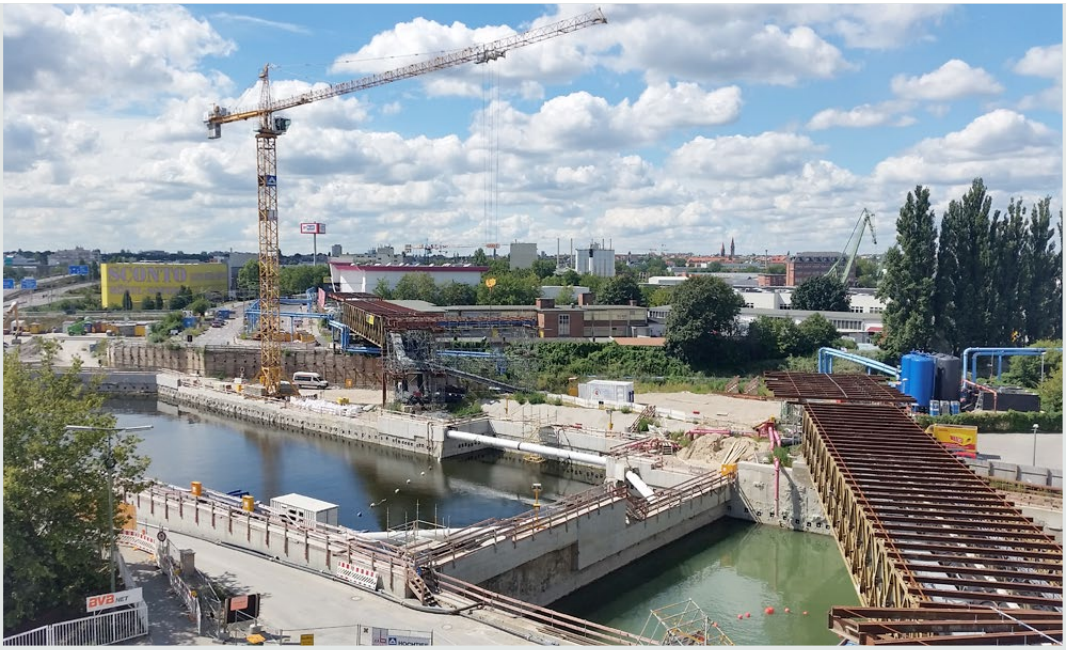
GuD AKTUELL

December 2016

News from GuD Geotechnik und Dynamik Consult GmbH



Construction site of the 16th construction unit of BAB A100 in the summer of 2016 at the Neukölln junction.

Highway Project for a Better Quality of Life

The 16th Construction Phase for BAB A100 in the South of Berlin

The Berlin urban highway is being extended between the junctions Neukölln and Treptower Park.

The purpose for the 3.2 km long addition to the existing highway is to achieve a better connection between the eastern districts of Berlin and the federal highway system. Due to the diversion of commercial and through traffic, residential areas will be relieved of noise and pollution. The noise level around this new highway will be comparatively low because the new section will be built utilizing a trough system and porous, noise reducing asphalt of which 385 m highway are tunnel. In March of 2016 the joint venture Schüssler Plan, VIC, and GuD Geotechnik und Dynamik Consult GmbH have been commissioned to supervise and manage lot 5, 6, and 7. Additionally, we will be acting as geotechnical experts. The cost for sixteen construction units of the BAB A100 highway are expected to run up to 473 million Euro by the year 2022.

New Plans for Frankfurt Skyline

Formerly the highest building in Frankfurt.

After the demolition of the formerly highest building in Frankfurt/Main plans for a new hotel and residential tower with a height of approx. 140 m are in the works on the former AfE area.

