AECOM Delivering a better world

AFRICA COST GUIDE

Property & Construction

2023/24

aecom.com

Delivering a better world.

AECOM is the world's trusted infrastructure consulting firm, partnering with clients to solve the world's most complex challenges and build legacies for future generations.

At AECOM, we believe infrastructure creates an opportunity for everyone – uplifting communities, improving access and sustaining our planet.

We're trusted advisors — planners, designers, engineers, consultants and program and construction managers — delivering professional services spanning cities, transportation, buildings, water, new energy and the environment. Working throughout the project lifecycle, we're one team driven by a common purpose to deliver a better world.

AECOM AFRICA PROPERTY & CONSTRUCTION COST GUIDE 2023/234

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FOREWORD

Herman Berry
Director, Program Cost Consultancy, Africa

Welcome to our Africa Property and Construction Cost Guide 2023/24.

Our Cost Guide is an institutional tool for the broader built environment. Within our industry, this guide is utilized by our respected friends and colleagues to the benefit of our sector as a whole. At AECOM, we are dedicated to delivering excellence and we continuously look to enhance this valuable tool.

In the past year, the South African economy has encountered various disruptions on both global and local fronts. To persevere during these times AECOM's comprehensive strategy, Think and Act Globally, sets a new standard of excellence in the professional services industry. This strategy is focused on extending the company's industry-leading, global expertise to each of its projects around the world, transforming the way it delivers work through technology and digital platforms, and enhancing its position as a leading Environment, Social and Governance (ESG) company.

This strategy has not only safeguarded AECOM's local operations, but also facilitated seamless integration of our teams into AECOM's global business lines, spanning from New Zealand and the United Kingdom, to the United States of America.

By embracing this approach, our teams can leverage the vast resources and expertise available across our global network, ensuring that we deliver exceptional service and remain at the forefront of our industry, both locally and internationally.

Operating in diverse global regions has significantly enhanced the advancement and evolution of our digital capabilities. Through this experience, our teams have gained invaluable insights and expertise, allowing us to stay at the forefront of our market.

We continually equip our teams with cutting-edge software and digital tools, ensuring that we maintain our position as a trailblazer in the industry. By embracing the latest technologies, we empower our teams to deliver innovative solutions and drive continued progress in the digital space.

We take great pride in our substantial investment in the development of our staff, particularly through our mentoring programmes for candidates. These programmes have proven instrumental in supporting candidates during their crucial formative years and are now yielding remarkable results during the APC interviews. We are delighted to witness the positive outcomes of this investment, as our candidates demonstrate their growth and readiness for professional advancement.

We are delighted to announce that we have upheld our level one B-BBEE scorecard, as per the revised codes set by the Department of Trade and Industry. This achievement serves as a strong reaffirmation of our unwavering dedication to making a positive impact on South Africa. Our commitment to promoting economic transformation and creating a better future for all remains resolute. We are proud to play a part in building a more inclusive and prosperous society.

We extend our heartfelt gratitude to our valued clients for their unwavering support. These client relationships hold immense significance for us and we are wholly dedicated to nurturing and strengthening them.

As we progress, our team eagerly looks forward to continuing our role as trusted advisors, forging meaningful connections and collaborating closely with our highly regarded clients.

Kind regards,

01

THE CHANGING LANDSCAPE OF AFRICA

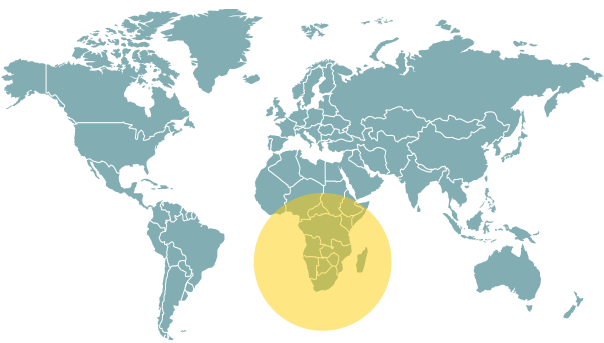
SECTION 1

The changing landscape of Africa

We are passionate about the development of Africa and continually seek to align ourselves with initiatives that aim to bring this development to life.

