, interdisciplinary 3D model, the design team creates a "digital twin" of the project, which is available prior to the start of works and can also be used during the operation phase. In addition to the customer's requirements, the 3D model is the key navigation instrument in the design process. The later users are thus able to play a major role in shaping the "ordered" facility. Raumgleiter's ArchScape application provides an interactive visualization platform that offers them an up-to-the-minute virtual experience of the project's progress. They can also select from various options that allow flexible configuration of particular building features (facade and interior fit-out). Details of the current state of the project are available to users at any time or location. All aesthetic design aspects also have implications for structure, services and operation.

Clearly defined interfaces

As the key interfaces were clearly defined by the design team, Gruner can use the 3D model to perform script-based analyses and assessments of the structural design and building services concept (including environmental control issues) and adjust the specialist design parameters where required. The specific issues under examination include two separate load cases acting on a facade fitted with different cantilever connection systems, summertime thermal control, indoor thermal comfort and energy performance in the context of the site-wide sustainable energy concept. The interaction between structural design and building environmental control is a particularly important aspect as configuration of the building interior allows the creation of flexible scenarios.

Dynamic and model-based quantity measurement

The building is conceived as a modular system. All elements are allocated to type classes and, depending on the class, contribute information needed for the model-based quantity measurement and detailed cost estimate under the Swiss eBKP-H cost classification system. The values assigned to specific building components (e.g. the cantilever connection system) are able to adapt dynamically in line with project changes. For this, the key parameters were jointly defined. The bill of quantities, based on the Swiss NPK specification system, can likewise be generated using the components from the 3D model. As the quality and functional requirements placed on the components are clearly defined, suitable products can be assessed and compared on the buildup platform, and stored in a project-specific folder accessible to the entire project team. The suitable product is sampled in the context of the model using an interface with buildup and the relevant parts list forwarded to CRB. As a result, product information appropriate to the project phase is always retrievable. In the specific case of the two facade options with cantilever connection system, particular requirements were placed on the product. The suitable component is offered by Debrunner Acifer Bewehrungen AG. During the 3D design process, the company's digital tools give designers full control of the installed products.

Added value by comparison of alternatives and cost optimizations

Gruner is able to optimize the progress of the works by specifying the threaded ACINOXplus UX cantilever connection system. To facilitate logistical planning and site controls based on lean principles, all reports relating to the time of order, delivery and installation are documented via a list portal, and made available to the customer as part of the building documentation.

To sum up, the particular features highlighted by the Yard project include the efficiency of 3D design, the role of interdisciplinary collaboration and information sharing, flexible project organization and the active involvement of the customer in the design and planning process.

Beat Loosli, welche dieses Video ermöglicht haben. Die Heizzentrale wurde in Plancal #Nova von Trimble Inc. modelliert und in Autodesk #Revit mit Hilfe von #Enscape gerendert.

#GrunerRoschi #CAD #BIM #Heizzentrale

#GRUNER #STUCKY

Follow us

Lernendenprojekt: #Weihnachtsaktion 2019

Statt Kundengeschenken hat Gruner erneut ein soziales Projekt unterstützt. 10 Lernende leisteten einen einwöchigen #Arbeitseinsatz in Says, Graubünden: Sie arbeiteten an einem Kuhstall- und Scheunenneubau.

Erneut wurden sie durch die fachliche Leitung von Urs Dill, Senior Bauleiter, Business Unit Generalplanung, begleitet. Ausserdem wurde die #Zusammenarbeit mit bergversetzer realisiert, einem Gemeinschaftsprojekt der Schweizerischen Arbeitsgemeinschaft für die Berggebiete (SAB) und der Schweizer Berghilfe.

Eindrücke zur Woche finden Sie im Video. Gefilmt von unseren Lernenden.

#Gruner #Lernende #Zusammenarbeit #Arbeitseinsatz #Bergversetzer

Swatch Neubau in Biel

Genauso spektakulär wie die Architektur von Shigeru Ban (local Architect Itten+Brechbühl AG) ist das Energiekonzept des Swatch Omega Areals: es wurde eine rezirkulative Grundwassernutzung von Gruner Gruneko AG geplant und umgesetzt. Mit diesem System werden im Sommer kalte und im Winter warme Grundwasserströme genutzt. Über hydrogeologische Simulationen haben wir die Anzahl und Verortung der Förder- und Rückgabebrunnen optimiert. Wir freuen uns, dass wir mit unserem innovativen Energiekonzept und unserer HLKS/MSR-Planung der Gebäude zu diesem aussergewöhnlichen Bauwerk beitragen durften – das lässt das Herz jedes TGA-Ingenieurs höher schlagen!