The AfE area was named after „Abteilung für Erziehungswissenschaft – Department of Educational Sciences", the former user of the area located on the Johann Wolfgang Goethe University campus. Before the twin towers of the Deutsche Bank were built, the AfE tower was the highest building in Frankfurt. Project developer Groß & Partner are planning to build an entire building complex which will also house two highrises. GuD have been commissioned for technical consultations as well as vibration monitoring and assessment for the first highrise, a hotel and residential tower with a height of 140 m.

Experts for the Federal Railway Authority (EBA)

Dear Readers,

geotechnical questions about safe and economic construction and operation of a railway are as old and diverse as the railway itself. New challenges present themselves all the time. The railway line leads through all of Germany, through and across all kinds of geologicial formations. They cross streets and waters and run through our cities and communities. At the same time, demands on railroads and cost pressure for construction are increasing. The regulations and standards currently in effect need to be observed and at the same time new and innovative solutions for railway construction projects need to be found and applied, without jeopardizing security standards.

The proven principle of dual control during contruction with designer and auditor is a VVBau requirement – a regulation issued by EBA, the federal government licensing authority. Currently, the railway line Berlin – Frankfurt/Oder is being extended for tomorrow's traffic. I am the geotechnical auditor for the planning segment (PA17) going through the district of Berlin Köpenick, which geotechnically is an exciting and challenging project without being especially spectacular in itself. From my own experience I know that the questions raised for an EBA expert do not only aim at the assessment of construction documentation. Often, railway issues with neighboring constructions, especially in urban areas, are raised and need to be clarified, evaluated, and solved to everyone's satisfaction.

Dipl.-Ing.
Kerstin Deterding
General manager

A New Expert is Sworn In

Dipl.-Ing. Almuth Große was publically sworn in by the Chamber of Engineers of Saxony as expert for earthworks and foundation engineering, subsoil related damages and waterproof building in areas with soil contact on September 14, 2016.

Dipl.-Ing. Almuth Große, Managing director GuD Geotechnik und Umweltgeologie GmbH

Anniversaries 2016

We thank our dedicated co-workers for their long-time collaboration and wish them all the best for the future:

Eitel Wierzoch – 25 years BBI
Hans-J. Appelius – 25 years GuD
Norbert Leiner – 20 years GuD

Current Publications

Employees of the GuD group have taken part in speeches and have co-authored publications. This is only a selection – more can be viewed at www.gudconsult.de.

- Comparison of load bearing behavior of vibrated and driven steel piles
  By Fabian Kirsch, Christian Moormann, Volker Herwig
- Conclusions of project team „Geotechnik der Initiative PraxisRegelnBau e.V."
  By Thomas Richter, Martin Ziegler, Elias Tafur, Bernd Schuppener, Franz Ruppert
- Possibilities and limits of geotechnics
  By Sascha Henke, Peter-Andreas von Wolffersdorff

Dissertations

We extend our congratulations to our colleague **Dr.-Ing. Hatice Kaya (Hamburg)** for obtaining her PhD at the Technical University of Hamburg-Harburg by submitting her thesis on „Soil protraction and gap formation due to inserting profiles into sealing layers made of clay".
We also congratulate **Dr. Patrick Arnold (Berlin)**, who received his PhD from the University of Manchaster by submitting his thesis on "Probabilistic modelling of unsaturated slope stability accounting for heterogeneity".

GuD Leipzig – Current Projects

Our team in Leipzig has a lot on its plate. Two exciting building projects in the center of Leipzig require all of the GuD Leipzig expertise.

At the eastern side of the Leipzig Central Railway Station a building with **two new hotels** of different categories is planned. The new construction features a base area of 44 m x 36 m and 60 m x 36 m. Only parts of the building will have a basement so that the excavation area will be approx. 1,670 sqm. A building pit with up to 5,5 m depths is required. A trough building pit with sheet pile walls and sealing base is being erected because lowering the groundwater to this level is not permited. Developers for this project are S&G Development Partners Objekt Leipzig GmbH, who have been developing projects for Leipzig for many years. We have drawn up the plans up until phase 4 and have applied for a dewatering permit. In addition, we are conducting the subsoil investigation for the retaining wall of the excavated pit.