We serve private and public clients, delivering technical excellence on infrastructure and program projects, whilst keeping our communities at the forefront.

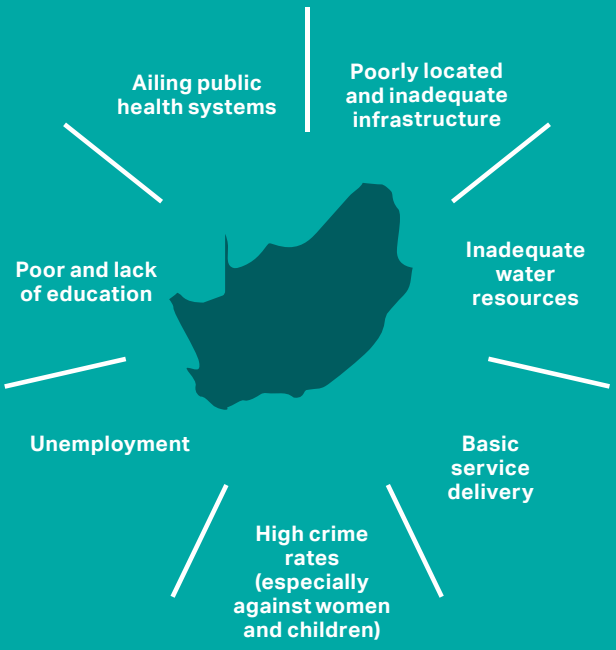
Our multidisciplinary team of award-winning engineers, planners, architects, environmental specialists, scientists, consultants, quantity surveyors (cost managers) and project and programme managers are committed to delivering projects that improve the quality of life for Africa's communities.



Improving lives

As a relatively new democracy, South Africa must deal with many challenges resulting from the past, as well as the new challenges which will have a major impact on the social wellbeing of the country.

The key challenges facing South Africa are:



When it comes to making decisions over infrastructure, a more holistic approach is needed that takes account of social and economic benefits. With evidence showing that social values such as health, quality of life and social inclusion can boost long-term economic growth, we make sure our projects and operations evaluate the whole picture and put people at the forefront to create a safer, more resilient country prepared for the future.

Exxaro Head Office
South Africa

Bridging the skills divide

Our strategy is aimed at facilitating empowerment of talented individuals through university and in the workplace. We believe that by providing these opportunities, young people will realise their potential to successfully enter the built environment professions.

In 2017, AECOM established the AECOM Educational Trust with the objective of providing bursaries to young black women to further their tertiary education in the built-environment.

AECOM's Learning and Development department, in partnership with Skills College, launched its sixth 12-month Disabled Learnership Programme this year. Learnerships are intended to address the gap between education, training and the needs of the labour market. To date, AECOM has sponsored nearly 100 disabled learners on this work-based approach to learning that culminates to a Business Administration NQF level two and three qualification.

As part of our commitment to improve skills, experience and excellence in the industry, AECOM offers bursaries each year to aid full-time employees and meritorious students that are studying towards the main fields of our core business. On average, eight full-time bursaries are awarded annually to talented students from disadvantaged backgrounds.

> “Learnerships are intended to address the gap between education, training and the needs of the labour market.”

Candidacy Support and Mentoring Programme

At AECOM, mentorship is deeply-rooted in our business offering and we understand its importance and how these relationships significantly impact our more junior team members, as well as our business.

The Candidacy Support and Mentoring Programme is a world-class structured programme that creates a focused learning and mentoring environment that supports and accelerates the candidacy journey across the whole built environment, as well as other appropriate professional bodies applicable to AECOM Candidate Professionals.

It is a full lifecycle programme that will benefit everyone, whether they are graduates not registered as candidates, young candidates, or mature candidates who have been registered as candidates for more than five years.

The programme is supported by our own internal pool of mentors and an external service provider (Mentoring 4 Success).

During the programme, mentors themselves participate in substantial leadership/personal development training, encompassing relationship building, emotional intelligence, generational theory, behavioural theory, coaching skills and goal setting.

Mentors who participate will be able to make up almost their full CPD requirement and possible accreditation as a registered mentor via M4S with SABPP.

The programme is further enabled via two unique mobile knowledge mentoring applications and analytic dashboards provided exclusively by M4S under an exclusive Africa licence agreement.

