JULY 2020

INSIDE K&A

Khatib & Alami Newsletter

FUTURE READY

Supporting our clients to build a better tomorrow

IN THIS ISSUE:

KHATIB & ALAMI

A NOTE FROM OUR CHAIRMAN AND CEO

Undoubtedly, the tragedy and turmoil caused by the current pandemic has been greater than most of us could have ever imagined. This humanitarian crisis has taken a terrible toll on people's lives across the world, and its impact is set to be felt for many years to come.

This is not, however, a time for despondency – instead, we must focus our energy in a positive way to put the virus behind us as soon as possible. Humankind has overcome many crises over the millennia, and we will beat Covid-19.

The immediate challenge, which is being faced by communities, businesses, and governments across the world, is to find acceptable ways of remobilization in order to establish the "new normal".

COLLABORATION IS KEY

Reaching this position demands that people have full confidence in the buildings, infrastructure and public realm around them. The built environment must be clean and healthy in every respect, with minimal risk of spreading disease.

This raises a number of important questions for our industry about how to design and operate buildings and infrastructure, such as: What are the best materials for maintaining a clean environment? What are the appropriate levels of social distancing in the work or leisure environment?

How do we best integrate new technologies into existing facilities, such as contactless airports? What strategies are needed to build resilience into our healthcare systems?

At K&A, we are working closely with clients, partners and stakeholders to respond to these and many other questions, while we also continue to meet the urgent needs of those who are still in the midst of fighting the pandemic.

At times such as these, it is vital that we all unite to overcome a shared foe, and K&A has been able to utilize its specialist expertise and experience in sectors such as Healthcare facilities design, hazardous waste management, Geographic Information Systems (GIS) and project financing, for the benefit of communities across the Middle East and Africa.

One of the most striking examples of this is the ramping up of support that we were able to provide for the Kingdom of Saudi Arabia's pioneering National Health Emergency Operations Center (NHEOC). Designed and engineered by K&A to include integrated emergency management technologies, the facility has played a pivotal role in supporting the Kingdom's response to the pandemic. A specialist K&A team has provided round-the-clock support to help sustain the NHEOC's operations and maintain high levels of preparedness.

CATALYZING THE DIGITAL TRANSFORMATION

One of the remarkable unintended consequences of Covid-19 has been the acceleration of digitization, as all types of organizations have been forced to rapidly adopt solutions to overcome issues such as home-working which would otherwise have been piloted, tested and rolled-out over many months, if not years.

For the Architecture, Engineering and Construction (AEC) industry, the rapid advancement of technology has been both a challenge and an opportunity for some time. While forward-thinking companies have sought to embrace the digital transformation, there is no doubt that it has not moved at the same pace as in many other industries.

The urgency created by the pandemic, however, has created a laser focus on extracting the full potential of various technologies, with an influx of financial and human resources driving an increased and faster adaptation. We have seen the effect of this at K&A, where we have been having conversations with clients in recent months about digital solutions which would never have been considered previously.

An example of this is in the integrated application of smart technologies to support food security – an existing global challenge which has been exacerbated by Covid-19. ▶

We have therefore been in discussions with clients about the potential for geospatial systems to be combined with Internet of Things (IoT), Big Data, Artificial Intelligence (AI) and other workable technologies to help governments to accurately analyze and manage national food supply chains, while improving communications between producers, retailers and consumers to ensure demand is met at a local level.

This solution is ready for development using tried and tested technologies which are similar to those now being used across the world for contact tracing. Regardless of whether such solutions are adopted by organizations, what we are witnessing is an increased openness to consider them. This is giving rise to new levels of understanding and fluency in digital solutions which will support their development going forward.

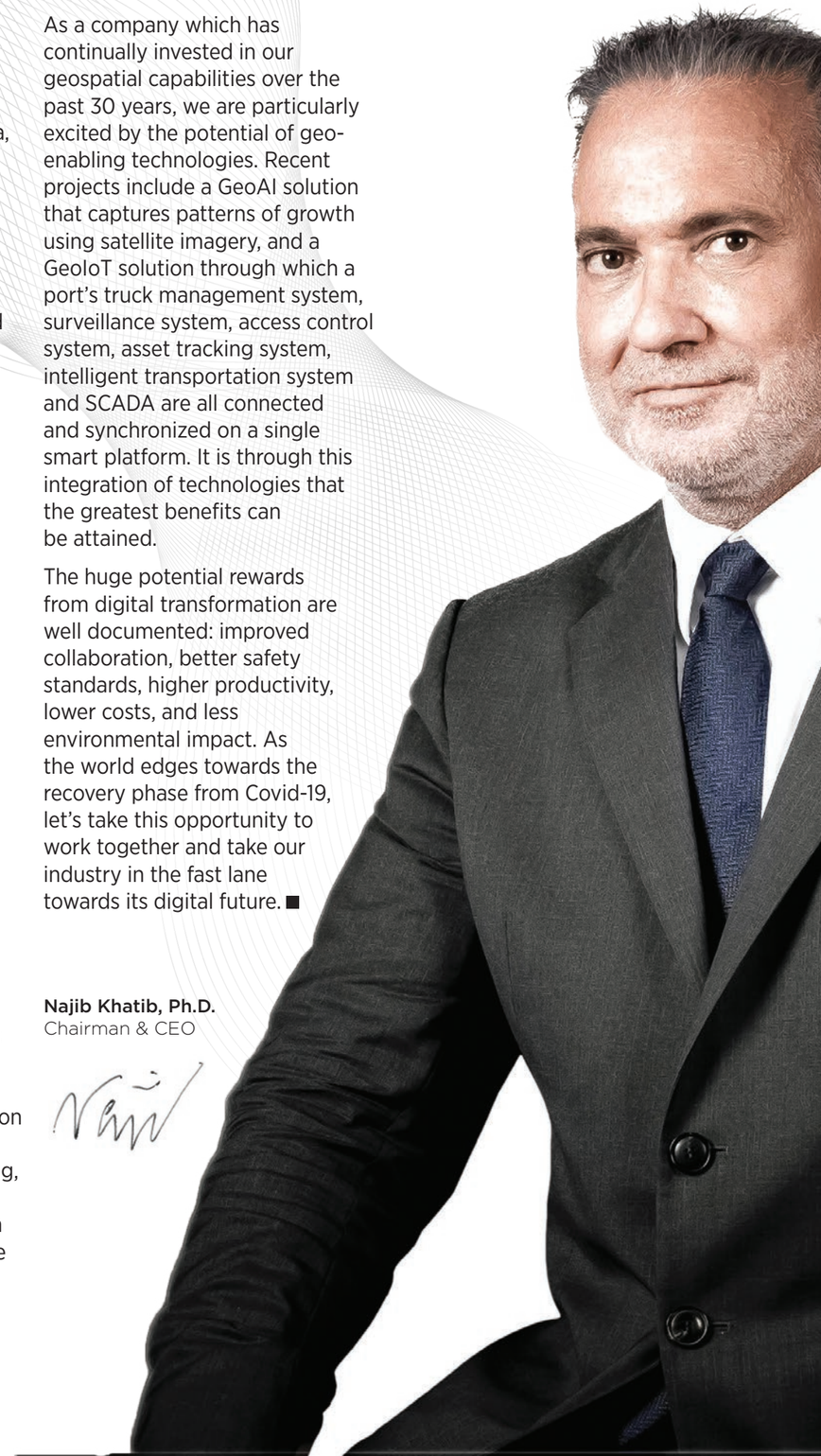
LOOKING AHEAD WITH OPTIMISM

While the backdrop of the pandemic has been appalling, as an industry we must collectively learn from this experience to embrace the digital transformation with vigor, implementing next-generation BIM, Machine Learning, AI, 3D printing, robotics and so on. This falls squarely in line with K&A's declared objective "to fuse engineering with technology", which is at the heart of our digital transformation.

As a company which has continually invested in our geospatial capabilities over the past 30 years, we are particularly excited by the potential of geo-enabling technologies. Recent projects include a GeoAI solution that captures patterns of growth using satellite imagery, and a GeoIoT solution through which a port's truck management system, surveillance system, access control system, asset tracking system, intelligent transportation system and SCADA are all connected and synchronized on a single smart platform. It is through this integration of technologies that the greatest benefits can be attained.

The huge potential rewards from digital transformation are well documented: improved collaboration, better safety standards, higher productivity, lower costs, and less environmental impact. As the world edges towards the recovery phase from Covid-19, let's take this opportunity to work together and take our industry in the fast lane towards its digital future. ■

Najib Khatib, Ph.D.
Chairman & CEO



IN THIS ISSUE

GIS AND CRISIS MANAGEMENT

GEOSPATIAL TECHNOLOGY: AN INVALUABLE TOOL TO FIGHT THE CORONAVIRUS CRISIS

Hurricanes, wildfires, terrorist attacks, and global pandemics are the types of crises that can cause disruption and chaos on a vast scale — impacting communities, damaging the environment and complicating relief efforts.

This has been brought into sharp focus by Covid-19. Its rapid spread has been across the globe unprecedented, putting huge pressure on those responsible for leading disaster management — the term used to describe the range of activities before, during, and after a disaster. Disaster management aims to maintain control over critical incidents and to provide a response framework to minimize their impact.

One of the most important assets required during any crisis is reliable, up-to-date information. Over the past few months, Geographic Information System (GIS) technology has played a vital role in providing vast quantities of real-time spatial data, enabling governments and leading authorities, such as, the World Health Organization to track its spread with speed and accuracy. This has had a significant impact on the response effort. Soon after the crisis emerged, researchers from Johns Hopkins University (JHU), Maryland, US, created an online dashboard to track the spread of the virus across the globe (updated in near real-time). This interactive dashboard (based on Esri's Operations Dashboard for ArcGIS) was viewed by millions of people, raising awareness of the threat posed by Covid-19.

Perhaps the most powerful application of GIS, however, has been at a local level. It has increasingly been leveraged by bodies such as municipalities and health authorities to understand the impact of the virus on their communities, helping answer questions such as:

Which neighborhoods might be affected next? Are essential services such as testing clinics located in the right areas? Are any key workers, schools or care homes located in high-risk areas? Where are vital supplies such as medicines or food most needed? Which hospitals are likely to suffer from capacity issues?

GIS can seamlessly integrate virtually any data which has a spatial component in it to enable predictive analysis, planning and timely actions.

By answering key questions, it can provide governing bodies with the information they need to understand where and when to place vital resources. This will help reduce some of the disruptions and, ultimately, save lives.

GIS can be a valuable tool for helping local communities to take informed decisions which will help them respond proactively in the most effective way possible.

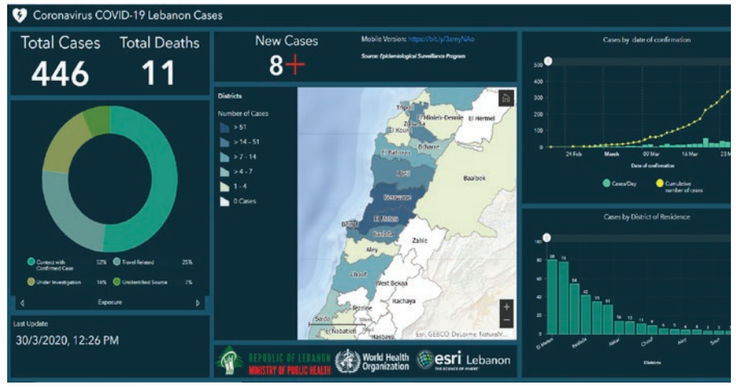
CASE STUDY: LEBANON

GIS BOLSTERS LEBANON'S EFFORTS TO COMBAT CORONAVIRUS

In Lebanon, GIS (Geographic Information System) technology has enabled the Ministry of Public Health (MoPH) to respond decisively to the threat posed by Covid-19.