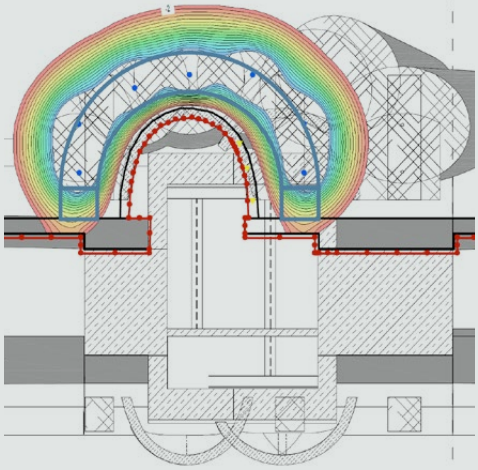
At Talstrasse in Leipzig a **new apartment building** is under construction. Developers are the Wincon Projektgesellschaft Talstraße GmbH & Co. KG. This building with six floors will also have an underground garage which will protrude beyond the floor plan. The total base area will therefore be 40 m x 40 m. In order to plan for approx. 5.8 m deep building pit, it had to be determined whether security measures have to be taken to protect the adjacent buildings. In this case, no further measures were needed. Apart from these services, we are also assigned to do the special construction supervision in order to clear the location in the land register for contaminated sites.

New construction at Talstrasse 4 – 6 in Leipzig, developed by WINCON Immobilien GmbH.

For the **new construction of a student's residential building** at Josephinenstrasse/Stiftstrasse we have been assigned to do the subsoil investigation and plan the foundation. Developers are RECONA GmbH & Co. 53 Vermögensverwaltungs KD in Berlin. In one part of the construction area we ran into a concrete slab under which we came upon a 7 m deep filling. The examination and comparison of different foundations in this area resulted in bored piles as best option. Apart from the foundation, we also planned excavation pit and took part in the award procedure. During the construction phase, we are in charge of special supervision.

Cool Plannings during Munich Summer

GuD Consult is geotechnical planner and freezing expert for the modernization and refurbishment of the underground stop Sendlinger Tor in Munich.



With the aid of freezing technique, the subway station Sendlinger Tor will be modernized.

The subway station was built in 1971, shortly before the opening of the Munich Olympic Games, and is today one of the morst important interchange stations in the Munich underground system servicing 145,000 passengers daily. In order to comply with security and fire regulations, the station will be reconstructed to make it more modern and customer friendly. In addition, two connecting escape tunnels for running subway traffic are to be constructed.

This demanding building project in the center of Munich is very challenging in terms of planning and execution without interrupting subway traffic. Due to this framework, GuD Consult was commissioned to take charge of the geotechnical planning, to take part in the award procedure, and to take care of the special issue of freezing supervision. Building measures are to start in the summer of 2017. Completion is planned for 2022.

GuD Consult and BBI – facing the future together

With a considerable investment into the Hamburg based engineering offices of BBI, GuD Consult are strengthening their profile and performance in Hamburg and Northern Germany.

In 25 years, BBI have made a name for themselves in and beyond Hamburg as geotechnical experts and integrated consultants and planners in the field of geotechnology and environmental technology. In recent times, BBI has also specialized as geotechnical expertise for the foundation of offshore wind power plants in the North and Baltic sea. Operations will be continued by the current manager Dr. Franjo Böckmann and the two new managing partners Dr. Sascha Henke and Dr. Olaf Stahlhut. As additional manager and liason with GuD, Dr. Fabian Kirsch and Dr. Götz Hirschberg, both managing partners at GuD, will go into office. Peter Bahnsen will continue to contribute to the associations ventures as senior partner. Due to these synergies, BBI will extend its portfolio especially in the areas of subsoil dynamics and numerics.