The **KnowledgeMentor™** and **Mentoring Head Quarters app**, and the **MentorExcellerator™** and **Career Head Quarters**.

These unique technology platforms allow for M4S and AECOM to gather, monitor and report on engagement analytics critical to validating the effective impact and accelerated professional development.

The analytics also provide substantial evidence of professional development for the annual CETA grant applications and the B-BBEE verification audits.

Sol Plaatje University
Northern Cape, South Africa

Broad-Based Black Economic Empowerment (B-BBEE)

Transformation is an important factor in South Africa's transition towards the vision of a non-discriminatory, democratic and prosperous society, as summarized in the Freedom Charter. Equity, diversity and inclusion is vital at AECOM and we know that transformation opens a path to inclusive economic growth and development.

Our B-BBEE journey continues as we set ourselves targets to continuously improve in all categories with investment in our people. We are proud to report that we have maintained our level one B-BBEE scorecard (as outlined below) in terms of the Department of Trade and the industry's revised codes - a reaffirmation of our commitment to contributing to a better South Africa.

B-BBEE Level Status:	**Level 1**
Procurement Recognition Level	135%
Black Ownership	20.47%
Black Women Ownership	20.47%
Black Youth Ownership	20.47%
Scorecard Information: Ownership Management Control Skills Development Preferential Procurement & Supplier Development Socio-Economic Development	 18.49 points 15.94 points 33.08 points 27.34 points 6 points
Total	**100.85 points**
Empowering Supplier	YES
Designated Group Supplier	NO
Scorecard	Generic – Construction BEP Sector (15 December 2022)

Sustainable Legacies – our Environmental, Social and Governance strategy

In ways that are both devastating and transformational, the coronavirus pandemic has highlighted weaknesses and inequities in the systems that support quality of life and prosperity in our already fragile world.

It has led us and our clients to rethink what's next, reorder priorities and accelerate changes that not only help repair what's broken, but lead to improved, lasting outcomes.

As the world's trusted infrastructure consulting firm and a leader in environmental, social and corporate governance, we are determined and well positioned to deliver positive, impactful and sustainable legacies for our company, our communities and our planet.

Whilst working with you, we aim to deliver a better world.

The strategy has four themes, each of which are detailed below:

Embed sustainable development and resilience across our work

Achieve net-zero carbon emissions

Improve social outcomes

Enhance governance

#2

In Engineering News Record's 2022 top environmental firms

SUSTAINABILITY Innovation Awards 2022

Winner - Green Consultant of the Year Sustainability Innovation Awards 2022

ScopeX™

ScopeX™ is AECOM's platform to reduce carbon across our planning, design and construction projects. It considers embodied and operational carbon across the entire lifecycle with the aim of reducing carbon impact by at least 50 percent compared to industry norms on major projects.

To decarbonize the built-environment and support our clients to achieve their net zero agendas, we're improving the cities and communities we serve. Whether its reducing Scope 1, 2 and 3 emissions, or supporting the development of clients' carbon strategy, ScopeX™ considers materials, site locations, logistics and construction methods to reduce and eliminate the impact of projects on the natural environment. We minimize energy use and optimize sources of renewable power to eliminate carbon emissions and meet clients' carbon goals.

The foundation of ScopeX™ is early engagement with clients. By determining what is critical for their project, we then deploy the best design solutions and digital tools to design the optimal solution for carbon reduction, all while tracking our total impact over time.

ScopeX™ includes an evolving digital platform, informed by the ongoing collection and analysis of client and project data to inform the development of future tools, and refinement of our services.

Taken together, we estimate that our ScopeX™ platform has the capability to design out at least 84 million tons of carbon dioxide emissions from the built-environment per year.

ARTICLE 1

Building a more resilient world

Herman Berry

Director, Program Cost Consultancy Africa

The Green School
Paarl, Western Cape
Image courtesy of GASS Architects

AECOM fast-tracks Green School, South Africa in Paarl for the 2021 school year.

Appointed in June 2019, there was considerable pressure to have the school open and operational, even before the school's teaching staff were appointed and children accepted. This meant that the opening date was non-negotiable. However, careful planning, teamwork and sheer hard work meant that Green School, South Africa was ready to welcome learners by 15 February 2021.