The MoPH worked closely with the World Health Organization (WHO) and K&A-Esri Lebanon to develop an online dashboard that monitors the spread of Covid-19 on district and national levels. Hosted on the MoPH website, the dashboard utilizes Esri's mapping software, ArcGIS Dashboard, to interpret and display MoPH-supplied data on the disease in real-time.

The dashboard was easily accessible for the public and authorities dealing with the crisis; users can pan and zoom around the interactive map to get insights on particular areas and districts of Lebanon.



A mobile version means they can access the information from their smartphones and tablets.

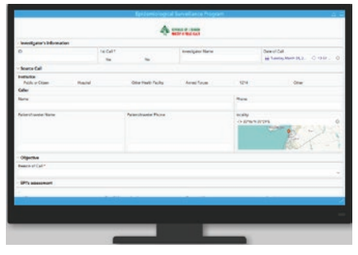
K&A's Senior Director - Geospatial Systems Integration and Esri CEO, Manal Elsayed said: "The aim was to help MoPH establish a national action plan to increase preparedness and emergency response capacities for prevention and early detection of Covid-19. As the pandemic spread across Lebanon, this dashboard became one of the most trusted and reliable sources for tracking and monitoring Covid-19 spread across the country."

GIS can support the following:

- Map cases, including confirmed and active cases, deaths and recovery cases of Covid-19 to identify where infections exist and have occurred.
- Map the spread of the virus and identify where authorities may want to target resources.
- Map vulnerable populations. Mapping populations by age, area and other criteria can help authorities monitor the most at-risk groups and regions.
- Map capacity such as facilities, employees or citizens, medical resources, equipment, goods and services to understand and respond to current and potential impacts of Covid-19.

Lebanon's emergency call center also benefits from Esri's Survey 123 application, through which it can gather information about caller records, symptoms, as well as their location.

> **"This dashboard became one of the most trusted and reliable sources for tracking and monitoring Covid-19 spread across the country."**
>
> **Manal Elsayed,** Senior Director - Geospatial Systems Integration and Esri CEO



The call center aggregates, consumes, and analyzes this real-time data to produce a ministry dashboard that tracks the total calls recorded for Covid-19. ■

SAUDI ARABIA'S NEW NATIONAL HEALTH EMERGENCY OPERATIONS CENTER BRINGS RESILIENCE AT CRITICAL TIME

When Khatib & Alami (K&A) completed its most significant project in the Emergency Management field, nobody could have known the vital role the facility was about to play responding to the threat of a global pandemic.

Launched by the General Directorate of Emergency, Disasters and Ambulatory Transport, the Kingdom of Saudi Arabia's first National Health Emergency Operations Center (NHEOC) is responsible for managing and overseeing activities related to Emergency and Disaster Management.

Geographic Information Systems (GIS) technology is playing a vital role in helping national governments and health authorities across the world to gather accurate data which can inform their decision-making and save lives during the Covid-19 pandemic.

The potential for GIS is exemplified in the Kingdom of Saudi Arabia, where the pioneering National Health Emergency Operations Center (NHEOC) is being used in the fight against Covid-19 as part of the country's effort to combat the virus.

K&A was appointed to provide full multidisciplinary design and construction supervision expertise for the NHEOC on behalf of the General Directorate of Emergency, Disasters and Ambulatory Transport. The facility is aligned with the latest international engineering and functional standards, with state-of-the-art technologies including video-walls, communication platforms, and redundant data centers hosting the NHEOC applications and sustaining its life-saving operations.

As part of K&A's multidisciplinary team, its GIS specialists introduced WebEOC®, the world's leading emergency management software, to enable bi-directional data sharing and common workflows. This allows greater collaboration among stakeholders, resulting in faster response times and deep resilience when dealing with crisis events.

The creation of an integrated event management solution enables decision-makers to take informed decisions in a timely way, based on clearly presented information. This information is presented and visualized on GIS Dashboards, allowing the NHEOC management to monitor and maintain operational KPIs, and assess the team's performance, making sure the Kingdom is prepared to face any medical emergency with clear plans and procedures communicated to all the relevant stakeholders. ■

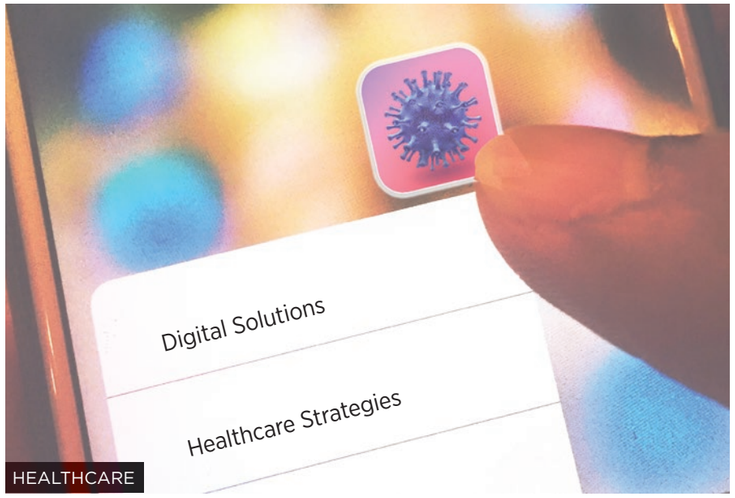
WEBEOC SYSTEM CAPABILITIES

The WebEOC® system automates the NHEOC's operations, based on the unified Concept of Operations (ConOPs) of the Ministry of Health. The system processes all of the relevant, real-time information gathered from different health facilities on specific platforms within the center's operations room, where it can be accessed anytime and anywhere.

Through the information which is gathered and shared, a unified framework and real-time awareness of any event's development are provided, making health crisis and disaster management more effective and accurate.

The establishment of the NHEOC is helping the Kingdom of Saudi Arabia reinforce its emergency and disaster management operations at the national and regional levels by improving and governing the communications between all key stakeholders.

During the Covid-19 pandemic, a dedicated K&A team is helping the Kingdom's efforts to fight the pandemic by providing 24-7 support to sustain the NHEOC's operations and continuously improve the system to make sure the NHEOC is always prepared in the face of this global pandemic.



HEALTHCARE

K&A AND M4H AGREE ON STRATEGIC ALLIANCE TO DRIVE HEALTHCARE RESILIENCE ACROSS MEA REGION

Khatib & Alami (K&A) and management4health (m4h) have signed a memorandum of understanding (MOU) which establishes a strategic alliance through which the two companies will deliver end-to-end healthcare solutions to public and private sector clients, with a diverse focus ranging from university hospitals with research centers to wellness clinics and health tourism.

The companies' combined approach offers holistic solutions for every stage of pandemic response, including tracking its spread within communities; developing healthcare strategies, digital solution, the design, procurement and project management of hospitals and specialist facilities; and assisting clients to secure funding from development institutions and/or other commercial financing firms and banks. K&A and m4h are also looking beyond the current situation to enable organizations to establish long-term resilience and preparedness.

Dr Najib Khatib, Chairman and CEO of K&A, believes the combined offering of the new strategic alliance provides an unprecedented breadth and depth of healthcare expertise to clients in the Middle East and Africa. "As communities come to terms with the unprecedented impact of Covid-19 across all aspects of society, it is vital that we work collaboratively to help them resume some sense of regular life in a safe and appropriate way. Our alliance with m4h brings together a wealth of knowledge and experience, including world-class digital solutions which give organizations and communities much needed confidence that their healthcare systems are in the appropriate state of readiness to minimize the risk and potential impact of any further outbreaks." Stefano Ferrari, Managing Director and Partner of m4h, adds:

"As the attention in many countries starts to focus on the post-Covid-19 world, it is essential that organizations are fully prepared for the challenges of safeguarding the health of their employees, their clients and communities, and that governments put all the necessary rigor into their current and future healthcare provisions. Through our alliance with K&A, we bring an opportunity to harness our vast expertise where the combined effort will help clients emerge from this crisis stronger, more resilient, and ready for the future."

> **"Our alliance with m4h brings together a wealth of knowledge and experience, including world-class digital solutions which give organizations and communities much needed confidence"**
>
> **Najib Khatib, Ph.D.**
> Chairman & CEO

The services provided by K&A and m4h support all aspects of national healthcare systems, including public health policy and awareness, medical facilities and private sector workplaces.

As a multidisciplinary consultant, K&A's expertise includes: the design and engineering of facilities; city & regional planning; digital geospatial solutions to support understanding and decision-making; procurement assistance; hazardous waste management; and project finance assistance, among other specialist areas.

This is complemented by the work of m4h which will bring a partnership of health sector professionals specialized in the design, implementation, monitoring and evaluation of international health projects and programs. ■

FUTURE KSA: MOVING FORWARD WITH A CLEAR VISION

MOHAMED ISMAIL, DIRECTOR - BUSINESS OPERATIONS AND PMC, LOOKS AT KEY AREAS OF DEVELOPMENT ACROSS THE KINGDOM OF SAUDI ARABIA

Saudi Arabia's long-term strategic initiative to diversify the economy away from a dependency on oil is now well established, and has seen significant progress in recent years. The initiative is built around three themes: a vibrant society, a thriving economy, and an ambitious nation – essentially ensuring that it touches every element of Saudi Arabian society.

One of the most important drivers of this strategy is tourism The aim is for the sector to contribute up to 10% towards GDP in the next 10 years, compared to just 3% today. Saudi Arabia is already the region's biggest tourism market in terms of visitor numbers and plans to be a top five inbound destination, with 100 million international and domestic visits a year by 2030.

A key part of achieving these goals is to encourage more Saudis and pilgrims to spend more time in the Kingdom – or in monetary terms, to increase household spending on local cultural and entertainment activities from the current level of 2.9% to 6% by 2030.

The decision by Saudis to seek out entertainment venues elsewhere is estimated to cost the Kingdom $30bn each year.

One of the responses to counteract this trend has been for the Saudi Arabian General Investment Authority (SAGIA) and the Saudi Commission for Tourism and National Heritage to strike a number of major investment agreements; such as a $27bn deal announced last September with a number of regional and international investors.

Affordable Housing Sites' Development in Saudi Arabia

In addition, the lifting of the 35-year ban on cinemas in 2018 was seen as a positive step in improving entertainment options for Saudis. The repeal has resulted in an average of 59,000 cinemagoers a month, according to figures from the General Commission for Audiovisual Media (GCAM). Moreover, Saudi Arabia is spending vast sums on turning its heritage and cultural sites into proper visitor attractions, with the goal to more than double the number of sites registered with UNESCO. The restoration of Wadi Al-Udayra in the Hail desert is a prime example of this initiative in action. On this particular project K&A was appointed to assess and propose solutions to prevent and mitigate against major floods, and restore the wadi's ecology.

The expansion of the Two Holy Mosques, arguably the two most venerated sites in the Kingdom, has gathered pace under Vision 2030. The plan is to increase capacity to welcome 30 million pilgrims every year by 2030. Today both sites attract around 20 million visitors annually, and the government has been keen for both the public and private sectors to be involved in the next phases of expansion. In this regard, K&A was appointed by the Ministry of Finance (MoF) to establish the Kingdom's first-ever project management office (PMO) in order to drive world-class delivery of the expansion works and 50+ infrastructure projects in Makkah, Madinah and Riyadh. The project is also ensuring that skills are retained in the Kingdom by training and developing Saudi talents.

While the Kingdom currently has five Unesco-listed heritage sites to draw in those seeking history and culture, its five ongoing gigaprojects (NEOM, the Red Sea Project, Qiddiya, Amaala and Ad Diriyah) lookbest placed to take the tourism sector to the next level. The schemes are being spearheaded by the Private Investment Fund (PIF), the sovereign wealth fund of Saudi Arabia.