With a team of 27 people, BBI is ready or large and complex tasks.

Major Projects in Hamburg and Northern Germany

We advise DEGES in Hamburg-Wilhelmsburg about the diversion of federal highway B4/B75.

Highways in Hamburg

The DEGES (German Unity Motorway Planning and Construction Company) is currently planning a **new construction of the A26-East highway**. This 9.5 km long stretch of highway will create an east-west connection between the A7 highway in the West and the A1 highway in the east leading through an existing harbor area. This will be the largest new highway construction in Hamburg in the next ten years. For two segments of this highway we have been commissioned with the planning and expert support of the subsoil investigation, with drawing up the geotechnical expert report as well as the geotechnical special planning and foundation report – party in collaboration with the offices of Steinfeld and Partner. This segment of the highway leads through existing industrial and railway installations. The crossing of the river Süderelbe is planned via a 53 m long new bridge; a noise protection tunnel of several hundred meters will be erected.

Another DEGES project is the six to eight lane **extension of the A7** highway between Othmarschen and the state border of Schleswig-Holstein. We are commissioned to assist with three tunnel segments of the 12 km long segment of the A7 highway north of the Elb tunnel. Commissioned by DEGES, we also evaluate and advise with **the diversion of the B4/B75 federal highway**. The old track route of 4.8 km length will be diverted East towards the existing railway system in order to minimize the traffic load for the local residents.

Permanent crossing „Fehmarnbelt"

In 2008, Denmark and Germany agreed on the construction of a permanent connection between the two countries via the so called „Fehmarnbelt". Denmark is building an immersed tunnel through the Baltic Sea and the connection on the Danish side. Germany has committed to ensuring an efficient road and rail connection on the German side. More than 75 km of rail connection between the city of Lübeck and the island Fehmarn are being upgraded with double tracks. The BBI team explores and evaluates the subsoil technicalities for the entire route, including all civil engineering structures. Apart from the rail connections, a variety study for the Fehmarnsund crossing is currently underway. We are exploring the subsoil with up to 80 m deep investigation bor holes.

The Fehmarnsund crossing is the biggest infrastructural project of the Deutsche Bahn in Northern Germany.

Excavation pit at the Hamburg Brooktor harbor for the extension of the corporate headquarters of Gebr. Heinemann.

Challenging building pits

We currently pariticipate in several building pits with a total base area of several 1,000 sqm and up to three basements in the city of Hamburg. We provide services from subsoil examination and foundation consultation to excavation pit planning and construction supervision. The building pits Holstenstrasse and Lohsepark as well at the Atlantik hotel are part of this.

City Center Challenge

Sensitive neighborhood development, traffic, or adjacent railway lines turn excavation pit planning and foundation concepts in city centers into a demanding challenge.

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The Grand Tower in Frankfurt/Main will be the Germany's tallest residential buildig with a height of 172 m.

For these current projects in Franfurt/Main, our team has supported the complex planning and construction processes and has supervised the construction.

In Frankfurt's Europa quarter, the construction of the **Grand Tower Frankfurt** with 401 residential units over 47 floors on a base area of 2,600 sqm is underway. GuD has been commissioned by the developer aptus 848. GmbH with the technical supervision and quality assurance of all special civil engineering and foundation tasks carried out by Züblin AG. The Frankfurt subsoil requires a demanding foundation concept with a combined pile raft foundation. 51 foundation piles with lengths up to 45 m were built and connected to the base plate.

The retaining wall of the trough building pit was made by implementing an anchored reinforced steel diaphragm wall into a depth of 22 m. Another special feature is the connection to the newly built adjacent Hotel Adina. During the construction of the Hotel Adina building pit an overlapping bore pile wall was built which is now the northern building pit wall of the Grand Tower. The highrise is supposed to be completed in 2019.