The school is a passion project for its founders, Herman and Alba Brandt, whose children attended a Green School in Bali in 2017. Their extraordinary educational experience inspired the establishment of Green School, South Africa. The personal significance of the project, a school for their own children and children from their community, was a driving force throughout the project lifecycle.

The family had a personal touch in every aspect, which meant that managing expectations throughout was critical. The coronavirus pandemic impacted progress significantly, with construction halted on 27 March 2020 and only resuming on 1 June 2020. This added a two-month delay to an already congested timeline.

When the hard lockdown commenced, no one could foresee how long it would be before construction could resume. As time passed, the team became increasingly concerned about the construction timeline, as well as the probable impact of global supply chain constraints on availability and price escalations of all critical materials.

To address these risks, the professional team redesigned many of the buildings to enable reduced construction times. An example of this is how all classrooms were originally planned as rammed earth buildings, but during lockdown this was changed to locally manufactured bricks. The team also tendered and finalised the procurement of all critical materials such as glass, steel, aluminium and the security system, etc.

The manufacturing of the custom-made roof trusses for all classrooms were even managed during lockdown

level four by adopting a modular concept to increase on-site efficiency. Critical decisions had to also be taken on how the school could be operational whilst still finishing some buildings after it had opened.

What is Green School, South Africa, and how is it 'green'? A Green School's mission is to educate for sustainability, so it has an extremely strong focus on sustainability in every component of the school. This includes design, construction and operation, but also extends to the curriculum and the way in which this is taught.

The school opened with an initial intake of 120 learners from kindergarten to Grade 8, and will add a grade so it caters for kindergarten to Grade 12 by 2025. The gross construction area of 2,973 m2 consists of 16 classrooms split between kindergarten and primary school, the Sangkep Hall (Balinese for 'gathering place') and the Heart of School area, complete with dining hall, kitchen, servery, library, art and music studios and ablution facilities.

Apart from the buildings, extensive landscaping had to be completed, such as a sports field, road network and security fence. From a design and construction perspective, the Living Building Challenge (LBC) was proposed by Terramanzi, the sustainability consultant. The LBC is an incredibly rigorous standard that requires a project to be regenerative and not just have a zero-carbon footprint. The fact that the site is situated outside the urban edge and far from public infrastructure services meant it had to generate its own electricity, purify its own water and treat its own waste water.

Some sustainability highlights of the school are:

- It is regenerative in terms of energy, producing 105% of its own electricity consumption, thus giving back to the grid and not taking from it.
- It is regenerative in terms of water, using less water than what the site naturally gets per year from rainfall – hence it gives back more to the river and groundwater aquifers than it takes from it.
- It is a zero waste-to-landfill site, also taking in waste from neighbours and the community to have a net positive impact on waste to landfill.
- The construction process had to ensure that no materials on-site included any Red Listed ingredients, and also that the manufacturing process of all materials did not use any of these items.

- Endemic flora was re-established in the gardens, thereby contributing positively to the biodiversity of not just the site, but the entire area, with so many different types of bees, butterflies and other seed-spreading.
- It incorporated vegetable gardens, fruit forests, medicinal gardens and herbal corridors in the campus landscape. The school day includes growing, caring for and harvesting – all with the aim of re-establishing people's connection to the land and food.
- All materials were carefully selected to reduce carbon emissions. Feng shui principles were incorporated to harness positive energies within the buildings to harmonise individuals with their surrounding environment. The thermal comfort of learners and educators was very important, with the classroom orientation, heights, roof overhangs and Thermally Activated Building System (TABS) all contributing to create a comfortable indoor environment.

With the different types of material requirements, in addition to personal touches by the client, budgets remained under pressure, so AECOM drove a value engineering process with the architect and interior designer. Basic quantity surveying principles were applied, such as reviewing the efficiency ratios of wall/floor areas, reducing wall heights and oversailing roofs, advising changing materials to meet target savings and reviewing construction areas of the various buildings, etc. The designers were guided to make practical changes without altering the essence of the design in order to achieve the client's vision.

