## Scope of Services
Gauff Consultants has a wide interdisciplinary spread as a working engineering company.

## History
1958 until 2014. An overview from the company’s formation until today. Over half a century of time and company history at a glance.

## Water is the source of life
One of the most important challenges of our time is the access to drinking water. The United Nations declare this as a Millennium Development Goal.

## Fewer diseases through improved hygiene
In order to avoid diseases and so as to avoid reintroducing those defeated, the safe disposal of waste water must go hand in hand with the supply of drinking water.

## Roads connect people
There would be no progress without roads; commercial centres are established at their junctions. Modern roads are a major factor contributing to economic growth.

## Total solutions for rail
The railway network is an important means of transport. More than 600 million tons of goods and more than two billion people are transported by it annually in Germany alone.

## Urban planning and architecture
From the layout to the building materials. Only when everything is right do people feel comfortable in a building. Beside knowledge and experience, intuition plays an important role in this.

## Mobility Consultancy
The planning of mobility concepts is a key task of future – and its successful realization a challenge for cities, regions and counties.

## IT Solutions
To expand limits of thinking and to create new innovations – this provides more comfort for the provider and the consumer in a world of networked traffic systems.

## Gauff Consultants
Competent, multidisciplinary and interdisciplinary. For every challenge and task, Gauff Consultants with its associated companies provides the most appropriate available specialist expertise for effective and targeted independent engineering services.

## Contact
The right contact for each enquiry and task. In Germany, in Europe and all over the world.
German Expertise since 1958

With respect to engineering services in more than 100 countries around the world, the name “Gauff Consultants” stands for a high level of competence, German thoroughness and reliable partnership.

Over 55 years of experience are the foundation for the companies within the Gauff Consultants group.

Since the formation of the engineering office of Gauff in 1958, we have successfully completed more than 30,000 infrastructure project solutions for our clients. In doing so, we have been and are always the reliable partner for national and international financiers, for the public sector as well as for private investors.

With the knowledge and the experience of our employees, we are able to offer project solutions in a wide range of professional disciplines. We focus in particular on services from the following sectors:

- Water and waste water
- Transport, road and rail
- Mobility consultancy and IT Solutions
- Environmental protection and energy technology
- Urban planning and architecture

For 50 years, our knowledge is also internationally valued and appreciated. With our more than 25 branch offices worldwide, we care for our projects in a customer-oriented way. We are thereby among the TOP 200 consulting enterprises within the international engineering service sector.

We combine tradition and innovation in our “German Expertise”. This makes us the project partner of choice for the realization of our clients’ infrastructure projects both at home and abroad – and this since 1958.

Dieter B. Gauff
WATER SUPPLY
- Recovery
- Abstraction
- Treatment
- Storage
- Transportation
- Distribution

WASTE WATER DISPOSAL AND PURIFICATION
- Collection
- Transportation
- Purification
- Reuse

ENVIRONMENT & ENERGY
- Dumping grounds for domestic and industrial waste material
- Soil cleaning
- Recycling of waste and construction material
- Protection of water bodies and water pollution control
- Renovation and restoration of water bodies
- Hydropower/Renewable energies
- Climate change
- Erosion control, bank and coastal protection
- Agriculture and irrigation

ROADS
- Stationary traffic systems
- Motorways
- Highways and urban roads
- Traffic management systems
- Park and ride facilities
- Handling facilities for combined transport
- Telematic controlled truck parking

STUDIES
- Technical and economic consulting of investment projects as well as operation and maintenance
- Project identification
- Master planning
- Investment studies
- Feasibility studies
- Technical studies
- Social studies
- Environmental studies
- Compatibility studies
- Income statements/research

PLANNING
- Basic evaluation
- Preliminary and draft design
- Approval planning and participation in the official approval of plans
- Implementation planning
- Execution and evaluation of tenders
- Participation in the awarding of contracts
- Technical studies and plannings
- Social and environmental plannings

SITE SUPERVISION/TECHNICAL SERVICES
- Construction supervision and site management
- Acceptance and handing over of the works
- Project documentation
- Surveying/cartography
- Soil mechanics, building ground, foundations, carrying capacity measurements
- Laboratory analyses for earth moving and road constructions, water and waste water
- Hydrology, hydrogeology
- Quality assurance and security audits

PROJECT MANAGEMENT
- Fiduciary taking over of the constructor’s function
- Participation in project development
- Controlling
- Technical and economical business activities
- Contract management
- Project coordination
- Project documentation
- Public relations
■ RAIL
– Long-distance rail
– Transhipment facilities or handling technologies
– Connecting railways, industrial and plant railways
– Operation and maintenance facilities
– Civil engineering (track civil engineering, underground cabling)
– Superstructure
– Platform facilities

■ TECHNICAL RAILWAY EQUIPMENT
– Process control technology
– Overhead line systems
– Urban railway power systems
– Electronic equipment
– Telecommunications systems

■ URBAN PLANNING AND ARCHITECTURE
– Project development
– Regional development
– Land allocation
– Building development
– Industrial estates
– Office buildings
– Banks
– Educational centres
– Industrial buildings
– Hall buildings

■ CONSTRUCTION ENGINEERING
– Bridges
– Ground water tanks, troughs and tunnels
– Retaining structures and supporting walls
– Noise barriers
– Platform roofs
– Special underground engineering
– Harbour facilities
– Airports
– Embankment dams
– Reservoirs

■ PROJECT CONTROL
– Clarification of the assignment of tasks and the preconditions for the participation in design and execution of investment projects
– Summary and monitoring of the investment and payment planning
– Coordination and control of the involved and concerned parties of the project (under public and private law)
– Continuous information flow to the client
– Controlling

■ OPERATION AND MAINTENANCE
– Fiduciary taking over of the technical and commercial operation
– Analysis of operations
– Business activities conducted on instructions
– Maintenance and repair management
– Rehabilitation concepts
– Optimization of accountancy/controlling
– Investment planning
– Evaluation and charging of fees
– Statutes
– Staff training

■ MOBILITY CONSULTANCY
– Feasibility study public transport
– Transport planning
– Advice to local authorities and transport companies
– Operational planning
– Tariff and distribution in the public transport sector
– Marketing public transport
– Freight traffic and logistics
– Traffic quality and security
– Financing/maintenance management
– Driverless Driving
– Vehicles
– Surveys
– Process consulting

■ IT SOLUTIONS
– IT SOLUTIONS
– Process automation for rail and bus
– DatNet®mobile: Mobile order processing
– Q-DABA®mobile: Mobile Market Research
– Q-DABA®: Contract and service settlement
– MIPS®: Management information system
– Stops management
OBERASBACH
One of the first clients of Gauff Consultants was the municipality of Oberasbach. During the years 1960 to 1980, the company Gauff Consultants takes over all services from the design to the construction supervision for the municipality’s canal system.