The **Schwedler Carré** is a building complex with offices, shops, and apartments which is currently being built in Frankfurt's district of Ostend. Directly adjacent to the building runs a multitrack railway line. A vibration report, which we were commissioned to draw up for the developer, Max Baum Schwedler Projektentwicklungs GmbH, resulted in major vibration transfer into the new building induced by railway traffic. To avoid negative impacts on the living standard we created a concept for a dynamic disassembly and planned the layout of elastomer mats. We were also responsible for the technical supervision of the transfer works. Completion of the Schwedler Carré is scheduled for 2017.

Elastomer mats are supposed to prevent vibration through railway traffic.

Small Apartments with Large Underground Parking

A new construction of small apartment for students is planned at Emil-von-Behring-Str. 2 in Frankfurt. A special feature is the large underground parking garage with a base area twice the size of the residential building.

The new construction of these „micro apartments" over eight floors, including commercial space, will feature a full basement. South of the new building complex an underground garage with the same length as the building will be constructed which will be very close to the neighboring building. The construction of the basement will be made in the shelter of a trapezoidal building pit with dimensions of 95 m x 30/65 m. The base area is 4,200 sqm. Because the building pit base is located in 1.25 to 2.1 m underneath the ground water level, dewatering by ground water draw down is intended. We are commissioned to plan the building pit and take part in the tender procedure as well as participate in the awarding procedure for construction, evaluation of building pollutants, and water permit.

© Cresco Capital Group

Almost the entire area will feature a basement.

New DGGT Board

Dr.-Ing. Fabian Kirsch was elected to the Board at the general assembly of the Deutschen Gesellschaft für Geotechnik e. V. (DGGT) – German Geotechnical Society – which took place at the Subsoil Conference. At the same time the GuD founder, Professor Thomas Richter, concluded his many years of committed work as DGGT board member.

Dr.-Ing. Fabian Kirsch is the new DGGT board member.

Subsoil Conference 2016

As every year, GuD Consult – for the first time along with our BBI colleagues from Hamburg – had a booth at the 34th DDGT Subsoil Conference in Bielefeld. We had three fruitful days with many interesting and informative talks. Our colleagues from GuD Consult and BBI were involved in the program with their own presentations and speeches as well as co-authoring.

Stimulating talks at a well frequented GuD Consult and BBI booth.

GUD Consult now SCC** certified

Since January of 2016, GuD Geotechnik und Dynamik Consult GmbH has unlimited SCC (Safety Certificate Contractors) certification.**

SCC is an internationally acclaimed method for certifying the security management system in companies. It combines issues related to (work) security, health, and environment.

Top Physical Condition to Tackle Major Tasks

B2Run Berlin – the GuD team in front of the Olympic Stadium.

GuD employees are not only involved in their professional fields. They are also physically active – preferably in a team!

Our soccer players made 5th place in the **13th Alps Cup** soccer match on June 23, 2016. Our team had to compete agains strong opponents at an exciting match with many interesting encounters.
A major victory was won for our team at the **4th IMMO SAILING CUP** held by WOHNKOMPANIE at the Havel lake in Berlin. The weather was good for sailing and Oskar Rodloff, Maike Wedewardt, and Lilly Berndt were able to make first place after four sailing rounds. This was the second time a GuD team took part and everyone had a great time.
For the first time this year we had teams in Berlin and Hamburg take part in the **B2 runs**. Ten participants each started for GuD Berlin and BBI Hamburg. The B2 runs are the most important German company running championships taking place in 17 German cities. Another running event was the **17th Berlin Water Company's 5 x 5 kilometer team relay race**. Ten of our employees started for GuD Berlin on July 3, 2016.

GuD supports Germany's no. 1 Volleyball team

Since the 2016/2017 season, GuD Consult is sponsor for the BR Volleys team. We want to continue making Berlin's high performance sports possible and thus increase Berlin's appeal. The BR Volleys are a partner representing a not overly attractive kind of sport but with high standards and a strong dedication and involvement in youth work. For this year's sponsor's tournament, GuD employees have formed a team and made fourth place at the first go. We also continue to support the Oranienburg Handball Club and are looking forward to the new season.