GASS Architects deserve recognition for their exceptional execution of the design brief, successfully meeting all our client's sustainability requirements. Their unwavering commitment to environmentally-conscious design, meticulous attention to detail and innovative solutions have seamlessly integrated sustainable features into the building's design. The result is a structure that harmoniously blends functionality and aesthetic, whilst prioritizing sustainability GASS Architects' dedication and expertise. Together, this contributes significantly to a more sustainable and greener future, serving as in inspiration too.

When Green School, South Africa opened its doors on 15 February 2021, the classrooms and Heart

of School buildings were complete, the gardens were planted and all infrastructure components were operational. It was an almost impossible project, but showed how collective determination and hard work can change a challenging dream into a beautiful reality.

This project brings diversity to AECOM's standard public education services. It is hoped to be a trailblazer for similar types of private campuses in future.

> “Sustainalytics, a provider of ESG research, ratings and data, has ranked AECOM 12 out of 307 in the industry group for construction and engineering in terms of ESG.”

GREEN STAR SOUTH AFRICA

Employees across our South African business have completed the 'Green Star South Africa' accredited professional course.

Our people are well-versed in sustainable construction and are available to help clients achieve their environmental responsibilities, as well as their financial objectives in terms of infrastructure and building development.

Green building ratings currently undertaken by our team of sustainability consultants include: Green Star Office, Green Star

Interiors, Green Star Existing Building Performance, LEED Design and Construction and LEED Interior ratings.

The Green School
Paarl, Western Cape

Image courtesy of GASS Architects

02

OUR DIGITAL TRANSFORMATION

Innovation

SECTION 2

Digital Project Delivery (DPD)

AECOM promotes a collaborative working environment underpinned by digital technologies. Our focus is on implementing more efficient methods to design, procure, construct, operate and maintain built assets and infrastructure.

Our cost managers and consultants are fully aligned to standard DPD protocols and procedures. This ensures consistency and successful outcomes in our daily working practices. Our teams are committed to the development of 5D BIM through a collaborative workflow that aims to improve BIM data quality and facilitate improved digital outcomes.

These include the ongoing development of the following:

- Design/measurement coordination
- Risk/change management
- E-tendering
- Global collaborative tools
- Construction progress reporting
- 5D BIM Implementation
- Mobile connectivity to monitor site progress
- Paperless communications and reporting

digital AECOM pipe·insights plan·engage

Digital AECOM

Digital AECOM brings together the potential of AECOM's digital technologies to deliver a better world.

Working across the program and project lifecycle, Digital AECOM combines our leading industry knowledge with digital consulting services and products to define, develop and implement personalized – and even disruptive – solutions that accelerate our clients' digital journey and achieve better outcomes

We exist within AECOM's sphere of innovation, and expanding ecosystem of tools, systems and processes – with a team of over 2,000 digital practitioners who understand both the urgency of the challenges facing the infrastructure industry, and our responsibility to respond in an impactful and enduring way.

As one of our core values, innovation drives our embrace and development of digital technologies.

From **PlanEngage**, our online platform that streamlines the planning stakeholder engagement process, to **PipeInsights**, our AI/ML platform that improves the speed and accuracy of pipe inspections, we have developed user-friendly software-as-a-service (SaaS) products that provide greater connectivity between data, projects and communities.

We constantly invest in our digital capabilities to deliver faster, smarter and better. Working with agile specialists, as well as some of the world's largest software providers, our extensive technology alliances allow us to select the right options to meet our clients' needs.

Budgets and timescales involved in infrastructure projects mean few can afford to gamble when it comes to digital adoption. Achieving net zero carbon targets and circular economy ambitions add further impetus and complexity.

As digital experts and trusted advisers to the architecture, engineering and construction industries, Digital AECOM is the bridge between the digital and infrastructure worlds, equipped to create a more sustainable and equitable future, and to deliver a better world.

To learn more about Digital AECOM please visit: **digital.aecom.com**

Spotlight on solutions

Selected digital solutions we've developed to solve today's pressing challenges:

Digital Twin - there's never been a better time for asset owners to adopt digital twins to unlock significant value and provide benefits for themselves, their customers and safeguard their staff.

SWIFT (Sustainable Ways of Integrating Future Transportation) – examines future scenarios for regional development considering transportation's role in sustainable development patterns and the role of emerging transportation technologies, such as automated vehicles and Mobility as a Service (MaaS).