Wadi Al-Udayra and its Surrounding areas

The signs of progress are visible on each. In the case of NEOM, the $500bn city-of-the-future by the Red Sea – the first phase covering the economic concept, funding and the roadmap of the development is complete, and a slew of construction contracts have been awarded. Last year K&A picked up three projects on NEOM Bay (Silver Beach) - a sustainable beach resort community within NEOM – and work remains ongoing.

At Qiddiya, dubbed the Kingdom's 'Capital of Entertainment, Sports and the Arts', detailed plans were laid out at the start of the year for a new race track that is poised to host Formula 1 from 2023.

The desire to host an F1 race to add to the roster of races already in the region in Abu Dhabi and Bahrain is a clear sign of the Kingdom opening its doors to tourism and major sporting events.

The race announcement came not long after a new tourist visa was issued as the Kingdom got ready to stage its first ever heavyweight boxing world title fight between Anthony Joshua and Andy Ruiz in Diriyah.

SMART CITIES

Under Vision 2030, the goal is for Saudi Arabia to have three cities to be recognized in the top-ranked 100 cities in the world. K&A was appointed by AQALAT (a limited liability company founded by Saudi Telecom Company in 2013) to design Smart Square, its smart city development in Riyadh. Last year, the project was awarded the Masterplan Project Award at the Cityscape Jeddah Awards.

Riyadh Smart square

K&A is currently working with Qiddiya Investment Company (QIC) to improve the delivery of Qiddiya by utilizing BIM and GIS technologies.

Our GIS experts have developed an integrated BIM-GIS digital platform that facilitates informed decision-making before, during and after the construction of a project. There has also been recent progress at Ad Diriyah, with the foundation stone laid late last year. Upon completion, the 7km^2 project will comprise 20 luxury hospital brands, including Aman Resorts, five iconic squares, a 15,000-seat arena, and a Formula-E racetrack. At Amaala, the ultra-luxury development planned along the northwest coast, Foster + Partners were appointed as architectural advisors in March. Meanwhile, the 28,000km^2 Red Sea Project, which will include more than 90 islands, hopes to award up to 10 billion riyals ($2.7bn) in construction contracts by the end of 2020, according to Bloomberg.

On top of the tourism drive, the Kingdom has also enacted a number of historic gender related social reforms in the last four years. Women were allowed to attend football matches in 2018, were granted the right to drive for the first time in decades in June last year, and since August can travel abroad without a male guardian. The government says it would also like to increase women's participation in the workforce to 30% from 22% by 2030.

These reforms are likely to have a positive effect on tourism in the long-term by helping to change outside perceptions of the Kingdom, but more importantly, they show that Vision 2030 is truly transforming every aspect of society. As Saudi Arabia assumes the G20 presidency for this year, the stage is set for it to take the global lead on introducing positive policies for Kingdom and the world moving forward. ■

Mataf Expansion with Zamzam Rehabilitation in Construction Phase

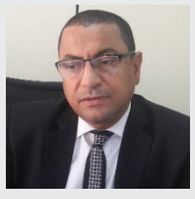
MAJOR SCALE INFRASTRUCTURE

In the last four years Saudi Arabia has invested heavily in the construction of ports, railways, roads and airports. In order to take full advantage of these investments it has entered into a series of international partnerships with the private sector to complete, improve and link infrastructure internally and across borders.

Al-Madinah Al-Munawarah Wastewater Treatment and Sludge Management Plant

The budget for infrastructure spending this year is SAR:56bn ($14.9bn), according to KPMG. Additionally, there has been a significant expansion programme in the water and transport sectors comprising desalination plants, sewage treatment plants, strategic reservoirs, selected transmission pipelines, and transport systems, which are increasing by being delivered through Private Public Partnerships (PPP).

K&A has been involved in the delivery of a number of these projects such as: North-South Railway, Haramain High-Speed Railway, Riyadh Metro, Al-Wajeed Water Masterplan, and Al-Madinah Al-Munawarah Wastewater Treatment and Sludge Management Plant.



Dr. Mohamed Ismail,
Director, Business Operations - KSA, Riyadh

INNOVATION I MIDDLE EAST AIRLINES HQ

MEA HEAD OFFICE IN BEIRUT EQUIPPED WITH INNOVATIVE POLYPROPYLENE PIPING FOR CHILLED AND HOT WATER SYSTEM

In our role as design and supervision consultant for the new Middle East Airlines (MEA) headquarters in Beirut, we came up with an innovative design solution for the chilled and hot water system.

As an alternative to Black Steel Pipe Schedule 40, we chose to use multi-layer, faser-composite polypropylene pressure pipes (PP-R), as we discovered these would equip the building with a more sustainable and robust chilled and hot water system.

Our MEP department, with the approval of the client, carried out extensive research into the benefits of polypropylene pipes as an alternative to Black Steel Pipe Schedule 40, and visited several trade exhibitions such as ISH-2019 in Frankfurt and IFEMA-2019 in Madrid to see the product first hand.

Senior Mechanical Engineer, Hassan Chehade said: “This technology has not been implemented on large-scale projects in Lebanon before so it has been a great opportunity to study, review and supervise the installation of the innovative polypropylene pipes on one of the grandest projects in Beirut.”

Chillers Valves Assembly

The MEA office building (45,967m^2 BUA) is served by a central cooling plant of 1,000 Tons.

The pipes are made of glass-fiber reinforced polypropylene composite which is ideal for the transport of cooling media in closed systems. This combination of material allows the pipes to remain rigid at high temperatures and significantly reduce linear expansion. They are joined via reliable heat fusion, which produces a virtually leak-free and cohesive unit with excellent safety and durability.

Chehade said: “While other piping materials lose performance over time to scaling and corrosion, PP-R material resists any form of change to the material wall. Even after decades of use, the PP-R pipe will retain its original flow characteristics. This prevents the loss of efficiency that occurs when using a pipe that can scale or corrode and will save energy over the life of the system. No chemical treatments are needed to protect the pipe, saving maintenance costs and reducing waste.

The MEA building is scheduled to be completed this year and Chehade said there is potential for the pipes to be used more widely in the region given their high performance.

“Our client has been very forward- thinking and the benefits of using PP-R over Black Steel Pipe Schedule 40 are clear from the studies we have conducted,” he said. “It is easy to fall into the trap of saying ‘but we always do it this way so why should we change?’ But as engineers we should always be looking to push the envelope of innovation for the benefit of our clients and end users.” ■

FEATURE I CONCEPT DESIGN

A CO-EVOLUTION OF ARCHITECTURE AND CITY PLANNING

EDGAR MOURAD, DIRECTOR, URBAN PLANNING & DESIGN, DISCUSSES COLLABORATIVE APPROACHES TO THE CREATION OF PEOPLE-CENTRIC CITIES

Edgar Mourad, Director, Urban Planning & Design - Lebanon, Beirut

The planning and design of cities and the public realm is evolving at a remarkably fast pace. The beginning of the 21st century was clearly marked by innovative urban management concepts that came hand-in-hand with smart technology and tools.

As cities aspire to bring improved quality of life to their residents, while supporting and encouraging tourism and investment, technology is playing an important role in the planning process to help unlock long-term economic, social and cultural development.

Yet along with technological solutions, it has never been more important to engage with end users and to nurture collaboration between public institutions, the private sector, voluntary organizations and citizens. This demands holistic thinking that draws on the full scope of planning, architecture, infrastructure development, asset management and other disciplines to put people at the heart of the planning approach.

INTELLIGENT BUILDINGS AND SMART CITY CONCEPTS

Smart cities are beneficiaries of a collaborative approach to urban planning, since technology must be fully integrated and deeply woven into the fabric of the development. A smart city is an urban area that uses different types of electronic Internet of Things (IoT) sensors to collect data and then use insights gained from that data to manage assets, resources and services efficiently, in return using that data to better improve operations across the city, with a positive impact on both sustainability and livability.

Technology can't, therefore, be an afterthought or a thinly applied veneer. It must be an active component, thoroughly baked into the city's infrastructure and inseparable from the daily experiences of city life. This demands careful interdisciplinary collaboration from the outset to imagine, design, build and manage smart cities.

Data science can be used to determine the size and location of amenities such as playgrounds, parks, malls and bike paths. Instead of simply guessing where they are needed, predictive models are generated and then tested before moving forward. This approach can be used for any large development, which is designed as a micro-city that offers a wide range of "smart" services.

An example of this is K&A's work on Smart Square in Riyadh for AQALAT (a limited liability company founded by Saudi Telecom Company in 2013). As the main design consultant, K&A harnessed IoT and digital technologies to build intelligent building systems that link core services such as lighting, power and water meters, pumps, heating, fire alarms, cooling, elevators, and access control systems. Sensors enable the exchange of real-time data and information, which will significantly improve efficiency, reliability, flexibility and investment returns. Moreover, K&A introduced renewable energy technologies to regulate the energy cooling and heating loads, thereby improving user comfort and reducing energy consumption.

SPATIAL PLANNING

Today, the integration of Geographic Information System (GIS) technologies with design has become an indispensable tool for planners and architects, providing vast amounts of spatial data to give clients and stakeholders the benefits of fully-informed decisions. K&A has been at the forefront of many data-driven spatial planning projects.

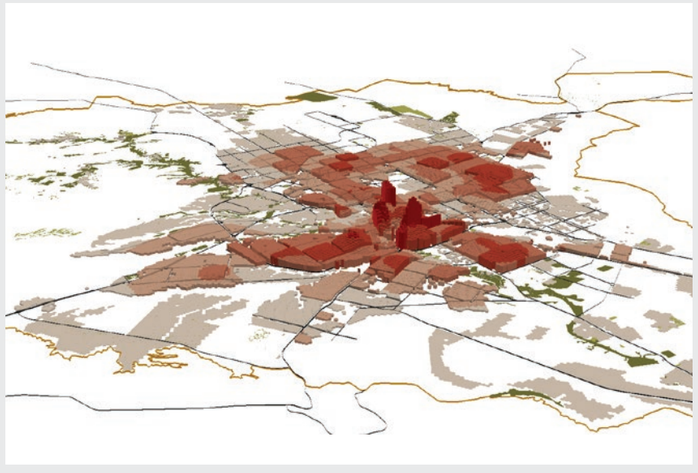
GIS adds value by overlaying complex geographic data to predict potential changes in a city's future. Such tools can significantly help policy and decision-makers to forecast and plan services and built infrastructure requirements, thereby ensuring they can be factored into spatial plans.

The Saudi Arabia Provision of Social Facilities 2030 and Sharjah Spatial Plan 2040 are two examples of projects where K&A used specialist modelling techniques to link diverse socioeconomic data, land uses, movement patterns and transportation networks.

This massively improved visibility and understanding of current and future factors which needed to be considered, enabling scientific justification for every proposed solution.

Another K&A project, Sharjah's Urban Observatory – part of the UN-HABITAT's Global Urban Observatory network – harnesses advanced statistical and geospatial information to define, formulate and produce key urban performance indicators for monitoring urban conditions and trends in the context of the Global Sustainable Development Goals (SDGs).

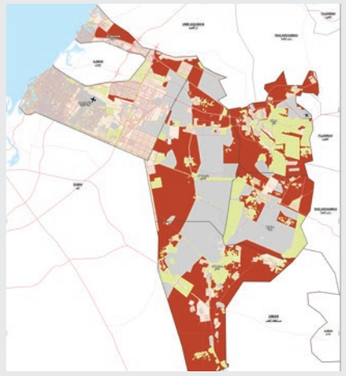
Equity in social infrastructure planning in Riyadh



K&A designed and built a Location-Allocation Modelling tool to support the planning process for the city of Riyadh, covering an area of over 5,700 km^2 by identifying the best locations for social facilities across eight categories (education, health, mosques, security, recreation, administration, governmental, and culture). The Location-Allocation Model was used to identify served and unserved areas by type of service and population distribution (up to 2030), based on planning standards and existing facilities' parameters. Riyadh's land bank data formed the basis to project the best locations for facilities following an urban Service Priority Index, highest needs, and population density.