GAUFF CONSULTANTS GOES TO AFRICA
The first German development aid projects are executed. Africa opening up as a new continent for Gauff Consultants. After starting in Gabon, Gauff Ingenieure -JBG- will soon be well known all over Africa.

START TRANS-GABON RAILWAY
With the project start for the line section Transgabonaise, Gauff Consultants is awarded the contract for one of the biggest railway sections in Africa. During 20 years design and construction time, nearly 900 kilometres of railway tracks are laid.

ABUJA DAM
Gauff Consultants is awarded the contract for the water supply design of the new Nigerian capital Abuja. In order to supply the approximately 650,000 inhabitants, an 8 square kilometres embankment dam is constructed on the river Usama. The project definition contains design and construction supervision of a storage lake, a pumping station, a wastewater treatment plant as well as 30 kilometres of gravity mains.

ENGINEERING OFFICE GAUFF
Thanks to the formation of the predecessor in title of H.P. Gauff Ingenieure GmbH & Co. KG -JBG-, the foundation stone was laid in Nuremberg for the present-day grouping of Gauff Consultants. Thinking one step further and based on a solid foundation, so helping to shape the future has been one of the company’s cornerstones both then and now.

FORMATION GRE
Gauff Consultants expands the scope of services. In addition to the sectors of water supply and waste water disposal as well as road construction, the company GRE is founded for the rail-bound traffic sector.

SETEC
Gauff Ingenieure -JBG- acquires the Austrian SETEC Engineering GmbH & Co. KG, an internationally acknowledged enterprise with more than 30-years specialist know-how in the water supply sector. By the purchase of this company, Gauff Consultants deepens its know-how in this sector.

KUG INGENIEURE
KUG Ingenieure GmbH & Co. KG is founded as a wholly owned subsidiary company of Gauff Ingenieure -JBG- on 1st September 2008. KUG’s potential is the broad experience of its employees regarding planning and construction supervision as well as the broad spectrum of highly qualified specialist engineers.
**WATER SUPPLY AZERBAIJAN**

From 2004 onwards, the renovation of the outdated water system became a main concern of the government. Supported by the World Bank, it was renewed and from 2008, the development of regional water sources was promoted. Gauff Consultants made an essential contribution for the improvement of the living conditions with feasibility studies and the preparation of the tender documents.

**FEDERAL MOTORWAY A3**

The 1779 draft of a Central European road network by Friedrich v. Lüder already provided a route connection “Frankfurt – Regensburg – Passau – Linz – Wien”. Today, the A3 is one of the arterial roads in Germany. For the load relief in the area Wuerzburg/Heidingsfeld – Wuerzburg/Randersacker, Gauff Consultants was commissioned with the planning of the six-lane expansion up to 7.4 km along with two large bridges as well as the planning of the Katzenberg tunnel.

**WASTE WATER TREATMENT IN SANLIURFA/TURKEY**

With the project “Sanliurfa”, Gauff Consultants provides a valuable contribution to the waste water treatment sector in Turkey. The infrastructure measure involves the construction of one of the most modern industrial waste water treatment plants as well as its network of supply lines.

**NYALI BRIDGE, KENYA**

Gauff Consultants also sets standards in the bridge building sector. The Kenyan government entrusted the steadily growing company from Germany with the building of the longest prestressed concrete bridge in Africa with a total span length of 390 metres. The bridge connects the island of Mombasa with the Northern coast of Kenya.

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**ETC TRANSPORT CONSULTANTS**

By name change in 1995, ETC Transport Consultants GmbH developed from the BVC Berlin – Berliner Verkehr-Consulting GmbH which was founded in 1974. Since 2009, ETC is the contact for the public sector and companies with regard to consulting and IT Solutions in the public transport sector within Gauff Consultants.

**PB-CONSULT**

PB-Consult Planungs- und Betriebsberatungs-GmbH is a subsidiary company of VAG Nuremberg and Gauff Rail Engineering. As such, it combines the competence of an experienced traffic company with the know-how of a large planning and consulting company qualified in transport and traffic.

**MANNS INGENIEURE**

MANNS Ingenieure GmbH is part of Gauff Consultants since 2012. Founded in 1991, the company looks back on more than two decades of experience and expertise. MANNS stands for innovative solutions for municipal and state governments in the sectors of transportation, urban construction and environmental protection.

**GAUFF CONSULTANTS**

Gauff Consultants combines tradition and innovation of its companies under one roof. Multidisciplinary and interdisciplinary exchange of knowledge and experience enables the company to offer specialist knowledge and engineering services as a single package to our clients within a networked and complex world. German Expertise since 1958!
In 2000, 150 Heads of State concluded that this situation is intolerable and has to be improved quickly and include the supply with healthy drinking water to the list of the most urgent global tasks. "Clean drinking water for all" was defined as a millennium goal of the United Nations, and a central challenge for mankind. This is still true today because it is about our common future, humanitarian action and the life of many people.

If the wells run dry due to a drought, we are bound to find ways so that people do not die of thirst. And we must never forget people in the more remote regions of the world – they also need water. Only water keeps people alive. Humans need to drink two to three litres of water daily, in very warm countries even up to six litres!

The tasks are enormous. The Aid and Development Organisation for children UNICEF estimates that one billion people living in slums have no water connection. We are morally bound to supply them in the coming years with clean water. But even there where water flows out of the water-tap there is still a lot to do. Today, precious drinking water often seeps away into the subsoil due to old, flawed and leaky pipelines.

Over one billion people have to live without access to clean drinking water. The experts of the United Nations estimate that this number will triple within a few years. Already today, more than three million people per year die due to unclean drinking water. Most of the victims are children – 4,000 die daily!

Water is the Source of Life
Safe water supply increases the life expectancy of children in developing countries and helps to protect them from diseases. However, water means not only healthiness but also economic development. With such economic development, schools and universities arise. Education is a guarantee for a durable and sustainable future. The former UN Secretary-General Kofi Annan was right in pointing out: “Clean water is an important part of human dignity”.

All over the world, engineers try to safeguard and improve the living environment of the people. They bear the challenge and plan for the human world of tomorrow. With elaborate, economically secured and innovative solutions they make sure that the most precious “comestible” will flow until the furthest corner of the earth.