Our team at the sponsor's tournament of the BR Volleys.

Highrise Foundation over S-Bahn

A highrise with 150 m height is planned next to the new Berlin Central Railway Station. At the same time, a tunnel for the future S-Bahn line S21 will be built.
Two building pits for the highrise foundation with about 55 m lengths, 22 m widths and 20 m depths already exist south of Invalidenstrasse. The excavation pit walls are reinforced concrete diaphragm walls which implement the existing diaphragm walls.

View into the building pit with three steel stiffening levels.

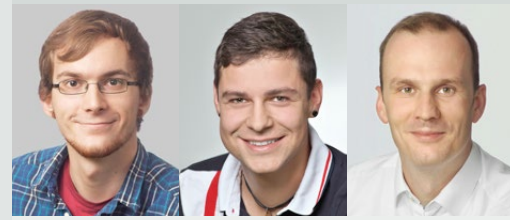
The horizontal sealing is a half levelled jet grouted slab which is connected through micro grouting piles and large bored piles. Horizontal strutts will be done by three temporary steel stiffening levels. In the shelter of the building pits, a segment of the tunnel for the S 21 S-Bahn line will be constructed and connected with the adjacent underground subway tunnel. For the future construction of the highrise above the tunnel a combined pile sheet foundation was designed. Therefore, the foundation of the tunnel as well as the highrise consist of a 2.5 m thick foundation slab, 44 shaft grouted large bore piles with a diameter of 1.5 m and 50 m depths, as well as the already existing shaft grouted diaphragm wall. In the spring of 2016, the final excavation level of the building pit was reached and the construction of the tunnel started. GuD Consult was in charge of the permit and construction planning for the building pit and the piles for the comibined pile sheet foundation and technically supervised all measures.

New Co-Workers

This year we again were able to welcome many qualified colleagues into our team and are looking forward to a successfull cooperation.

GuD Consult Berlin

M. Eng. Robert Will | M. Sc. Katrin Wenzel | Anja Dirner-Egerdy

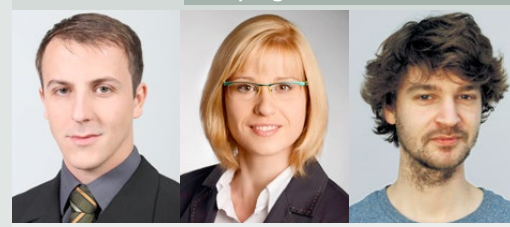


B. Eng. Lennart Kaepernick | M. Sc. Peter Meinert | Dipl.-Ing. (FH) M. Sc. Marco Breitenstein

Dr. Patrick Arnold | Dipl.-Ing. Andreas Klopp | M. A. Svetlana Lerche

M. Sc. Gianluca Zorzi | Dipl.-Geol. Doris Hoffmann | Dr. rer. nat. Michael Thelemann

Leipzig



MEng. CE Tomislav Jurin | Dipl.-Geol. Eva Klein | Sebastian Ernst

Hamburg

Dr.-Ing. Hatice Kaya | M. Sc. Henrieke Lerch | Dipl.-Ing. Verena Meyn

Enclosing of Waste Material in MIP Walls

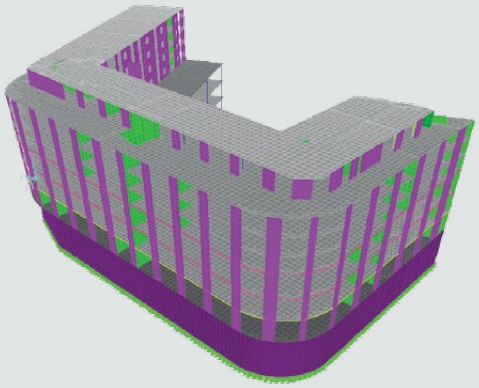
An alternative for the classic securing of contaminated waste, for example by enclosure with seal or sheet pile walls, exists: The MIP (mixed in place) procedure allows for a cost effective and safe vertical enclosure.