Spatial Plan for Nine Cities of Sharjah Emirate 2040

One of the main aspects of Sharjah's Spatial Plan covered the mapping of existing and projected land uses, including residential, commercial and industrial areas, as well as sensitive areas which should be protected from future urban development. On this basis, it was possible to create, for the first time in Sharjah, an optimal tool for sustainable land management. A Land-Use Constraint Model was built to allocate highly sensitive areas including agricultural lands, natural green open spaces and natural habitat zones, archaeological and heritage protected zones, and water resources. This model was highly efficient to allocate available free areas for new developments by extracting actual built-up areas, committed areas and land having physical constraints like mountains and Wadis.



COMMUNITY PARTICIPATION

National spatial development plans have become a reliable framework for many countries to better manage policies that influence urban development. Architects, planners and engineers face the need to work more collaboratively with local authorities, developers, consultants, market analysts and contractors to bring together technology, strategic management and policymaking into one framework that oversees social changes and considers infrastructure development, social and institutional measures, business reforms, and innovation. This means involving large-scale citizen participation within the planning and design process.

K&A's work on the Regional Strategies within Oman National Spatial Strategy 2040 (ONSS) is a case in point. The ONSS aims to develop a 20-year planning framework that is geared towards delivering a better balance between social, economic, environmental and physical development and population growth across the country's different regions, whilst also taking into account the need to counter predicted climate change impacts.

The focus of the ONSS is on people, places and building communities, through a better coordination of where people live with where they work. As the lead consultant for Regional Spatial Strategies (RSS) of four main governorates; Ad Dakhiliyah, Ad Dahhirah, Shamal Ash-Sharqiyah, and Janub Ash-Sharqiyah – representing almost third of Oman's area and population – our multidisciplinary team is working in tandem to guide and frame structure plans, city master plans and detailed development plans within the governorate boundaries to achieve:

- Integration of spatial and economic planning
- Equity in land use policies and processes
- Improved resource allocation, environmental quality and quality of life
- Public engagement
- Human resource development and sustainability

K&A conducted several stakeholder engagement workshops involving governors, municipal council members, and public and private stakeholders, as well as the participation of youth and women.

The workshops and regional dialogues helped our experts to introduce the RSS project to the various stakeholders and engage them with the selection of a preferred strategy based on several core themes such as: urban development, rural development, economy and diversification, environment, cultural heritage, food security and water resources, transport, mobility and infrastructure.

Future cities will see more human-centered design approaches, ensuring that vibrant communities, connections, and a strong relationship between people and place are paramount. ■

K&A HOSTS RENEWABLE ENERGY DEBATE

MENA REGION IS AT FOREFRONT OF INDUSTRY GROWTH

The opportunities and challenges that exist in the development of renewable energy projects in the Middle East and North Africa region were debated in a panel session hosted by Khatib & Alami (K&A) at the PPP MENA Forum in Dubai.

The PPP MENA Forum held at Conrad Dubai brought together government officials, PPP units, project owners, consultants, financial institutions and lenders, private investors and stakeholders from across key sectors.

Moderator for the K&A-led panel discussion on 'Renewable Energy Projects in the MENA Region' was Dr. Najib Dandachi, Executive Advisor, K&A, who was joined by panelists Dr. Ahmed Badr, CEO and Executive Director of Regional Center for Renewable Energy & Energy Efficiency (RCREEE) and Eng. Ahmad M. Alazemi, Private-Sector Projects Department, Undersecretary Sector, Ministry of Electricity & Water, Kuwait.

Dr. Badr told delegates that the region's renewable energy market was "booming" due to new "disruptive technologies" including "financial engineering technology".

"Disruptive technology is not only about physical technology but also about financial technology," he said. "In the Middle East and North Africa, there's a very important economic tender which we call FCV or Fragile Conflict, Volatile Economics. So to encourage the private sector to invest money based on equity to debt you need to make sure that investors feel safe from risk," he explained.

"In order to do proper derisking analysis, you need to bring a lot of processes by private sector banks to give confidence to private investors that in case of any default of any risk these banks will come and cover them. This is what we call financial engineering and that's what we're seeing taking place across the region in places like Egypt, Morocco, and Jordan – and it varies from country to country and project to project."

Regional renewable energy investments were expected to reach $35bn per year by this year (2020) as countries looked to diversify their energy mix, while the International Renewable Energy Agency (IRENA) states that a total of nearly 7 GW in renewable power generation capacity is planned to come online by the early 2020s led by the UAE, Oman and Kuwait.

Dr. Badr said that improved energy storage systems such as lithium-ion batteries and concentrated photovoltaic (CPV) to counteract the intermittency of solar and wind generation would stimulate the renewable energy market as they reach commercial viability for utility-scale plants.

"The opportunities are there from what is going on in the region but renewable energy technology is immature and evolving and is thus still not as stable as oil and gas technology, he said. "So the uptake goes hand in hand with financial engineering or technology disrisking to encourage investment – as investing in technology today which could be obsolete by the time a project comes online is a big risk."

HELENA DE FLAVIIS, SENIOR DIRECTOR, INFRASTRUCTURE ADVISORY & DEVELOPMENT, KHATIB & ALAMI, ON THE PPP MENA FORUM:

"Many public sector organizations from around the MENA region were represented at the Forum. It was a good opportunity to understand the plans of the various PPP units, the different ministries and other procuring authorities for 2020 and beyond. Of particular interest was a healthy pipeline of projects that were presented by countries like Saudi Arabia, Oman and Egypt, some of which K&A is already involved in. We are confident that these countries will continue to provide opportunities to the private sector across the supply chain, from consultants to investors to contractors – and this year we look forward to increasing our participation in PPP projects in the region."

Dr. Badr also pointed to the growing influence of China's One Belt One Road (OBOR) initiative, which last year acquired a 49% stake in Saudi Arabia's ACWA Power, as a route to unlocking more investment in renewable energy projects.

Eng. Alazemi updated delegates on the future of renewable energy in Kuwait, stating that the government aimed to cover 15% of Kuwait's peak load with renewable energy by 2030. He said that a ministerial decree in 2018 mandated that all government buildings should have no less than 10% of the peak demand from solar rooftops.

He said: "When we looked at 10 governmental buildings with PV rooftops, we found that we reached about 73 PV projects that is approximately equal to 2,221 MW."

Kuwait has had several small to mid-scale demonstration solar projects in recent years, with steady increases in size. One of the most important showcases has been Shagaya Renewable Energy Park, sponsored by the Kuwait Institute for Scientific Research.

Eng. Alazemi said the first two phases of the 4,000 MW project were complete and that the third and final phase, consisting of a mix of concentrated solar power (CSP), PV and wind energy to be delivered by public-private partnership, would have a request for quotation (RFQ) for a transaction advisor in Q1 this year. ■

RECORD-BREAKING PROJECT SET TO ADDRESS CRITICAL WATER CHALLENGES

The Al Mahsama Water Reclamation Plant in Egypt's Sinai Peninsula, for which Khatib & Alami (K&A) was the main consultant, was inaugurated in April in the presence of the country's President Abdel Fattah El-Sisi. The project is the largest of its kind in the Middle East and one of the largest in the world.

The new facility was initiated to help address critical water supply challenges east of the Suez Canal. In doing so, the Egyptian government wanted to establish a solution that would create significant opportunities to drive sustainable economic development and long-term growth in line with its Vision 2030 plan.

Launched by the Engineering Authority of Egyptian Armed Forces (EAAF) and funded by the Saudi Fund for Development, the new facility repurposes one million cubic meters per day of mixed-use drainage, agriculture drainage, treated sewage and treated industrial wastewater from Al Mahsama drain to provide irrigation water for up to 100,000 acres of land in central Sinai.

To reach its intended destination, the water must first be taken below the Suez Canal to the new 42,000m^2 reclamation plant for treatment and onward distribution.

Drain water, which was previously released untreated into Lake Timsah, is transferred 600m to the Al Mahsama Water Reclamation Plant through two pump stations into Srabium siphon, from which the water is further pumped using eight vertical turbine pumps – six working pumps and two on standby – with each pumping at a flow rate of 7,000 m^3/hr to discharge the water to the plant.

PROJECT FEATURES

Client:
Engineering Authority of Egyptian Armed Forces

Role of K&A:

Main Consultant for the Entire Project

Project Specifications :

Plant Capacity: 1,000,000 m^3/day
Construction Cost: 88 Million including O&M for 5 years
Completion Date: 2020

Services Provided:
Concept Design
EPC Contract Documents
Design Review
Construction Supervision

MILESTONE PROJECT

This large and technically complex project is a milestone in Egypt's water security agenda and represents a qualitative leap in the field of agricultural wastewater treatment across Africa, where water reuse and recycling is still evolving as a sustainable solution to water scarcity. The plant is part of Egypt's progressive and multi-pronged approach to ensuring the country's water security through wastewater treatment, desalination, and the preservation of natural water resources.

The plant's daily capacity will contribute to the preservation of the natural ecology of the Al Temsah Lake, located west of the Suez Canal, which has been impacted by wastewater disposal, causing severe consequences for animal habitats and local fishing culture. It also relieves pressure on water from the Nile.

The plant will provide a new source of water wealth for the peninsula, creating a new generation of job opportunities in the agricultural sector and contributing to the development of new communities in the area. It also represents a significant step in improving the environmental condition of the peninsula.

INNOVATIVE APPROACH

Despite the scale and complexity of its construction, this remarkable fast-track project was delivered within budget in just 12-months, thanks to several measures adopted by the stakeholder team.

Al Mahsama adopted a vertical plant approach, which reduced the space required by 70% and created major efficiencies in terms of construction cost and time.

In addition to the reduced footprint, vertical alignment of the treatment units also supports operational efficiency by enabling the facility to benefit from low head (energy) losses. This is the first time this innovative practice has been implemented in Egypt, or in such a large scale project.

Dr. Maher Kahil, Senior Manager for Water Treatment at K&A, said: "We always seek to make a positive impact in the communities in which we work, so we are delighted to have played such a key role in helping to deliver this water reclamation plant for Egypt. Thanks to the vision and leadership of the Egyptian government, the Al Mahsama Water Reclamation Plant will help to address water shortages east of the Suez Canal and create significant opportunities for sustainable economic development." ■

ENERGY & UTILITIES

KHATIB & ALAMI AND SCHNEIDER ELECTRIC WORK TO BRING SMART GRID TO PAKISTAN'S LARGEST CITY

Khatib & Alami (K&A) and Schneider Electric are working with Karachi-based energy supplier K-Electric (KE) to transform its city-wide network into a smart grid. In its role as the systems integrator, K&A is set to bring a robust GIS-empowered infrastructure for KE to support their SAP-based asset management framework and also the planned advanced distribution management system (ADMS) and smart grid applications.

These integrated solutions will help improve KE's performance, provide full control over asset management and reduce maintenance expenditures.

Commenting on K&A's long partnership with Schneider Electric, Project Manager, Mazen Anouti, said: "2011 marked the very beginning of a trusting relationship with Schneider Electric that led K&A to become the first Schneider Electric Platinum partner in the Middle East and Africa Region.

"This project is our very first with Schneider Electric outside our core markets; this will surely unlock new opportunities with Schneider Electric in geographies where K&A has no presence and allows us to work at a new level of advanced utility implementations."

K&A will provide a full migration of KE power distribution assets including low and high voltage networks into the ArcFM Electric Data Model based on best industry practices and international standards.