For decades, Gauff Consultants has been significantly involved in helping achieve these targets.
Water Production

In order to develop Abuja as the new capital of Nigeria, the drinking water supply of the city had to be guaranteed. Based on hydrologic and geologic analyses as well as a draft design, a feasibility study was executed resulting in the selection of the river Usama as a suitable source for the water supply of Abuja. The project was realized with construction costs of 225 million Euros. The consultancy involved design and construction supervision of a dam and storage reservoir with a capacity of 105 million cbm, a pumping station with a capacity of 5,400 cbm/hr, a wastewater treatment plant, 30 km of gravity pipes, two reservoirs of 12,000 cbm each as well as 30 km of feeder roads.

Water Pumping

After completion of Sabaki river intake and abstraction plant including Baricho water treatment plant it was found that due to the extreme sand load of the fluvial water and the corresponding sedimentation in the area of the river intake, the plant could only be operated at 60% of its intended capacity. Through a comprehensive study involving seismic measurements, test drillings, data collection as well as design by means of a hydraulic model, alternatives were proposed.

Water Transport

Whereas internationally new wells, supply lines and waste water treatment plants for the population have to be constructed, domestically existing supply lines have to be rehabilitated. Thus, Gauff Consultants was commissioned with the planning of the rehabilitation of the more than 100 years old drinking water tunnel Gotthardt-Hoellberg. The tunnel is part of the Ranna-line. By means of this line, whose construction started in 1905, drinking water flows under gravity from the source work at Ranna to Nuremberg. The rehabilitation of the old tunnel was successfully realized by insertion of pipes taking into account the thermal expansion and the geological specifications of the tunnel.

Water Distribution

Zambia is afflicted frequently by drought. In order to guarantee the supply of water to the population and to combat cholera as well as other “water borne diseases”, the German Federal Government provided 38 million Euros until now in order to build wells. Until 1997, all in all 1,050 wells were built in the Central Province. Since then, a further 1,450 wells were completed in the Eastern Province. On average, 250 inhabitants benefit from each well. As a result, 750,000 people can now be supplied with clean drinking water with the project target of 3,000 wells.
Water Treatment

In order to meet the ever increasing requirements in the supply area of the distant water supply in Franconia, the water works Sulzfeld was built. With a water production from own sources of 385 litres per second (including conditioning) and 260 litres per second water from overland pipes, two reservoirs each of 5,000 cubic metres, a pumping capacity of 380 litres per second and an investment cost of 18 million Euros, the guaranteed supply was restored. The consultancy involved a study of water consumption patterns, all design stages as well as site management and local construction management.

Water Storage

In order to improve the water supply in the area of smaller cities upcountry, a pilot project with a cost of 22.5 million Euros was started which was realized in close cooperation with KfW Bank and the Government of Mali. The consultancy comprised project management for the hydrologic and geologic studies, preparation of tender documents for drilling companies in 100 centres, studies and design of 30 water supply facilities, technical assistance and construction supervision for the whole programme.

Water Management

For the public utility company of Schneverdingen, Gauff Consultants, developed a digital mapping and pipeline register for gas, water, electricity and street lightning. For this purpose the engineers utilized the latest satellite-based GPS technology for surveying and works and its own software and hardware. The application of these modern technologies resulted in noticeable quality improvements in mapping and pipeline registers and for the corresponding plants. Furthermore, it allowed a selection of the quickest and most economic solution possible to connect the plants to the supply area.

Operation

After the technical rehabilitation and extension of the water supply systems in Kampala, financed by international donors, the operational procedures needed improvement. For this purpose, a management contract was concluded which was also the preparatory phase towards privatization. The services comprised consulting, operation and maintenance, procurement and the implementation of an IT based information system. As a result, revenue could be doubled; the costs in the personnel department reduced by about 25% and by about 40% in purchasing. The total water loss was reduced from 68% to 45%. Subsequent to this management contract, the operating company was honoured as the “Best Performing Utility Company” in Africa.
In order to avoid diseases and so as not to reintroduce those already overcome, the safe disposal of waste water has to go hand in hand with the supply of drinking water. The United Nations have therefore declared the year 2008 as the “International Year of Sanitation”. The aim is to use half of all investments in the water sector for the hygienic treatment of waste water and excrement in future. Through this, human excrement should be converted into useful raw material. Today, over 2.6 billion people are still without basic sanitary services. As a result more people die due to poor hygiene than due to wars.

“Prevention is the best medicine!” 80% of all disease in developing countries is caused by unclean drinking water and especially by foul waste water. The safe supply of water can only be guaranteed if waste water is professionally disposed of and cannot seep away unfiltered into the soil. Water supply and waste water disposal belong to a common cycle, and require an integrated approach to achieve acceptable solutions.
All member countries agree upon the principle way of proceeding in order to achieve the millennium goal. One of the thought leaders was Ryutaro Hashimoto, Prime Minister of Japan and chairman of the UN Secretary General’s Advisory Board on Water and Sanitation, an advisory committee which directly assisted Kofi Annan. The “Hashimoto” action plan focuses on three aspects: hygiene, sanitary facilities and treatment of waste water. Moreover, it proposes that in future, precious potable water should no longer be used for the conveyance of excrement or for irrigated agriculture.

The space on our planet becomes more and more limited. According to estimations, the population will increase from 6.7 to 9.2 billion in the next 50 years. If we want to keep up with this increase, we need to use the most suitable technical solutions for the treatment of waste water. Engineers have already developed and realized ideas that avoid the use of precious drinking water for the lavatory flush. They recover clean industrial water from sewage treatment plants, remove harmful bacteria, and eliminate thereby the source of many dangerous diseases.

For years, Gauff Consultants has implemented intelligent, ecofriendly and economically viable solutions in waste water treatment.
Drainage Master Plan

In order to achieve a structural and cost-effective sewage disposal, 20 cities in the neighbourhood of Erlangen with a drainage area of 1,250 hectares were administratively merged into a corporate body of public law, the sewage board Schwabachtal. With a project cost of 35 million Euros, the main collectors, storage, pumping stations, complex local network capacity as well as a contribution towards the construction of a water treatment plant in the city of Erlangen could be financed. The consultancy comprised surveying, all design stages as well as site management and local construction supervision.

Waste Water Remediation

The municipality of Sivas, Turkey, entrusted Gauff Consultants with the design of a new waste water treatment plant for a population equivalent of approximately 300,000 as well as the associated sewers. Beside the division of the existing sewage system into a separate wastewater and surface water systems, all the existing water supply pipelines were examined with regard to losses and accordingly newly designed. Moreover Gauff Consultants was entrusted to execute the tender procedures, contract award and the construction supervision. This guarantees that until the year 2015 no further expansion would be necessary.