OCEAN (Operational Carbon & Energy Analysis) – gathers data for holders of large asset portfolios to understand their portfolio level performance and compare building performance against industry norms.

Transforming project delivery

Our clients count on us to think without limits. By harnessing the power of digital technology and innovation, and connecting our technical experts and visionaries around the world, we deliver tailored solutions and transformative outcomes for our clients and the communities they serve.

Using a bespoke AECOM-developed Reality Capture tool, comprising a mobile phone, 360-degree camera and cloud application, we're able to take 360-degree images of projects that are automatically uploaded and stored on a secure cloud server quickly and easily, visually documenting construction-site progress throughout a project's lifecycle.

The tool allows us to document site progress faster, with stakeholders able to view and assess the information at any time and from anywhere. The images can be easily retrieved as the application logs their location and capture times, which is in stark contrast to traditional photograph repositories that either rely on extensive tagging or renaming.

The 360-degree images provide a more ubiquitous view of projects, which would traditionally involve taking dozens of photographs at multiple locations.

- Project stakeholders to assess site progress remotely anytime and from anywhere by taking a virtual walkthrough.
- Dedicated microsite for stakeholder access to an immersive virtual site walkthrough.
- Visually documenting construction site progress through the use of 360-degree images.
- Promoting transparency across projects and enhancing trust.
- Quicker documentation of site progress.
- All information is stored on one platform, in one place.
- Health and safety concerns can be picked up and shared with the SH&E team.
- Efficient claims handling due to the ability to view an archive of project images tagged with the same GIS data.

Department of Agriculture, Land Reform and Rural Development
Pretoria, South Africa

Image courtesy of Boogertman + Partners

Building Information Modelling

The 5D BIM process

For the cost management team, our focus is on 5D BIM. This refers to the linking of cost information to a 3D model. The number "3, 4 or 5", in connection with BIM, relates to the type of information associated with the model. It refers to other dimensions, such as time (4D) or cost (5D). 2D and 3D essentially refer to CAD 2D plans and 3D models, while 5D BIM entails the intelligent linking of individual 3D CAD components to cost-related information.

The possible benefits of BIM from a cost management perspective:

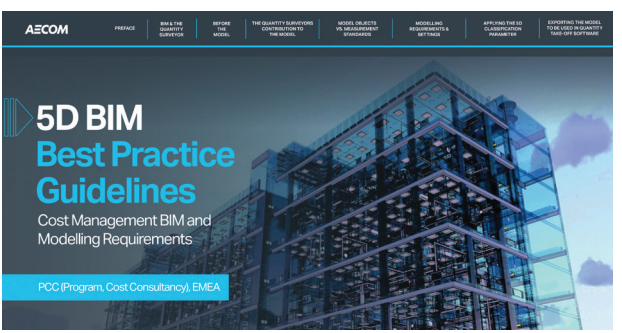
- Fast, reliable and accurate quantity take-off and cost estimation.
- Auto computation of calculations, hence reduced calculation mistakes.
- Categorised cost reporting and estimation via the use of zones/locations.
- Improved visualisation of the elements for measurement and costing purposes.
- Enhanced communication and collaboration amongst the professional and project team.

Our PCC team have developed a thorough leadership document that is an essential guide for quantity surveyors, cost managers and cost estimators looking to be involved within a project utilising BIM.

The document further acts as guidance notes to the design team about modelling best practices and requirements for the quantity surveyor to be able to rely on the object data within the 3D model. The document makes recommendations based upon 5D-friendly modelling practice to standardise the output of 3D models in a format that is 5D compatible.

By applying the guidance within the document, the need for manual take-off will be greatly reduced. The ultimate goal is that the development of consistent modelling best practice improves the quality and usability of model data.

> The ultimate goal is that the development of consistent modelling best practice improves the quality and usability of model data.”



Research support

Research is a key part of AECOM's aspirations to embrace complex challenges and deliver innovative outcomes.

Through our research and knowledge creation activities, we aim to stimulate beneficial cultural and business changes, resolve industry-specific problems, support our knowledge database and deliver cost-effective, high-quality and relevant services.

We also undertake contract research on assignment for clients.

Globally, we have a tradition of supporting research collaborations, and in South Africa we are currently pursuing a wide-range of research studies with local academic and research institutions, professional bodies and the government.