ArcFM owner Schneider Electric is handling local administration through their local office and providing licenses, software patches and support when needed. ArcFM will offer new tools that will optimize utility operations through networks analytics, improved productivity and will facilitate reporting and information sharing amongst KE engineers and management over desktop, web and mobile platforms in a sustainable manner. ■

INDUSTRY AWARDS

SWCC WATER DISPATCH CENTER

NATIONAL WINNER OF THE DIGITAL INFRASTRUCTURE PROJECT OF THE YEAR AT MEED PROJECT AWARDS 2020

The newly-built Water Dispatch Center in Riyadh for the Saline Water Conversion Corporation (SWCC) was selected as the National Winner for the Digital Infrastructure Project of the Year category at the MEED Projects Awards 2020.

K&A designed a full-fledged Riyadh-based Dispatch Center for SWCC, mobilizing a team of designers, architects, engineers, IT and GIS specialists.

This strategic project, in line with Vision 2030, has brought about a complete digital transformation of the water management business of the world's largest producer of desalinated water. Through its establishment, it has helped Saudi Arabia to tackle water scarcity and high consumption rates in a much more cost-efficient and technologically advanced manner and provided competitively priced potable water and electricity to millions of people.

Senior Director - Energy & Utilities, Bilal AbouElHassan, said of the award: "To see our water dispatch center crowned National Winner is a testament to our ongoing success and innovation in digital utilities and proof of our team's strong commitment in transforming SWCC for the better. This was a first-of-kind project for the Kingdom of Saudi Arabia's water desalination sector given the level of integration achieved between the AEC (Architecture, Engineering and Construction) and IT/ OT (Information & Operational Technologies) to deliver the final Water Management System (WMS) to SWCC."

The K&A Energy & Utilities team has already achieved many success stories such as our Utility first Management Contractor project in Sierra Leone for the Electricity Distribution and Supply Authority (EDSA), an Esri Special Achievement in GIS (SAG) award for our Geospatial Enterprise Solution project at National Grid, Saudi Arabia, multiple excellence in GIS awards achieved for geospatial projects with Abu Dhabi utilities including best geospatial project for the latest Enterprise GIS Upgrade project in 2017, and becoming the first ME-based company to achieve Esri's Utility Network Management Specialty in 2019.

These energy and utility achievements have further cemented K&A as a leader in this field, with a growing portfolio of over 135 energy and utilities systems integration projects delivered and over 170 contracts won across the Middle East, Africa, and South Asia.

The WMS gives SWCC complete control of water production and distribution in a way it never had before:

1- Real Time Operation
- Deal with emergencies declared by plant operator to shift production where necessary or instruct compensation from storage.
- Reduce time for decision making.

2- Operational Planning
- Coordinate the demand and supply to ensure safe, secure and economic satisfaction of the customer.
- Improve efficiency in operations.

3- Performance Review
- Post-event analysis of what happened on the day.

RECOGNIZING EXCELLENCE: AWARD-WINNING PEOPLE AND PROJECTS

In the last 18 months, Khatib & Alami (K&A) has won 15 industry awards, recognizing our people and projects' significant contributions to the industry and communities we serve. These big wins showcase our commitment to industry excellence while highlighting our positive impact on society, the local community, and the environment.

CONSTRUCTION INNOVATION AWARDS

CEO OF THE YEAR

Dr Najib Khatib was named CEO of the year for his unprecedented leadership and clear vision in driving K&A's strong and sustainable growth. As Chairman and CEO, he has been responsible for guiding K&A forward from being a multi-national player to a truly global organization, ensuring our 6,500+ people are fully equipped with the skills and capabilities to support our clients' ambitious projects. His award recognized the outstanding contributions and achievements he has delivered throughout his 23-year career with the company such as: changing the jurisdiction of K&A holding from Lebanon to Singapore, undertaking a major digital transformation, forming K&A US, and a new business stream, K&A Infrastructure Development.

MEED AWARDS

CONSULTANCY OF THE YEAR

Our determination to deliver outstanding quality and value was at the core of our Consultancy of the Year award. Last year, we invested in our people's capabilities, expanded our business line offerings such as private financing for PPPs for major infrastructure projects and championed new methods and smart technologies such as BIM-GIS integration that have helped our clients achieve their visions.

BIG PROJECT AWARDS 2019

INFRASTRUCTURE PROJECT OF THE YEAR

Al-Madinah Al-Munawarah Wastewater Treatment and Sludge Management Plant aims to capitalize on securing safe environmental disposals and energy, and nutrients recovery in the face of Al-Madinah's growing number of residents and visitors - estimated to reach 30 million/year by 2030. The result of our critical work is a world-class sewage treatment plant and the design of the Kingdom's first solar sludge drying system, which together will provide long-lasting socio-economic benefits for Al-Madinah and the Kingdom of Saudi Arabia as a whole.

CONSTRUCTION WEEK LEADERS IN CONSTRUCTION KSA AWARDS

CONSULTANCY OF THE YEAR

This prestigious accolade draws on the unparalleled commitment of our 3,200+ strong workforce that is deeply engaged to support the Kingdom's development and the realization of Vision 2030. In the last 12 months, K&A has completed an impressive 160 projects and become a leader in delivering strategic mega-projects for major clients such as Aramco, NEOM, the Ministry of Finance and Ministry of Housing.

SAUDI MINISTRY OF HOUSING

BEST CONSULTANT OF THE YEAR

This award recognizes the commitment of our 400+ international team in delivering the design and supervision of around 75 affordable housing sites for around 500,000 Saudi families.

CONSTRUCTION WEEK AWARDS

HIGHLY COMMENDED HEALTH AND SAFETY INITIATIVE OF THE YEAR

Our Stop the Drop health and safety campaign was entirely focused on safe work at height and the prevention of falling objects at the Address Residences Dubai Opera. Because of the unique geometry of the buildings, with their staggered balconies, the campaign was centered around a first-of-a-kind fall arrest system, the Vertifan Protection Screen solution by TSS (Total Safety Solutions). The objective was to provide a self-climbing fan to free up crane time and position the fan as close to the leading edge as possible.

The Vertifan also provides a vertical screen for up to three floors so that cleaning work and installation of edge protection and blockwork can be carried out from behind a safe screen.

ENR GLOBAL BEST PROJECT 2019

AWARD OF MERIT (HOSPITALITY)

The stunning Saadiyat Rotana Resort & Villas is an Estidama two-pearl rating hospitality development that was successfully recognized for its best practices in sustainable design, construction and operational efficiency. Located on a sanded beachfront, out of which a protected nesting beach for indigenous Hawksbill turtles exists, this project takes pride in its conservation efforts as well as its hospitality offering.

MEED PROJECTS AWARDS 2019

GCC ENGINEER OF THE YEAR

Water and Environment Senior Director, Maher Habanjar was endorsed by industry judges for his selfless efforts in mentoring new generations of engineers and completing more than 100 projects in the MENA region. One of his projects, the Al-Wajeed Water Master Plan in the Kingdom's Empty Quarter desert is safeguarding the well-being of more than half-a-million population in Tathleeth and Bisha governorates, where water shortages are presenting a serious threat to health and the economy.

MEED PROJECTS AWARDS 2019

WATER PROJECT OF THE YEAR NATIONAL WINNER

ENGINEERING ACHIEVEMENT OF THE YEAR CATEGORY WINNER

INNOVATION MEDAL CATEGORY WINNER

Al-Wajeed Water Master Plan is a major social infrastructure project aligned with Saudi Arabia's Vision 2030. K&A oversaw the design and build of a world-class water treatment plant and conveyance system (68,000m³/day) to safely extract, purify and transport water from Al-Wajeed wells to strategic reservoirs in Tathleeth. This life-critical project, located in Saudi Arabia's Empty Quarter has helped supply potable water to Tathleeth and Bisha governorates that were suffering from a drought, exacerbated by pollution in Wadi Bisha and the drying-up of local wells.

MEED PROJECTS AWARDS 2019

RISING STAR OF THE YEAR

The talented architect, Mariam Al Taie, was named the Rising Star of the Year in recognition of her ability to build strong relationships within the Omani construction sector and major authorities. Mariam was also praised by the judges for having a diverse portfolio under her belt and a clear passion for the built environment.

MEED PROJECTS AWARDS 2019

HEALTHCARE PROJECT OF THE YEAR NATIONAL WINNER

INNOVATION MEDAL CATEGORY WINNER

COMMERCIAL PROJECT OF THE YEAR

Praised for its engineering genius and creativity, the Specialist Hospital Extension in Oman, for which K&A was the design and supervision consultant, is the first and the region's biggest to adopt a modular construction concept. In addition, the project is a first in the MENA region to adopt state-of-the-art bio-medical AR technology to minimize invasive surgeries, reduce patients' post-operational stays and improve bed-occupancy rates.

DIGITAL TRANSFORMATION

TURBO-CHANGING K&A'S DIGITAL INFRASTRUCTURE

NEW ERP/CRM PLATFORM FROM SAP SET TO EMPOWER K&A'S PEOPLE AND SUPPORT DEVELOPMENT OF DIGITAL SERVICES

The start of the new decade has seen us continue to invest heavily to ensure we are able to support our clients with the digital transformation which is happening within the sector. That means not only looking at our external client facing technologies such as VR/AR drones, 3D printing, digital twins, generative/parametric design, BIM, GIS and IoT, but also our internal technologies to bring synergies, efficiency and productivity gains that also help us to support our clients.

A key part of this corporate digital transformation has been the adoption of an Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) system from technology giant SAP. The ERP/CRM is a seamless integration of all core business processes across the entire organization enabled by software and technology.

The digital platform empowers K&A employees to make better and faster decisions with higher degrees of efficiency. It also supports the development of our services related to IoT, big data and AI.

Through diversification such as this, we constantly seek to maintain a position of knowledge and leadership across rapidly emerging trends such as the use of smart technologies and systems, new materials and tools. Our aim is to reflect them with acumen in our engineering services to inspire technology innovation and exceed our clients' expectations.

LEVERAGING INNOVATIVE TECHNOLOGY

During the past three decades K&A has developed one of the strongest GIS teams in the world. Our experts are establishing the foundations for smart city development and the evolution of smart city concepts. ■

BIM-GIS Integration for Saudi Arabia's entertainment megacity

Adding Client Value with Quuppa

In response to the growing demand for digital solutions in markets such as construction, smart buildings, logistics, and healthcare, we have signed a partnership with Quuppa, a global leader in advanced location systems, to further enhance our specialized open software platform, Way+, and support emerging demand for digital solutions in markets such as construction, smart buildings, logistics and healthcare.

Adding Client Value with Microsoft Azure

Our agreement to become part of Microsoft's booming co-sell program will give us access to a fast-growing network crucial to creating new business opportunities. K&A has developed customized applications and products for a broad range of markets: governmental, municipal, retail, healthcare, telecommunications, education, and security that are deployed through Microsoft Azure. This access gives the firm the ability to work with Microsoft marketing and sales teams, and to co-sell applications to existing Microsoft clients.