Waste Water Transport

The city of Zeulenroda is located along the bank of the corresponding drinking water barrage which supplies approximately 350,000 inhabitants with drinking water. In order to prevent the pollution of the drinking water by the entry of waste water during heavy rainfall, Gauff Consultants was entrusted with the design of a new waste water tunnel with a total length of approximately 2.4 km and an excavated cross section of about 11 m² as well as the supervision of the construction works. Due to its size, the new waste water tunnel has two functions; it is an interceptor to the waste water treatment plant as well as a sewer with storage capacity and with overflow facilities for excessively high rainfalls.

Waste Water Treatment

Gauff Consultants was entrusted with the training of the staff for the waste water treatment plant which was completed in 2000. For this, handbooks, safety and operating instructions as well as maintenance regulations were developed. Accordingly, Gauff Consultants coordinated spare part deliveries as well as the necessary repairs to the plant. Through these measures, technical and commercial qualification deficits could be overcome, and once again, the plant meets the highest scheduled service standard.
Waste Water Collection

The South Western main collector was built to meet the increased quantities of waste water as well as to make possible the rehabilitation of the storm water system. The costs for the construction of the 5 kilometres long section which has a diameter of 3,000 millimetres and is also designed as a sewer with storage capacity and overflow measures amounted to 26 million Euros. Due to the depth of 11 metres in places, the project was executed in the inner-city area by subsurface construction with inspection point space of 120 metres. The consultancy involved surveying, all design stages as well as site management and local construction supervision.

Technical Support

Planning with foresight always includes environmental protection for Gauff Consultants. With the planning of the construction of the new compact waste water treatment plant complex in Rosstal, Gauff Consultants actively planned environmental protection. The original plant from 1967 was outdated and the new construction was designed in that way that it blends harmoniously with its large rainwater retention basins into the valley landscape.

Waste Water Treatment

In 1988, the waste water treatment plant of the cities Maxhütte-Haidhof and Teublitz was completely overloaded and could no longer guarantee sufficient waste water treatment. The new construction of the waste water treatment plant needed to provide a high operating security as well as enough space for later expansion to meet the need of future increases in population. The new waste water treatment plant was designed as a recovery plant with sludge stabilization and has a modern nitrate elimination system as well as equipment for chemical phosphate precipitation. Due to the good design services provided by Gauff Consultants, investment in a sludge digestion system became unnecessary.

Waste Water Collection

As a part of the large renovation and restoration projects of the river Emscher and its tributary rivers, Gauff Consultants was entrusted by the Emscher Association with these tasks for the stream Hahnenbach. The concrete bed of the stream was removed and a natural bank restored. In order to relieve the stream from waste water, a new sewer with a total length of about 2.5 kilometres was constructed. The sewer was built in mining drift to a depth of 10 metres and has a diameter of about 1.4 metres.
Roads connect people

Roads are lifelines, create connections and develop cultural ties and economic developments. Since people started to trade, they have come together from all directions. The mysterious Nebra sky disk in Saxony-Anhalt, Germany, documents that an important culture at the crossover of four trading routes developed at that place. The Salt Road and the Silk Road were also flanked by antique centres. Centres develop left and right from roads even today – centres of research, industry, trade and art. Without modern roads, neither development nor growth is possible.

In the developed countries, a functioning road network has become a matter of course. In those countries where development has still to be advanced, the importance of a functioning road network is evident. Only with functioning connections between the partly remote agricultural areas and the international trade centres can migrations into cities be avoided. If goods and food cannot be sold, people leave their rural homes and end up mostly in the slums of the bigger cities. In particular, emerging nations and developing countries have this problem. A life of prosperity and dignity is then no longer possible.

Roads are lifelines: They connect remote districts of a country as well as of a continent. In 1996, the European Commission connected important cities with such lines and the Trans-European transport network came into existence. Engineers and planners in Asia, Africa and Latin America try to find solutions how gaps can be eliminated or the surrounding regions can be included into the road network. The closer a network is the better are the conditions for progress and economic welfare.
The overseas development policy of the German Federal Government recognized at an early stage that in remote regions people can neither exploit their possibilities nor can businessmen or tourists visit those regions. Therefore, road planning and design became a central task of much international development aid. With the construction of the roads, useful side effects were also initiated: Hundreds of labourers could earn their livelihood in the region and an improvement of the living conditions was made possible by the access to the local markets, schools and healthcare facilities.

**Transport Corridor**

The rehabilitation of the 203 kilometres long Livingstone-Sesheke/Katima-Mulilo road is a section of a new transport corridor between Walvis Bay in Namibia and Zambia which shall serve the strengthening of trade and economy. The Zambian Ministry of Works and Supply entrusted the execution of a feasibility study to Gauff Consultants. The study also confirmed the economic necessity of a 877 metres long bridge construction over the Zambesi river. The project with construction costs of 23 million Euros was realized in only 24 months. The project tasks of Gauff Consultants included design, preparation of tender documents and construction supervision.

**Tertiary Roads**

In order to develop the economic growth of the rural population of Cambodia, the Ministry of Rural Development in Phnom Penh entrusted Gauff Consultants with the design of the extension of the rural traffic network so that locally manufactured products could be better marketed. Beside the design of the new development, extension and maintenance of those routes, marketplaces and schools were planned as well. The consultancy contract also included construction supervision and organization of a road maintenance department within the Ministry.

**Urban Roads**

The elevated North highway in Ludwigshafen is an important part of the infrastructure of the Rhine-Neckar metropolitan region. It forms one of the main arterial roads in Ludwigshafen. The structure, which was built between 1970 and 1981, now shows shortcomings regarding the design of the existing traffic load as well as considerable structural damage. Therefore, maintenance is no longer sufficient and it has to be completely rebuilt. During the preliminary planning, the engineers of Gauff Consultants were able to introduce a very high level of detail in the preparation of possible alternatives. The challenge in this process is that the elevated highway must be renewed “during operation”.

**Zoning and Land Use Planning**

The marketplace of the municipality of Adelsdorf was separated from the residual heart of the town due to the highly frequented federal road 470. Road 470 needed to be rerouted so that the marketplace could again be utilized by the population. Gauff Consultants developed several utilization concepts in order to centre the marketplace for the municipality. After a public decision, the preferred alternative was realized so that today the marketplace of Adelsdorf is the city centre.

**Transport Corridor Southern Africa**

Zambia – Transport Corridor Southern Africa

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Telematic Controlled Truck Parking

In order to improve the parking area situation at rest stops and service stations, and off-motorway service areas, pre-gate parking or slot-management improvement for trucks was developed using telematics-controlled truck parking (truck parking in columns). By the computerized-controlled arranging of the trucks according to their departure times, the existing area was optimally used with the result that 70 – 100% more parking space was achieved. The fully automatic operation of the system was successfully tested and approved at the Montabaur service station and rest stop by the Frauenhofer Institute in summer 2013.