For implementing a vertical seal, the MIP procedure uses augers to submit a cement slurry into the ground. The soil-concrete-cement mixture hardens and takes over either sealing, or static properties for which the cement part has to be increased accordingly. To ensure total enclosing, the waste material has to be sealed horizontally downward and upward depending on the composition of the waste and geology. The insertion of artificial horizontal base sealings (injection gel or jet grouted base) is fairly complex and expensive so that these types of sealings should only be used under special circumstances. Such an enclosure is especially suitable when a natural base sealing (clay, till, etc.) exists.
If the waste materials are volatile pollutants, or if a wash out by rain should be prevented, a horizontal upward sealing may be necessary. Generally, building on top of such enclosed waste material is possible. To prevent pollution diffusion inside the buildings, a so called fresh concrete compound foil connected to the MIP wall is recommended. GuD Consult has planned and supervised this method at the construction site Wisbyer Strasse (together with the engineering office of Lehmann) and Usedomer Strasse.

The MIP procedure has successfully been implemented at Wisbyer Straße in Berlin.

Protection from Rail Traffic Immissions

Vibrations and secondary airborne noise due to urban rail traffic affects the usability of new constructions more frequently. The topic of traffic vibrations pertains to more than 50 % of our structural dynamic tasks.



At the Postplatz in Dresden we have planned a building foundation using a threedimensional finite element model.

Depending on stimulation, foundation, and structural construction, vibrations due to rail traffic can lead to vibration load and especially to secondary airborne noise load. These immissions can already be measured, calculated, and evaluated during the structural planning phase. Often, elastic building foundations a sensible reduction measure. It is crucial for the success of such measures to realistically take the stiffness parameter of gound and building into account. This year we have supported projects throughout Germany. At HafenCity Hamburg a steel spring element was implemented to protect the building from the subway vibrations. For a residential building project in Dresden we have dimensioned a partial building foundation underneath the base plate while such extensive elastic foundation as protection against secondary airborne noise immission has already been implemented at Schwedler Carré in Frankfurt/Main. In Munich, a partial elastomer foundation is being built for a residential and commercial building at Barlowstrasse, based on our planning. The success of these measures can be verified by vibrations measurement, as has been done at Wisbyer Strasse in Berlin. The results of the projects mentioned, and many more, show that the timely involvement of a structural dynamics engineer into the planning process can result in effective vibration and secondary airborne noise protection actions.

In Munich we planned a partial elastomer foundation.

New Law for Wind Energy at Sea

Hanseatic Power Cert

In the summer of 2016 the changes made to the renewable energies law, especially the law for developing and promoting wind energy at sea, have resulted in an entirely new regulation for the tendering procedure for offshore wind energy.

The aim of this new regulation is to strengthen competition, to adjust to the guidelines of the European Commission, and to improve planning security for the windparks connected to the grid. This means a major change for our industry. For GuD as geotechnical experts, geotechnical planners, or consulting engineers there has been a noticable shift in the job descriptions. But most of all, our offshore certification association HPC Hanseatic Power Cert GmbH in Hamburg will be affected. In our future tenders, feasabilities, shorter planning periods, risk factors, and due diligence tests will play a major role. Our team of engineers, geologists and geophysicists in Berlin and Hamburg are excellently trained to tackle these new market conditions.
As members of the counsel for the Federal Office of Navigation and Hydrography as well as numerous work groups of the German Association for Geotechnics we advise and support the standardization of relevant work processes in the field of offshore wind energy. We are also involved in the development of stadards and regulation, for example the new DIN 18088 and the VDI recommendations 4551.

Imprint

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