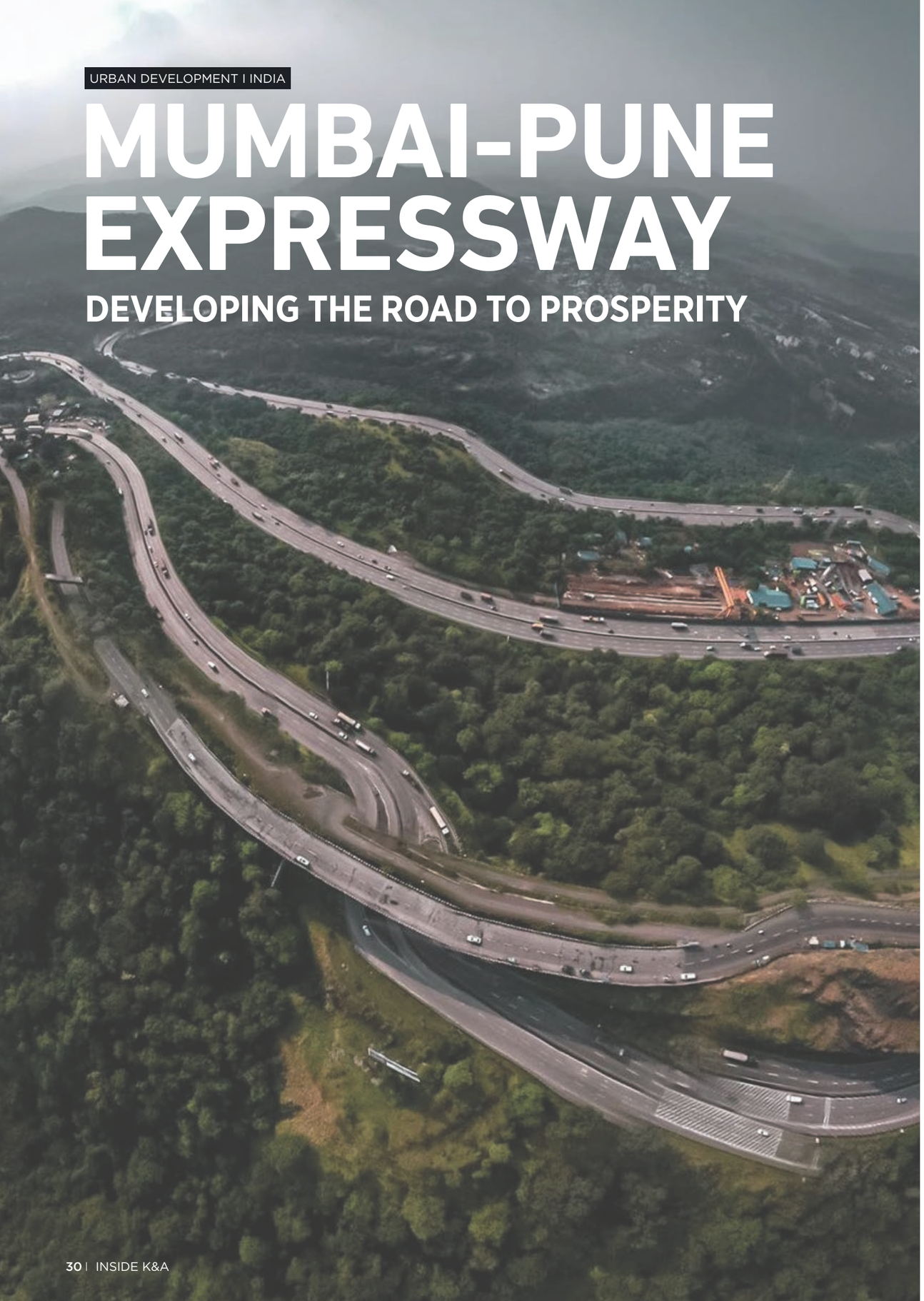
"Our partnership with Quuppa reflects our commitment to be at the forefront of delivering innovation and smart solutions for clients. The construction sector is on the cusp of a digital transformation thanks to the rapid advancement of artificial intelligence and automation, and tools such as Way+ will play a vital role in enabling their adoption."

Manal Elsayed, Senior Director - Geospatial Systems Integration and Esri CEO

URBAN DEVELOPMENT I INDIA

MUMBAI-PUNE EXPRESSWAY

DEVELOPING THE ROAD TO PROSPERITY



By 2041, the Indian state of Maharashtra will see 71 villages along the Mumbai-Pune Expressway accommodate around one million people, representing an increase of 900%.

Khatib & Alami (K&A), in partnership with Feedback Infra, is leading the formulation of an urban development framework for 71 villages along the Mumbai-Pune Expressway, which will help local authorities manage anticipated population rises in Maharashtra, India's second-most populous state. With current population trends in the Mumbai region and major infrastructure projects such as the Mumbai-Pune Expressway, Navi Mumbai International airport, and Jawaharlal Nehru Port spurring investment, approximately 4.5 million jobs are expected to be created in the project area by 2041, it will also see a corresponding 900% rise in its population to around one million residents.

This important project is expected to ease pressure on neighboring Mumbai, Navi Mumbai, and Pune to provide land for housing. It is located 45km from regional capital Mumbai and 80km from Pune, both of which are accessible via the Mumbai Pune-Expressway, which passes through the entire length of the project area.

Bangalore-based project manager, Vidya Udayan Murali, said: "By envisioning the project area as a future international destination, we are supporting Maharashtra State Road Development Corporation in delivering a project that will be truly transformative for the region.

TOTAL AREA:
187 km²

POPULATION:

Current:
0.1 million (2011)

Projected:
1.15 million (by 2041)

LENGTH OF EXPRESSWAY: 32 km

NUMBER OF VILLAGES: 71

4.5 MILLION JOB OPPORTUNITIES BY 2041

95,000 AFFORDABLE HOUSING BY 2031

"The project will offer a high quality of life for residents, foster social inclusion and economic competitiveness and support environmental sustainability and protection.

"K&A has undertaken vision formulation and concept designs, development plan formulation, preparation of development control regulations and urban design guidelines. Throughout this project, we have facilitated the newly formed local development authority to steer the policies to guide the growth and impart a judicious and environmentally-sensitive development with optimization of resources."

AN INTEGRATED APPROACH TO SUSTAINABLE DEVELOPMENT PLANNING AND IMPLEMENTATION

When the project started, the area was guided by two authorized regional plans, the Mumbai Metropolitan Region (MMR) Plan (2016-2036) and Raigad Regional Plan (notified in 1991). The challenge was to integrate the proposed land development provisions and champion an appropriate land use proposal that will successfully advance economic growth, social development and environmental protection. In addition, the project had to adhere to the timelines and stipulation of the Maharashtra Regional and Town Planning Act, 1966 of the Maharashtra state.

Lead Urban Planner and Project Coordinator, Linta Joy said: "The key principle adopted here is to make the development plan a guiding tool for future developments without being highly deterministic and rigid.

The development plan is envisaged to be accommodative of the future market-led developments responding to the evolving needs of its citizens.

"The process was consultative in nature, incorporating multi-level stakeholder perspectives into the formulation and execution of the plan. Integrating the vision and aspirations of multiple stakeholders that included the Special Planning Authority, residents of the area, various government organizations, private entities, builders, and business enterprises was also extremely challenging."

AN ENVIRONMENTALLY AND TOPOGRAPHICALLY-SENSITIVE URBANISM

Proposing growth initiatives, development projects, and infrastructure planning were highly sensitive in some project areas. More than a quarter of the project area cleaves through forest and four villages in the biodiverse Western Ghats mountain range. The undulating topography of the terrain is likely to pose limitations to the construction, operation, and maintenance of infrastructure.

Furthermore, internal connectivity was challenged by the Mumbai-Pune Expressway that runs through the heart of the project. This has raised significant concerns about achieving new and suitable integration with local transportation networks.

TRANSITIONING TO A SINGLE FUNCTIONAL ORGANIC CITY WITH THE EXPRESSWAY AS ITS SPINE

K&A devised a development plan turning the entire project area into a fast-growing city with knowledge hubs that capitalize on logistical, service and tourism activities.

In view of the regional infrastructure projects, growth nodes and private sector involvement with minimal or no land acquisition, K&A has identified multiple growth stimulators such as:

Developing multimodal transportation networks and the provision of six strategically located under-passes and regional transportation development including 293km of internal road networks; 15km of metro rail and 47km of bus rapid transit system, 10km suburban rail and cycling tracks and intermediate public transport.

Building transit-oriented development linking premium projects like Virar Alibaugh multimodal corridor and tapping into suburban rail systems, to ensure seamless connectivity with Mumbai and increase affordability.

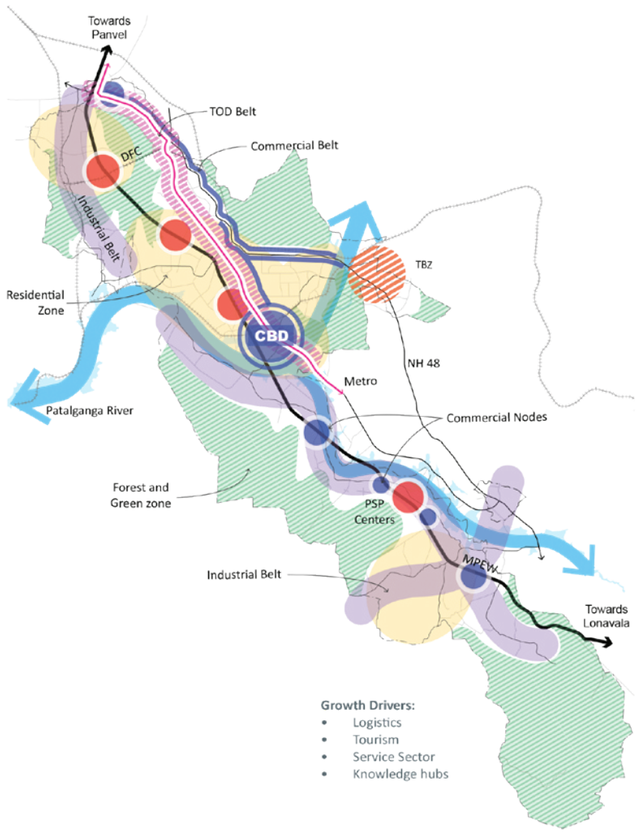
Increasing green belt and recreational green areas from 81 hectares to about 500 hectares – around a 33% increase in the total developable area without affecting 30% of forest and water bodies.

Building educational, health and other city level social infrastructure that fosters national and state-level activities and improves quality of life.

Establishing special theme-based areas to unlock tourism potential.

Developing a multimodal logistic hub, advanced industrial belt and business district to strengthen industrial activities and foster a resilient economy.

Increasing the projected revenue through development charges and monetization of land.



"The key principle adopted here is to make the development plan a guiding tool for future developments without being highly deterministic and rigid."

Linta Joy, Lead Urban Planner and Project Coordinator

GIS EXPERTISE AIDING URBAN PLANNING

K&A harnessed Geospatial Systems Integration (GSI) technology to prepare a GIS-based Land Information System (LIS) which integrates the existing land records, the proposed Development Plan, infrastructure and other projects in a digital platform that facilitates public authorities' involvement and smart governance. ■

TOOL UP FOR THE DIGITAL FUTURE OF DESIGN

Imad Hashash, Senior Project Architect, discusses how the digitisation of design will change the way the cities we live in are created and the skills of the creators.

Architects and engineers stand on the cusp of great change. Empowered by technological advances, those of us who spend our time creating the built environment where we all live will soon lead a design revolution.

Developments in digital technologies, rapidly improving machine learning and industry investment in software are converging at a nexus known as generative design. Already in its infancy, architecture and engineering's early experimentation with generative design has shown us that this new digitised approach could have a major impact on our work, just as technology is reshaping other industries and creating some entirely new ones.

As organisations join the digital surge and the UAE invests in smart cities and smart government, our industry must play its part. In fact, it is vital that we do. Smart cities will be informed by the design decisions we make now, as well as the way we make them. The use of digital technologies at every stage of the development process will create a foundation databank for our smart cities to run on, learn from and improve upon.

We expect generative design to play an important role in this wider transformation. Put simply, it offers a future where the creative work of architects and engineers doesn't begin with a notepad, or a trackpad. Instead it starts with well-researched sets of parameters, based on a thorough understanding of what the client and end-users need. These parameters will then be input to software that learns as it goes.

As we detail requirements such as accessibility, comfort, quiet areas and daylight, processing power and deft software will combine to create design options for us to work with. Not one or two options, but multiple iterations, some subtly different from the rest, offering a radical revision of conventional design thinking.

> **"While it promises to alleviate some design drudgery, generative design will not suppress or surpass creativity. In fact it stands to amplify it."**

Selections can then be winnowed down, rapidly refining how the whole design comes together while experimenting with the most interesting options that emerge. The ultimate aim is to enable teams to make the best design decisions possible, fast, while reducing the cost of construction and associated waste.