Motorway Construction

The six lane extension of the motorway A3 between Nuremberg and Frankfurt was a component of the Federal Transport Network Plan. Beside the enlargement of the existing four lane cross-section, the extension includes the new design of drainage facilities, the construction of noise protection facilities as well as several large structures as for example the viaduct Heidingsfeld and the Katzenberg tunnel. Due to the pipeline route in a water protection area, special measures became necessary in order to keep the water supply operational and for groundwater protection. The measures were elaborated by Gauff Consultants and formed the basis for the entire draft design.

Road Rehabilitation and Recycling

The rehabilitation and expansion of the road from Wright to Guiuan is of important significance for the development of Samar Island. The design of the road includes the application of advanced environmental and social criteria as well as increased requirements in terms of road safety, maintenance, profitability and climate change. The application of recycling technologies is planned in order to reach a cost effective and resource-efficient project realization. The road will permanently improve the access of the rural population to markets, educational institutions and medical facilities and become a backbone for the development of tourism in the region.

Road Maintenance

Within the reconstruction aid for the war-ravaged country, the restoration of traffic safety of the roads was one of the most urgent post-war tasks, especially in Kabul. KfW Bank on behalf of the federal ministry for economic cooperation and the Afghan government commissioned Gauff Consultants with the repair of the urban road in Kabul including the restoration of rainwater drains. Beside planning and coordination, Gauff Consultants also took over the management for the entire construction projects including the manufacture of asphalt mixtures and their installation.

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Total Solutions for Rail

Track systems are important arterial networks all over the world and especially in Europe where a close system of railway lines traverses the whole continent. As essential part of modern mobility railways are a fast, safe and economical viable means of transport especially for passenger traffic. With regards to freight traffic the capacities are still often not sufficient, even though the technical standards and network coverage has increased enormously.
Mobility is a basic need of humanity. Mobility means flourishing economy. Never before so many cars have been driven on European roads as today; and the number increases further. Since the 50s in Germany, the total of cars has grown from three million to about 44 million today.

Only thanks to the railway system we have avoided total gridlock, both in local and long-distance traffic. This is also becoming more effective concerning freight traffic which until now carries only a small part of overall load volume. Today railway tracks with a length of 70,000 kilometres traverse the Federal Republic of Germany. On those tracks, 600 million tonnes of goods and more than two billion people are carried annually. Safe, fast and reliable. And sustainable.

Since the invention of the railroad all were aware of its efficiency as means of transportation and that it could improve the mobility of all social classes of the population. Although underestimated for a long time, this “old” subject is presently more important than ever before regarding emission control and energy efficiency. Accordingly, rail transport is the best possible solution. The track helps preserve the environment, saves energy and is profitable especially for freight transport. The transportation of heavy load is often not possible without the railway.

During the recent past, rail traffic has become faster and faster, more reliable and competitive. Due to cost economical but at the same time innovative solutions had to be found. Drafting, designing, engineering and realizing is one aspect. The other aspect is to keep up with the dynamics of technical development. Today small chips operate complete signal systems; in former times, large manned facilities were necessary for this. By means of telecommunication now solutions are possible undreamt of yesterday. Already, satellite-based solutions are being implemented as standard. If a line is designed today somewhere in the world, the powerful alliance of long-term experience and latest technical know-how are vital.

Gauff Consultants is offering both things: long tradition and innovation.
High Speed

In the course of the construction of the European high-speed rail network, the corridor Nuremberg – Munich was upgraded to a design speed of 330 kilometres per hour. For the 77 kilometres long section between Ingolstadt and Munich, all design services for the complete rail systems ( electrification, telecommunication, signalling) were provided. Especially the adaption of the old relais technology to ETCS level created high demands for the design which also involved the complete operational design including all technologic procedures required to “construct under operation”.

Rail Hubs

For the implementation of the objectives of the European Community for the “Europe 2020” strategy the transport sector will play a prominent role. An efficient transport network can be very advantageous for Europe in terms of global competition. With the publication of its White Paper “Transport” for the years 2011-2020 the EU Commission pointed out the focus points of the European transport policy for the upcoming decades. In this regard, long distance rail transport is to be considerably strengthened. The realignment of the Stuttgart rail hub (Stuttgart 21) and the construction of the new railway line Wendlingen – Ulm (NBS) are one of the largest current public transport projects in Europe.

Bridge Construction

The construction of the railway network in Tanzania reaches back to the beginning of the last century. In 1906, the German East African Railway Company started with the construction works of the Central Line. The damages to the network due to the First World War were but poorly repaired. During the years that followed, priority was given to the extension of the network instead of necessary rehabilitation. In order to determine the actual situation of the Central Line with its more than 200 bridges, a study was commissioned. On this basis, 87 bridges were rehabilitated as a priority. The services of the 32 million Euro project included flood hydrology, design, construction tendering and construction supervision.

Project Control

San Juan, the capital of Puerto Rico, has an extremely high and ever increasing population density. In order to counteract total road congestion, a new city railway, the Tren Urbano, was constructed at an investment cost of 1.2 billion USD. Today, it is a highly developed transport system. It connects all quarters of San Juan as the main transport axis with a length of 17.2 kilometres and 14 railway stations and ranges as far as Bayamon. The consultancy involved project management, implementation planning as well as interface management of secondary sub-areas such as maintenance and storage facilities as well as factories.
Light Rail

After the implementation of the express route Hannover – Würzburg and the new railway station Kassel – Wilhelmshöhe, the old main railway station Kassel was only open to regional trains. In order to achieve a better service for the areas surrounding the main railway station, the project Regio-Tram (tramways run on intercity railway tracks) was initiated. Through an existing tramway tunnel, the passengers to and from the region on the Deutsche Bahn tracks can now directly reach underground, the old main railway station by tramway. Gauff Consultants designed the complete rail systems for this project with construction costs of 10 million Euros.

Electronic Interlocking System

German Railway (Deutsche Bahn AG) started a large modernization programme for the signalling systems at the end of the last millennium. As a part of this, a new electronic control centre in Stendal with construction costs of 40 million Euros was built. This project included the complete rehabilitation of the associated tracks. The consultancy involved all design services for these technologies including the migration from the “old relais technology”. All design services were undertaken by Gauff Consultants.

Project Management

Before the Wall of Berlin, the original railway network was the most modern network in the world. In order to meet the requirements after German reunification, this network was modernized and extended. The project management for the reunited Berlin with construction and delivery costs of approximately 20 billion Euros included the total time schedule and coordination of the interfaces for over 250 single projects which included, amongst other things, the north-south-connection, the main railway station and the Potsdamer Platz tunnel, 75 kilometres of long-distance rail, 65 kilometres rapid transit system sections, 39 railway stations, 14 tunnels, numerous new bridge constructions and bridge rehabilitations, an ultra-modern maintenance facility for ICE trains and several electronic signal control installations.