#Gruneko #Energiekonzept #Grundwassernutzung #Holzbau

Elegantes Brückenkonzept gewinnt

Das Brückenkonzept «Twin Boxes» konnte sich in einem 1-stufigen Verfahren gegen Entwürfe von namhaften Mitbewerbern durchsetzen und die Jury überzeugen. Die Brücke über die Wyna ist Teil der geplanten Ostumfahrung um die historische Altstadt von Beromünster.

Die Projektierungsarbeiten starten Ende 2019 und umfassen alle Phasen vom Vorprojekt bis zur Inbetriebnahme.

#GrunerWepf #Brücke #Ästhetik #Wettbewerb

Verleihung Gruner Innovationspreis 2019

Jährlich findet die Verleihung des Gruner Innovationspreises für Absolventinnen und Absolventen des Instituts Bauingenieurwesen der FHNW statt. Ausgezeichnet wird die innovativste Bachelor-Thesis.

Die diesjährige Gewinnerin ist Frau Salome Lustenberger mit ihrer Thesis «Neubau Hallenbad in Rothrist, Statische Analyse und Variantenuntersuchungen». Der Innovationspreis wurde Ende September von Michael Schumacher, Abteilungsleiter Tragwerksplanung von Gruner, an der Diplomfeier überreicht.

#Gruner #Innovationspreis #Bauingenieurwesen

Vieux Emosson filled

The reservoir behind the newly heightened Vieux Emosson dam is full for the first time.

Stucky has been working on this project intensely since December 2009. Beginning with a prefeasibilty study Stucky completed all phases of design and studies, application for authorizations, call for tenders, execution project, site supervision, monitoring and commissioning phases for the dam-heightening project, but also for several ancillary works (access tunnel, adduction, pumping station, etc.).

The main works lasted from 2012 to 2015. The impoundment started in May 2017 entirely from natural inflow and has lasted longer than initially planned since it did not take advantage of the pumps of the Nant de Drance pumped storage plant (www.nant-de-drance.ch) which are not yet functional. During this ini-

OFFER

Our competencies at a glance

INFRASTRUCTURE
RAPID PROGRESS – SAFE ARRIVAL

We are there to help people who are on the move and need reliable services. We offer our customers advice and support in the development and implementation of large- and small-scale infrastructure projects, at local, regional, national and international level, for public and private transport facilities as well as water, gas and electricity utilities.

STRUCTURAL DESIGN
METICULOUS DESIGN THAT STANDS ABOVE THE REST

We develop the optimum structural solutions for buildings and bridges. With an open-minded, innovative approach to the realization of complex and creative architecture, we are your engineering partner of choice. In terms of sustainability and visual impact, our structures always deliver what is promised. And for structural maintenance and improvement schemes, we are never short of good ideas.

FIRE SAFETY
BETTER SAFE THAN SORRY

With profound expertise and a fiery commitment, we offer our customers advice and support on both small and large-scale projects. All our efforts are geared to delivering a convincing solution that satisfies all criteria. Although a residual risk always remains, our consulting services and innovative engineering methods ensure that this remains at an acceptable level.

BUILDING SERVICES
ALL-ROUND COMFORT

We develop intelligent integral concepts for buildings where owners and users can feel at home. The life-cycle perspective nonetheless remains firmly in focus. Light, shade and the indoor environment are simulated before the first pipe is even laid. Architecture, structure and M&E equipment are skillfully reconciled throughout the concept, design and implementation phases. As experts in the use of geothermal energy, gas and biomass for heating, cooling and electricity generation, we are also helping to implement Switzerland's energy strategy 2050.

LEAD DESIGN,
GENERAL PLANNING
BETTER WAYS OF MANAGING CONSTRUCTION

In ensuring the smooth progression of design and construction, we adopt a variety of roles: as general planner/lead designer on new-build, refurbishment and alteration projects, we eliminate all interface problems in the design and production processes. At the design stage, we reconcile the demands of clients and architects. At the construction stage, we keep a tight grip on costs, deadlines and on-site workmanship.

ENVIRONMENT
NEXT STOP – THE FUTURE

Regardless of facility type – whether for buildings, roads, tunnels, landfills or the open countryside – we provide surveys, analyses and counselling, and develop comprehensive solutions for our customers' projects. Our sound decision support maximizes the benefits for the environment and humankind – in the near future and for generations to come.

SAFETY, SECURITY
THE LESS RISK, THE BETTER

We help to protect infrastructure, companies and individuals while improving security at major events. Our risk analyses and assessments enable us to pinpoint hidden dangers. We partner our customers in analyzing possible solutions and put in place effective measures that prevent minor incidents from triggering major crises.

ENERGY
CLEAN ENERGY FOR CLEAN LIVING

No matter how deep the water, with hydropower plants we are never out of our depth. We oversee projects in Switzerland and worldwide, from the feasibility to the commissioning stage, always with an eye to optimizing technical, safety, ecological and economic performance.

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