Mention this kind of technological automation though and there's usually a ripple of fear. Fear of job loss, or change altering the core components of a profession. But the output from generative design is only as good as what you put in. So, while it promises to alleviate some design drudgery, generative design will not suppress or surpass creativity. In fact it stands to amplify it, speeding us through the work necessary for any project, leaving us more time to plan, experiment with new ideas and explore the outer edges of our creative impulses.

Extracting the most from this opportunity will take talented engineers and architects.

As they have done before, they will have to learn new skills, adding a strong understanding of the software and algorithms that will help shape the designs of the future. We can already envision an industry bottleneck forming around a shortage of talented people with the right combination of architecture, engineering and programming skills to design in this new way. The role of industry bodies, such as RIBA, the AIA and ICE, in charting the skills development of professional engineers and architects will only grow in importance.

The adoption of these new skills is an opportunity for more innovation in design. Unshackled from constraints of capacity and time, we will be able to deeply explore how our clients' requirements can be rendered a reality.

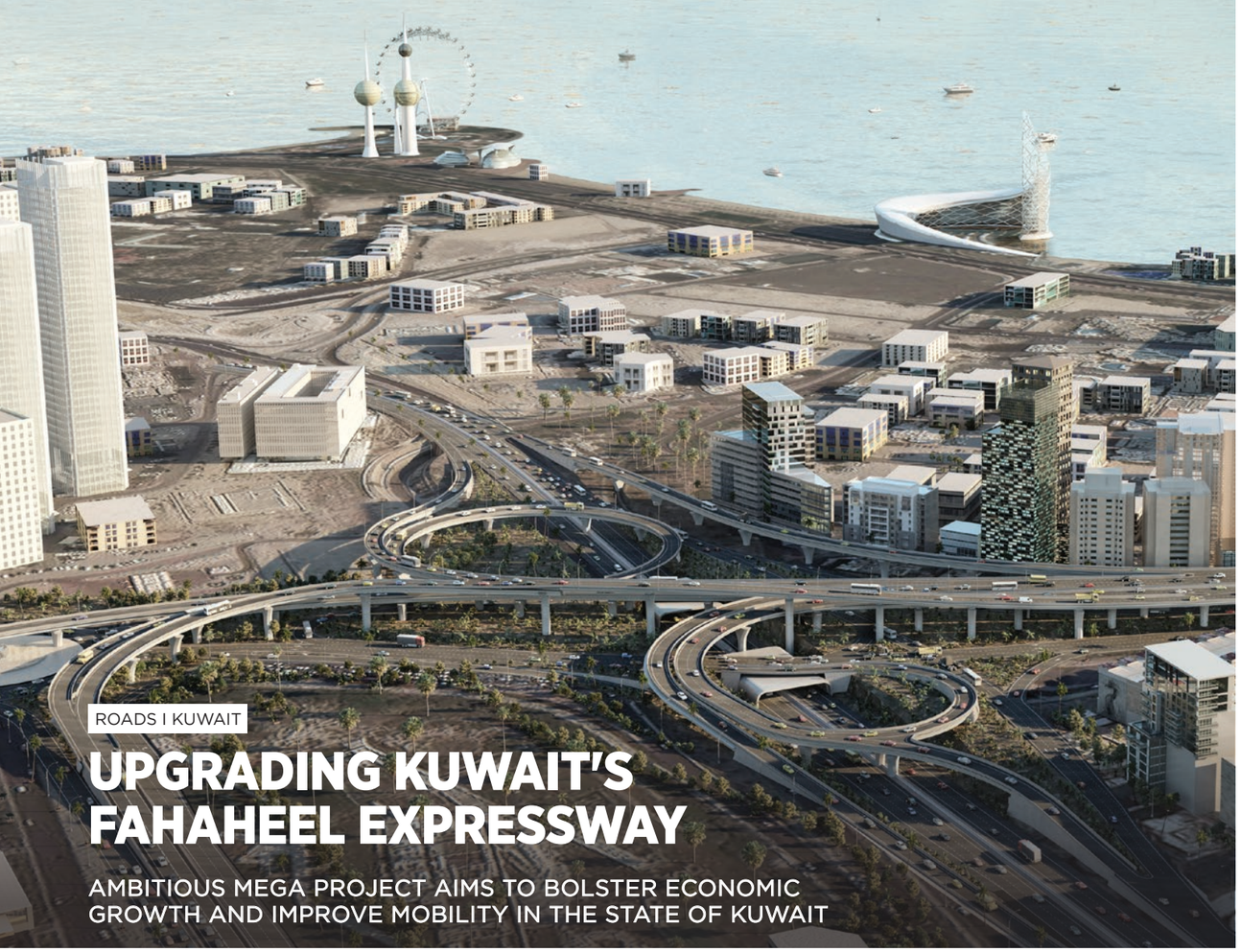
Every day, the built environment sector is getting closer to seeing advanced digital solutions become the industry norm. In our own practice, for example, we are excited by the opportunity to integrate digital building information models with spatial and geographic data into a single platform. Planners, developers, owners and occupiers will all be able to see and easily understand how and where their built asset fits into the wider environment.

This is currently being applied in our role as Building Information Modelling (BIM) consultant on a 96 building masterplan; we're setting the BIM standards to be followed across all aspects of the development. The digital picture that will emerge will be used on a Geographic Information System (GIS) platform to enable the detailed management maintenance of the entire community. We are confident this is just the start, and while widespread adoption of generative design is still in the future, it is close. Its ongoing development could influence every industry that relies on design to excel and innovate.

> **"Elite architects will no longer be those who draw the best, they will be those who can imagine and visualise the most incredible projects, and have the skills to translate their vision into the digital vernacular of architecture's future."**

It could also change the [nature] of architecture as a pro[fession]. Elite architects will no [longer be] those who draw the b[est], they will be those who can i[magine] and visualise the most incredible projects, and have the skills to translate their vision into the digital vernacular of architecture's future. Then the only limits on the built environment will be in our imaginations. ■

Imad Hashash,
Senior Project Architect -
Lebanon, Beirut



ROADS I KUWAIT

UPGRADING KUWAIT'S FAHAHEEL EXPRESSWAY

AMBITIOUS MEGA PROJECT AIMS TO BOLSTER ECONOMIC GROWTH AND IMPROVE MOBILITY IN THE STATE OF KUWAIT

Khatib & Alami (K&A), in association with Kuwait Technical Consulting Bureau (KTCB), has successfully completed the feasibility study and concept design for the improvement of Route 30 Fahaheel Expressway. As one of the State's most significant roads and transportation projects, it is helping to address the infrastructure pillar of Kuwait's Vision 2035 Strategy.

The flagship project will deliver a complete overhaul and expansion of Route 30 Fahaheel Expressway – the most congested route in Kuwait – to maximize its capacity and improve the safety of operations.

"The success factors of the project stem from a fast-track study, design methodology, and integrated stakeholder management that led to resilient collaboration with the client, the Public Authority for Roads and Transportation (PART)," said Project Director and Bridges Manager, Dr Nabil Samadi.

"We also joined efforts with Kuwait Municipality, Ministry of Public Works, Ministry of Finance, Ministry of Electricity and Water Works, and other key stakeholder, authorities, and governorates to champion the best transport corridor solution, in alignment with the broader Kuwait City Master Plan 2030, and benchmark it with similar projects globally."

The population density and land use along the Route 30 Fahaheel Expressway vary, from the high-density commercial and residential area in Kuwait City and the north of the 5th Ring Road, to the moderate-density residential area at the south of the 5th Ring Road, and the industrial area at the end of the project at Ahmadi.

Dr Nabil Samadi added: "Route 30 Fahaheel Expressway is the major highway that intersects main road corridors through different types of grade-separated interchanges at 22 locations. Moreover, there are 22 pedestrian bridges along the 40km project corridor, with an average of three lanes in each direction."

Route 30 Fahaheel Expressway is one of the most important links between Kuwait City and the satellite cities of Ahmadi, Fahaheel and Fintas. A key aim of the project is to reduce congestion between them, transforming them into well-connected transportation hubs. "This critical project positions K&A and KTCB asone of the lead infrastructure designers in Kuwait," said Shiraz Bazma, Senior Manager and Head of Kuwait Office.

K&A and KTCB oversaw the review of Route 30 to understand existing and potential conditions. This involved exploring myriad possibilities interrelated to transportation, urban design, the environment, and economic development objectives from the Kuwait Master Plan.

"This critical project positions K&A and KTCB as one of the lead infrastructure designers in Kuwait."

Shiraz Basma, Senior Manager and Head of Kuwait Office

A traffic analysis study was also conducted, highlighting the need for an additional three lanes along Fahaheel to cater for future transport needs, in addition to a detailed Environmental and Socio-Economic Impact Assessment (SEIA) study, and a Quantitative Risk Assessment (QRA) study to establish the criteria for the selection of the best alternatives, considering constructability and safety.

With construction set to complete within four years, this design-build project will help support Kuwait's 2035 mandate to develop and modernize transport infrastructure for the country and improve quality of life. ■

PROJECT FEATURES

Owner:
Public Authority for Road & Transportation (PART)

Ministry of Public Works (MPW)

Location:
Fahaheel Route 30

Role of K&A:
Design Consultant

Project scope:
Improvement of the expressway, including 22 interchanges and 22 pedestrian bridges

Length: 40 Km

Cost: $4.5 billion

Design Duration:
December 2017 – March 2020

"KTCB's extensive experience in the local market as one of the leading engineering local firms continuously working to gain the trust and confidence of our clients while associating with K&A, has led to the successful completion of one of the most fascinating projects in the State of Kuwait to come to life."

Nabila El Mishri, CEO and Owner of KTCB

INTERVIEW I MARLON VAN MAASTRICHT

USER COMFORT IS THE NEW SMART

Marlon van Maastricht, Senior Manager – Landscape Architecture, Urban Planning & Design Departments at Khatib & Alami, shares his thoughts on the evolution of smart cities.

WHAT DOES THE TERM 'SMART CITY' MEAN TO YOU?

Concepts like smart/sustainable cities are quite abstract and trend driven. We have started to question their actual meaning and application in recent years.

- What does smart mean?
- Is it just being digital?
- Is it just being technologically advanced?

I find this discussion very interesting and important in relation to urban planning, especially looking at how that benefits or challenges the consumer and end user.

We are starting to realize that technology is only one side of the story when it comes to the planning of our future cities and communities. In some ways, the tech boom has actually created a counter movement and yearning to go back to basics, for example in terms of recreation and our natural living environment. And conversely, tech is also providing answers to enable new ways of living and working, as we have seen during the current pandemic with the move towards home-working.

We need to find the right balance - our priority should be to understand and facilitate the changing needs of the end user, especially when it comes to the public domain in our cities and communities.

This will enable us to focus on applying the best available technologies for improving the user experience and quality of life in general. Within that context, I prefer not to use the trendy term "smart" city at all, but rather use the term future city.

ARE WE SEEING A SHIFT THEN IN THE EMPHASIS OF SMART CITY DEVELOPMENT?

We live through our screens nowadays, and in some aspects, it could be argued that as we have become more digitally connected to the world and each other, we have actually become more disconnected as human beings.

In the Middle East, we have seen a positive shift in focus towards user comfort and convenience in several projects, such as the Sustainable City in Dubai, and initiatives such as Green Riyadh in KSA.

As a city, Abu Dhabi in particular has taken big strides forward in putting user comfort and urban green at the top of the agenda where it belongs – this no doubt helped to propel its rise and rating as the most livable city in the Arab world, according to the 2020 Global Livability Index issued by the Economist Intelligence Unit.

WHAT ROLE CAN TECHNOLOGY PLAY IN THE EVOLUTION OF FUTURE CITIES?