Studies and Design

During the planning period from June 2013 to May 2015 Gauff Consultants are preparing the technical documentation for the extension and modernisation of the existing railroad corridor Xb, section Novi Sad-Subotica-Hungarian border in accordance with EU interoperability standards and AGC, AGTC and SEECP agreements. The contract comprises the preparation of a feasibility study including cost-benefit analysis and an environmental impact assessment study, as well as preliminary design and preparation of tender documents for design and construction works.
Urban Planning and Architecture

Architectural masterpieces such as the Colosseum in Rome, the Taj Mahal near Agra, the Eiffel Tower in Paris or the Guggenheim museum in Bilbao have a great charisma. What looks playfully gently or bold and daring, is the result of people of genius who perfectly connected form, function and environment. However, not only are the great examples of architecture of former times and today works of art, if we walk attentively through our cities, we can see masterworks of everyday life more and more often.

These masterpieces can be found at airports and office buildings as well as at factories and in the social housing construction. The art of form design consists of balancing the design of the building fabric and the functionality. In all parts of the world it has to be decided on-site how the ideas of the constructor can be harmonized with the basic conditions of the surroundings.
However, construction is also the art of form in view of the economic situation and the life cycle of a building. On-site and at numerous places on all continents and under permanently changing conditions it has to be decided which idea and which plan can be realized best.

Here, the art is to decide between common bricks and construction material on the basis of latest knowledge of the nano-technology.

Beside external perfection, the intrinsic values are important. The interior of a building has also to be harmonious so that people feel comfortable and secure: at work as well as at home.

Designers are able to develop complex criteria and are able to reply to all questions from those regarding the construction material to the fitting in to the surrounding and the observation of legal regulations regarding safety.

Balancing design, functionality, economy and quality is the challenge for designers all over the world. Good designers have the best technical knowledge and are able to abstract, to control high complex processes and to foresee risks. Shall a construction be even more than this? For this, the best designers have to listen also to their intuition. Only by intertwining of attributes such as these an optimal surrounding can be created.

Gauff Consultants provides the best possible mix of experience, competence and intuition.
**Administration Buildings**

The East African Community (EAC) is the community of the states of Kenya, Tanzania, Uganda, Rwanda and Burundi. In the framework of co-operation in the political, economic and social sectors it was agreed that the new headquarters shall be built in Arusha. On an area of 10 hectares, an ultra-modern headquarters is being developed which will be handed over fully equipped and ready-for-use. Inspection and preparation of the building plans and work schedules, preparation of tender documents for construction and procurement, proposal evaluations, contract negotiations and construction supervision as well as the complete project management. Construction costs: 14 million Euros.

**Wind Tunnel**

After approximately 40 years of operation, a new climate wind channel development for railcars was concluded in Vienna. In the channel, trains can be tested up to 300 kilometres per hour and at temperatures from -55 degree Celsius until +60 degree Celsius under simulation of sun, rain and snow. The project with construction costs of 53 million Euros was awarded as a design and build tender. The consultancy involved client consultation, choice of applicants, issue of the required specification and tender documents, tender evaluation, design evaluation and consulting services as well as representation of the constructor and site management.

**Airports**

National airport projects include, among others, the development facilities for the extension of Cargo City Süd at Frankfurt airport including design of traffic infrastructure and buildings. In Nuremberg Gauff Consultants were responsible for the overall coordination of various individual projects, the design survey and the site development of traffic infrastructure. International projects include the project control, drafting of contracts and management of contractual negotiations for the Budapest Airport Terminal 2 project.

**Training Centres**

In addition to their main purpose of providing education, nowadays training centres also serve as communication, knowledge and event centres. Gauff Consultants is responsible for design and supervision of various construction measures, meeting the implementation of these requirements as for example the construction of the new research and training centre for the technical department of the Fraunhofer Institut in Erlangen resulting in a clearly structured building with a roofed entrance area. The building meets state-of-the-art requirements for energy demand, technical equipment and functionality.
Police Headquarter

Through the development of the new Berlin police department with construction costs of 170 million Euros, numerous departments which were previously scattered throughout the whole municipal area were centralized in one head office. Moreover, the departments fighting against crime and technical inspections can now use corresponding laboratories in the new office. On a total area of 25,000 square metres, distributed into 11 floors (three of them underground parking floors), 1,600 employees are engaged. The consultancy involved services for the construction engineering and technical equipment, each as “construction accompanying design” and site supervision.

Ports

The government of Nigeria concluded the construction of a dockyard for larger ships to further help the development of the country. An area of 900,000 square metres as well as a 200 metres long dry dock with fully equipped multifunction workshop, training centres and accommodation should be developed. The total project costs amounted to 166 million USD. The consultancy involved design evaluation, and construction supervision. 14 years after completion, the partial privatization of the dockyard could be substantially completed on this basis.

Industrial Buildings

In addition to the quality of design and construction Gauff Consultants also pays particular attention to quality, schedule and cost control as well as to competent change management. In this case Gauff Consultants is providing support to the Clients for various projects, e.g. the BMW aerodynamic test centre in Munich. Gauff Consultants was responsible for technical and organizational project support for the construction of two new wind tunnels including workshops and office space.
Mobility Consultancy

The currently ongoing changes of social and economic conditions affected by globalisation, fundamental demographical changes, development of energy and commodities market has profound repercussions on the urban, regional and governmental transport policy.
In order to manage the solving of today’s upcoming problems of requests for information, a competent team of traffic planners, traffic economists, geographers, sociologists, economists and political scientists is necessary. They elaborate solutions to bring economic efficiency, quality and financeability of transport systems in accordance with economic, demographic, social and ecologic challenges.

The consultancy services of Gauff Consultants comprise solutions for constantly growing complex traffic issues, for increasing mobility requirements of passenger and freight transport, for the design of the competition on the transport markets and for the increasing responsibility of authorities in public transport.

Corporate opportunities and risks of the transport companies, financing solutions for complex transport systems as well as increasing requirements regarding environmental soundness are an important benchmark for the advisory in these networked and multidisciplinary areas.
Development of New Container Terminal

Nowadays 90% of the global general cargo trade is transported by container ships. Oslo is Norway’s logistics hub. Gauff Consultants prepared the decision processes for a new container terminal in Oslo-Alnabru by assessment of the economical and operational requirements. It included the evaluation of base variants of the terminal layout, a cost-benefit analysis of the layout variants, timetabling and operational simulation, optimization of train and shunting operation as well as calculation of efficiency.

Light Rail Feasibility Study

The Khartoum tramway which was originally introduced at the beginning of the 20th century was closed down in the sixties. Today the municipality and building authorities of Khartoum, Omdurman and Khartoum North are providing efforts to control the constantly increasing road traffic and to rehabilitate and extend the tramway network. Gauff Consultants conducted a feasibility study in order to assess expected operational costs, revenue costs, investment costs and costs of capital as well as to evaluate the feasibility of conception and operation of the tramway network.

Harmonisation of Public Transport

The breakdown of urban traffic in Nairobi clearly shows the necessity of an efficient concept to handle public transport. Gauff Consultants conducted a study developing the basis for a technical and financial harmonisation of measures in view of an improvement of the traffic situation and increase in the efficiency of the different transport networks in the Kenyan capital. This is based on a detailed traffic analysis and models as well as the development of a concerted strategy for the implementation of an integrated transport solution. The results are the main foundation stone for a sustainable mobility improvement.

Ensuring of ÖPNV Financing

The financing of the local public transport in Germany is complicated as the funds to finance bus and train transport are contributed by the Federal Government and Länder as well as by the municipalities. Gauff Consultants elaborated an expertise for the Free State of Saxony comprising monitoring of achievements of ÖPNV FinVO and conceptual preparation of ÖPNV financing in the Free State of Saxony after 2015.
Revenue Sharing for Transport Associations

Modern local public transport operators always have to bear economic efficiency in mind. Gauff Consultants assisted the public transport association Paderborn-Höxter mbH in the further development of a concept for a revenue sharing based on sales data. The contract comprised the automation of the initial calculation of the sales data, the calculation for the following years with a consolidated calculation model as well as the implementation and evaluation of a passenger survey on 19 regional bus lines.

Feasibility Study Railway Electrification

In 2013 the European Commission in Brussels approved a plan from the Latvian Government to renew the railroad network. The railroad network is to become a safer, environmentally friendlier and faster means of transport. The Feasibility Study for further electrification of the railway network conducted by Gauff Consultants is an important cornerstone for Latvia’s ambitious plan. The Feasibility Study mainly focused on market analysis and traffic forecasts, analysis of future and current energy needs, definition and assessment of electrification alternatives, selection of railroad sections, evaluation of investments costs and cost-benefit analysis.

Process Evaluation for Transport Companies

In a constantly growing networked world, the customer’s demands on the transport companies are also increasing. Here, accurate real time information not only provides solutions as a general rule but also in case of failures in order to minimize impacts to the maximum extent possible for the transport companies themselves as well as for their customers. Therefore the processes of the transport companies always have to be optimized and adapted to the latest technical and legal framework conditions. Gauff Consultants is assisting transport companies world-wide in process evaluation and optimisation.

BSAG Target Network 20 plus

The tramway like the Roland statue and the “Town Musicians” is a landmark of the city of Bremen. It is a most reliable, comfortable and economical means of transport. Therefore the BSAG has developed the Target Network 20 plus in cooperation with the Municipality and assisted by Gauff Consultants. It is focusing on further enhancing the connection of the districts to the city centre through specific network planning for tramway and railway.
IT Solutions

Transport companies as service providers for public transport have to deal with topics such as customer satisfaction, quality and economic efficiency on a daily basis. They are continuously confronted with a constantly increasing number of data to be collected and provided on which transport companies, commissioning authorities, politics and clients can rely.
Gauff Consultants established themselves as a reliable consultant and service provider for complex data processing system for public transport.

Essential central IT applications are:
- Data pool RBL/DatNet®
- Mobile business applications DatNet®mobile, Q-DABA®mobile
- Quality measurement and management system DABA®
- Management information system MIPS®
- Station management system HMS

Furthermore solutions can be individually adapted to the customer’s needs.

Constant cost and deadline constraints as well as new requirements for data provision (e.g. for real time passenger information) force transport companies to proceed to internal process optimisations.

Data pools based on real time (RBL), quality measurement and management information systems and mobile software solutions (apps) enable a fast, reliable and transparent information flow, the assembly of all data, automatized evaluations, short reaction time and simplified communication channels.
**Coordination Centre**

The development of the real time data system DatNet® as a tool for the standardization of systems and elaboration of standardized interfaces was developed for an optimum recording, saving and converting of real time data for the day-to-day business of the local public transport (ÖPNV) and regional rail transport (SPNV). It offers the possibility to integrate real time data sources, to install a coordination centre monitor and editor, to connect the interfaces to the passenger information system as well as to the information system of the transport associations.

**Operating Data**

The coordination centre based on real time data is associated with the implementation of main operational data. It includes the supply of punctuality data, position of vehicle via GPS, documentation of operation and malfunction information. The data can be collected in the vehicle as well as on-site via mobile devices.

**Customer Service Centre**

Especially, the data collected in real time via DatNet® are used to inform customers as it is also the case in customer service centres where customer complaints and incidents are registered, forwarded and evaluated. Also the punctuality of trains, delay information, diversions or substitute transport services are processed here and forwarded to the customer for quality assurance.

**Quality Data and Passenger Survey**

For an objective measurement and assessment of the quality of the proposal for the local public transport (ÖPNV) and regional rail transport (SPNV), the quality measurement and assessment software QDABA® is being used. The monetary assessment in the bonus malus system is based on objective and subjective criteria. The results are used to define penalisation in transport contracts during performance control. A complete process from the mobile collection of basic data to calculation of indices and elaboration of assessments to visualisation of data is possible.
Controlling

The data collected in the company’s coordination centre are assessed for the transport companies in the in-house management information system MIPS®. It includes analysis and assessment for the billing of mileage, intra-corporate reporting, planning of proposals and quality measurements.

Passenger Information in Real Time

The real time data system DatNet® is the basis and interface to complex passenger information systems. Passenger information are published online and transferred in real time to vehicles, stops, stations and customer service centres. The station management system HMS is also connected to it.

Mobile Business Solutions for Transport Companies

The mobile business applications of Gauff Consultants comprise developments of “apps” for iPhone, Android- and Windows CE devices. They aim at improving the communication with the employees, increasing the efficiency in the provision, handling and distribution of information, enabling the direct transfer of data to background systems and making all data available. Gauff Consultants’ products for mobile devices include the quality management system QDABA®mobile and the digital connection of staff via DatNet®mobile.

IT Services

Our business segment stands for innovative traffic infrastructure software products. Interdisciplinary cooperation of informaticians and traffic engineers as well as innovative ideas combined with efficient team work are the key to a successful project. Gauff Consultants’ software products distinguish themselves by their modular design and innovative software architecture enabling them to be adapted to new tasks or customers’ specific requirements at any time. In addition to our standard software we offer individual solutions, customer oriented services as well as operation and maintenance of software products.
We have the right partner for every challenge and task relating to trend-setting engineering services. In order to meet the needs of our clients in all fields of planning and consulting optimally, Gauff Consultants offers cutting-edge know-how in a broad spectrum of specialist fields and areas of competence.