Technology is infinitely going to advance and evolve, and should therefore be the baseline, not the goal in terms of the urban planning and development of our cities and their public realm. The rate of this advancement is constantly changing, and is affected by external factors. Just six months ago, who could have imagined the impact that the current pandemic would have in fast-tracking technology and the way we work today – it forced practically the entire business world to "go digital" and remote within a few months, inadvertently driving efficiencies while opening up new lifestyle opportunities.

Looking ahead, IoT, Blockchain, A.I. and other disruptive technologies will continue to change the way we live our

lives, both positively and negatively, in ways that we don't yet fully understand.

We're also seeing the rapid advance of new forms of mobility, such as driverless vehicles and TODs (Transit Oriented Developments), that are set to deeply change the forms and applications of transport, infrastructure, and the public realm in the next decade or so.

In the context of the planning and (re-)design of our existing and future cities, we are still in the very early stages of inventing, exploring and incorporating these technologies to the fullest benefit of the end user.

And as technology indefinitely keeps getting smarter, the goalposts will also keep shifting on how to successfully apply it to the maximum advantage of end-users and their equally dynamic needs and desires.

It is only by focusing on the bigger picture and greater good with an open mind, that we will truly unlock the true potential to consistently keep improving our living environments and lifestyles, and create healthy, happy communities.

This insatiable quest is what keeps our jobs as planners, designers and engineers interesting and "smart"! ■

MARLON'S ACADEMIC RESEARCH

Marlon has recently completed a Master Degree in City Sciences at Rochester Institute of Technology (RIT).

His Capstone project assessed and evaluated the public domain in Dubai as a Smart City.

Through my research I point out that, compared to other smart cities, Dubai may be ahead of the game in terms of digital transformation and embracing technology, but like many other Middle Eastern cities, it needs to acknowledge and remedy the fact that its city has originally been designed for cars and not pedestrians. In terms of the public domain, the most critical artery within the urban fabric of any city, Dubai has overlooked user-comfort as the overarching top priority in too many ways and different places to call itself truly Smart in my opinion.

In a climate like the one of the Middle East, we see that in many cities like Dubai, the public realm, especially dense and frequently used areas near public transport nodes, do not have any trees or if they do, certainly not enough of them, since much of the urban fabric was not built for pedestrians due to the heat. By focusing more on green and the public ground, we could actually bring down the temperature in a more natural way.

"Technology should be the baseline, not the goal, in terms of the urban planning and development of our cities."

Marlon van Maastricht,
Senior Manager – Landscape Architecture, Urban Planning & Design Departments

HEALTH & SAFETY

INNOVATIVE FALL ARREST SYSTEM AT THE ADDRESS RESIDENCES DUBAI OPERA

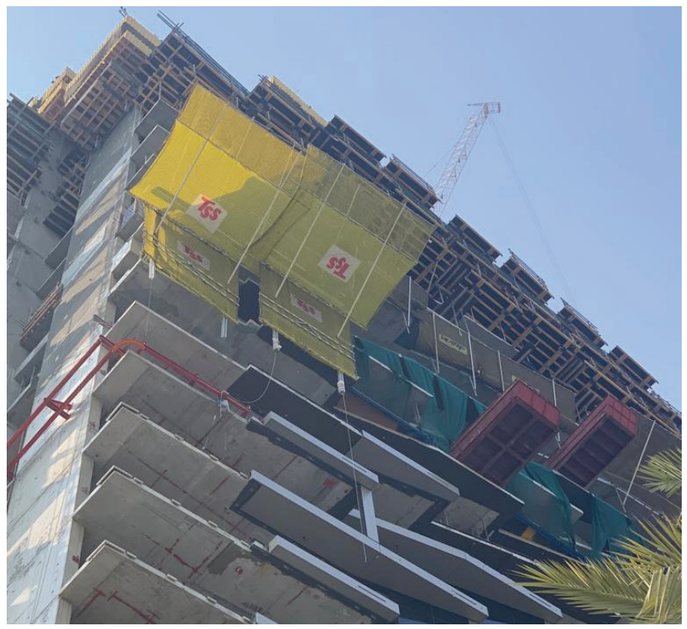
The Address Residences Dubai Opera (plot A2) project required a unique fall safety system that had never been used before on a tall building in the Middle East.

The tower's staggered balcony meant that conventional safety and fall arrest systems would be unable to cover the entire active slab and thereby provide an adequate level of safety from falling objects or arrestation of slips and falls.

Khatib & Alami (design and supervision) and contractor TAV, with the approval of client Emaar and project management consultant Mace, engaged with TSS (Total Safety Solutions) who are leaders in fall safety systems.

TTS Vertifan Protection Screen had to be specially adapted for the project before it was deployed on tower A2, which is close to Sheikh Mohammed bin Rashid Boulevard. The objective was to provide a self-climbing fan to free up crane time and position the fan as close to the leading edge as possible.

The Vertifan also provides a vertical screen for up to three floors so that cleaning work and installation of edge protection and blockwork can be carried out from behind a safe screen.



VERTIFAN PROTECTION SCREEN FEATURES

- TSS Vertifan Protection Screen System & self-climbing fan, therefore crane independent.
- TSS Safety Net Fan for corners which has never been used before.
- The versatile modular design has been adapted to the geometry of Tower A2, hence it works well with the project's table form system and staggered balcony / irregular shape.
- Lightweight efficient engineering and full Aluminium units.
- Integral triple layer, extra-wide safety Net Fan to catch any falling materials.
- Full vertical protection for follow trades such as perimeter blockwork.
- Floor to floor protection with protection screen, double layer safety netting and handrail barriers.
- Permanent edge access and working platform.

WHAT WAS ESTABLISHED AT THE START OF ADOPTING THE VERTIFAN PROTECTION?

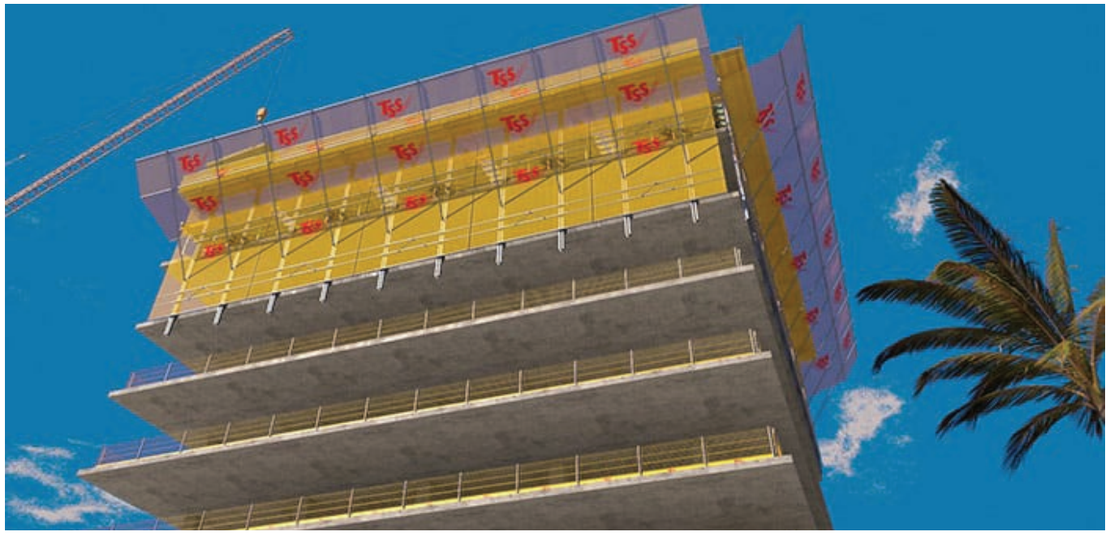
TSS had to establish the correct anchorage of the Fan needles to the reinforced concrete slab and identify suitable cast-in anchors which would be prepositioned in advance. Moreover, it had to deploy safe systems of work for a new system on an ongoing project. Off-site pre-assembly, due to a lack of on-site space, made the process easier.

Pioneering safety fan system a first for the UAE

The coverage of a Vertifan unit is 4.5m wide x 7.5m high with an integral extra-wide fan.

This can be extended in height for another two floors. The netting provides for the full vertical barrier at the building perimeter of Tower A2, which is closest to Sheikh Mohammed bin Rashid Boulevard, as well as horizontal fall arrest protection with the safety net fan. Working side by side with TSS, we made it possible to have the vertical protection screen operate with table formwork and staggered balcony. The Vertifan system will always be one floor below the back propping level, and with the safety catch net, it is providing the required protection for falling objects or personnel from the current floor level.

Since the deployment of the Vertifan Protection Screen in February 2019, the project has currently reached 16.8 million safe man-hours without LTI. ■



NEWS

K&A AWARDED ESRI'S "RELEASE READY SPECIALTY" DESIGNATION

Khatib & Alami (K&A) has been recognized by Esri as a Release Ready Specialty business partner in acknowledgment of its industry leadership and ability to help clients leverage the latest geospatial technologies.

The Release Ready Specialty designation, which is awarded to partners who are early adopters of Esri software releases, supplements K&A's existing status as an Esri Platinum Partner. It demonstrates K&A's commitment to remain at the forefront of the geospatial sector through its continuous investment in digital technologies, training and deployment.

K&A's Geospatial Systems Integration (GSI) division works with public and private sector clients throughout the world to develop and integrate solutions supported by Esri's industry-leading products and software. Through these solutions, clients are able to capture, analyze and interpret real-time location-based data, empowering them to make smart, evidence-based decisions.

Manal Sayed, senior director and head of K&A's GSI team, said: "We are delighted to be recognized by Esri for our dedication to keeping pace with the latest updates and releases. Technology is constantly advancing, and we firmly believe in the need to be at the forefront of the industry to ensure we're able to offer our clients the best digital solutions for their needs."

K&A's Release Ready Specialty designation further reinforces the strong relationship between the two companies which began more than 30 years ago with a project in Oman. K&A became Esri's first Platinum Partner for the Middle East & Africa region in 2014.

In addition to Release Ready Specialty, K&A holds ArcGIS Indoors, ArcGIS Online, and Utility Network Management Specialties from Esri.

K&A APPOINTED TO WORK ON SHARJAH'S 10TH INDUSTRIAL ZONE

Sharjah Chamber of Commerce and Industry (SCCI) has appointed K&A to provide world-class transport and utilities infrastructure designs for the emirate's 10th industrial zone, covering an area of more than 2km^2. This pioneering initiative, which will become a model for developing all industrial zones in Sharjah aims to drive sustainable growth and development, supporting long-term competitiveness and encouraging business investment.

We will provide engineering services for the industrial zone's infrastructure including the design of roads, street lighting, pavements, parking, and stormwater drainage systems, as well as supervise the work of the contractor.

Senior Director, Northern Emirates, Taher Abu Laila said: "We are very pleased to have been selected by the Sharjah Chamber of Commerce and Industry to work on this major infrastructure development project in the emirate.

Furthermore, we welcome the opportunity to leverage our engineering expertise to help the local authorities in their mission to boost the economic competitiveness and prosperity of Sharjah." ■

SUPPLYING BASRA WITH NEW WATER RESOURCES

In Iraq, we are currently helping Basra communities resolve their water shortages that stem from Shatt al-Arab's river pollution by undertaking a thorough assessment of the current and future population demand, identifying other water resources, and proposing the most convenient water treatment technology.

WE ARE K&A

We hope you enjoyed reading this issue of Inside K&A. The aim of the magazine is to provide a brief insight into our work, people, markets and ideas, drawing on our diverse skills and expertise across the built environment sector.

Our multidisciplinary services span a wide spectrum of industry sectors, including: architecture; city and regional planning; transportation; water and environment; geotechnical and heavy civil; power and renewables; oil and gas; program management services; and geospatial systems integration.

If you would like to find out more information about anything you have read in Inside K&A, or to be put in touch with one of our experts, please email us at marketingandcommunications@khatibalami.com

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