Priorities:
- Water Supply, Wastewater Collection and Treatment, Environment and Energy, Road Traffic Infrastructure, Regional Planning, Urban Planning and Architecture

Priorities:
- Priorities: Overall Planning for the Railway System, Track Systems, Railway Equipment, Structural Engineering, Building Construction
Priorities: Urban and Rural Water Supply, Wastewater Collection and Treatment, Environment, Road Construction, Tramway Systems

Priorities: Mobility Consultancy and IT Solutions

Priorities: Mobility Consultancy Rail, Operational Planning, Operational Management, Driverless Transport Systems

Priorities: Water Supply, Wastewater Collection and Treatment, Hydraulic Engineering and Hydraulic Management

Priorities: Road Traffic Infrastructure, Environmental Protection and Renewable Energies, Telematic Controlled Truck Parking
Hungary | Budapest
GB – Gauff Budapest Kft.
Gizella út 51-57. 08.214 | 1143 Budapest
Tel. +36 1 4 71 14 83
Fax +36 1 4 71 14 85
greinternational@gauff.com

Albania | Tirana
SETEC Engineering GmbH & Co. KG
Project Office Tirana
Komuna e Parisit, Dervish Bej Mitrovica, 2nd Floor, Apl. 2 | 1001 Tirana
Fax +355 4 24 45 18

Africa

Algeria | Algiers
KUG Ingenieure GmbH & Co. KG
Lot n°: 34 Base équipée, 2ème Etage | 16011 Dar el bieda, Alger
Tel. +213 21 50 69 37
mbelkadi@gauff.com

Ethiopia | Addis Abeba
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
K.K. Bole, Woreda 6 | Addis Abeba
Tel. +254 911 40 95 28
jbgadd@gauff.com

Burkina Faso | Ouagadougou
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
Rue 15 532, Porte 690 | Ouagadougou
Tel. +226 50 37 63 13
Fax +226 50 37 63 10
jbgooua@gauff.com

Democratic Republic Congo | Kinshasa
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
11, Avenue Ma Campagne | Kinshasa I
Tel. +243 8 98 95 61 95
jbkin@gauff.com

Ivory Coast | Abidjan
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
Quartier Cocody, Cité des Arts Rue Booker Washington | Abidjan
Tel. +255 22 44 60 82
Fax +225 22 44 02 24
jbgabi@gauff.com

Ghana | Accra
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
c/o Vision Consult Ltd. H/No. C537/3
Coconut Avenue, Asylum down | Accra
jbgacc@gauff.com

Kenya | Nairobi
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
East Church Road, Westlands
P.O. Box 49817 | 00100 Nairobi
Tel. +254 20 4 44 52 88
Fax +254 20 4 44 61 24
jbgnai@gauff.com

Malawi | Lilongwe
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
HIPPODROME, RUE 326, PORT 8 | Lilongwe
Tel. +265 21 50 69 37
Fax +265 21 50 69 37
jbgmalawi@gauff.com

Nigeria | Kaduna
Gauff Consultants (Nigeria) Ltd.
4 A, Gwari Crescent Ugbwar Rimi GRA | Kaduna
P.O. Box 423
gconigeria@gauff.com

Republic Congo | Brazzaville
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
22, Avenue Charles de Gaulle | Brazzaville
B.P. 2791 | Brazzaville
Tel. +242 6 52 41 75
jabraz@gauff.com

Zambia | Lusaka
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
Plot No. 176 A, Kasangula Road Roma
P.O. Box 32817 | Lusaka
Tel. +260 211 29 21 36
Fax +260 211 29 08 60
jbgzam@gauff.com

Tanzania | Dar es Salaam
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
Ali Hassan Mwinyi Road/Ruhinde Road
Plot No. 87 – Ada Estate
P.O. Box 4351 | Dar es Salaam
Tel. +255 22 2 66 41 31
Tel. +255 22 2 66 41 32
Fax +255 22 2 66 41 33
jbgdar@gauff.com

Uganda | Kampala
Gauff Consultants (U) Ltd.
Plot 53, Upper Kololo Terrace Road
P.O. Box 201 | Kampala
Tel. +256 41 2 63 67 99
Fax +256 41 2 59 95 08
jbgkam@gauff.com

Asia

Afghanistan | Kabul
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
c/o Ministry of Public Works
Building No. 2, 2nd Floor
1st Microrayon Street, near Hajee Quadeer Square | Kabul
AF_kabul@gauff.com

Azerbaijan | Baku
Gauff Baku
Salatin Asgerova No. 129 | Baku
Tel. +994 51 9 04 70 94
jbgmegus@gauff.com

China | Beijing
PEC+S
Beijing Office – 1002 Room 10/F Tongguang Mansion No. 12
Nonghuanhannl – Chaoyang district | 100026 Beijing
Tel. +86 010 65 38 93 60-801
Fax +86 010 65 38 96 09
greinternational@gauff.com

Jordan | Amman
SETEC Engineering GmbH & Co. KG
Branch Office, Jaba Street 9A | 11821 Amman
Fax +962 79 4 26 08 81
jbgjordan@gauff.com

Jordan | Karak
SETEC Engineering GmbH & Co. KG
Branch Office, Thaniyeh I Karak
Tel. +962 3 2 36 08 81
Fax +962 3 2 36 08 81

Cambodia | Phnom Penh
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
#260, Street 2002, Sangkat Teuk Thla
Khan Sen Sok I Phnom Penh
Tel. +855 23 88 47 84
Fax +855 23 88 47 84
jbgphnom@gauff.com

PPIC – Phnom Penh International Consultants Co., Ltd.
N. 60, 3rd Floor, Room 310, Monivong Blvd.
Sangkat Wat Phnom, Khan Daun Penh | Phnom Penh
Tel. +855 23 42 66 78
Fax +855 23 42 66 78
ppicph@online.com.kh

Myanmar | Yangon
MMIC – Myanmar International Consultants Co. Ltd.
La Pyayt Wun Plaza, 37 Alanpya Pagoda Road, Room 403 (a, b) | 4th Floor Dagon Township | Yangon
Tel. +951 370 8 36-9
Fax +951 370 8 36-9
uthoungwin@mmicltd.com

United Arab Emirates | Dubai
H.P. Gauff Ingenieure GmbH & Co. KG -JBG-
Gauff Branch Office in UAE
AFZA, Block C – 314 | Dubai
Tel. +971 6 74 54 14-5
Fax +971 6 74 54 14-5
msbed@gauff.com
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