Current research nationally and internationally centres around:

- Local, regional and international influences on construction costs and prices.
- BIM cost models.
- Sustainability and green buildings — drivers of green design, construction and operations within different building types.
- Improving infrastructure project delivery in South Africa.
- Tall, large and complex buildings — efficiencies in construction and life-cycle costing.
- The triple bottom line in construction and property development.
- The soft landings process for buildings.

We have ongoing collaboration with our international offices with specific regard to global infrastructure sentiment surveys, sector-specific research and developing global project-cost databases.

Finally, we aim to work closely with the industry on continuing educational workshops and in developing relevant industry reports and publications.

03

OUR SERVICES

Our services

Quantity surveying and cost management

AECOM provides comprehensive cost management services through all six stages of a project cycle, as identified by The South African Council for the Quantity Surveying Profession, Tariff of Professional Fees, Quantity Surveying Profession Act 2000 (Act 49 of 2000), which is summarised as follows:

Stage one

Assisting in developing a clear project brief.

Advising on the procurement policy for the project.

Advising on other professional consultants and services required.

Advising on economic factors affecting the project.

Advising on appropriate financial design criteria.

Providing necessary information within the agreed scope of the project to the other professional consultants.

Stage two

Agreeing on the documentation programme with the principal consultant and other professional consultants.

Reviewing and evaluating design concepts and advising on viability in conjunction with the other professional consultants.

Preparing preliminary and elemental or equivalent estimates of construction cost.

Assisting the client in preparing a financial viability report.

Auditing space allocation against the initial brief.

Providing services for which the following deliverables are applicable:

- Preliminary estimates of construction cost
- Elemental or equivalent estimates of construction cost
- Space allocation audit for the project.

Stage three

Reviewing the documentation programme with the principal consultant and other professional consultants.

Reviewing and evaluating design and outline specifications, as well as exercising cost control in conjunction with the other professional consultants.

Preparing detailed estimates of construction cost.

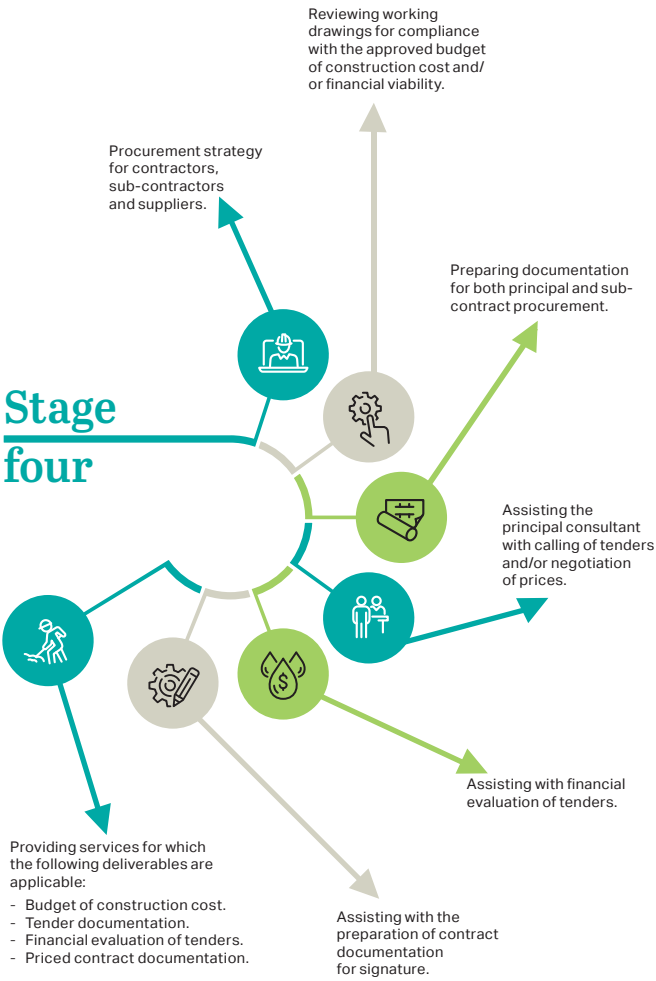
Assisting the client in reviewing the financial viability report.

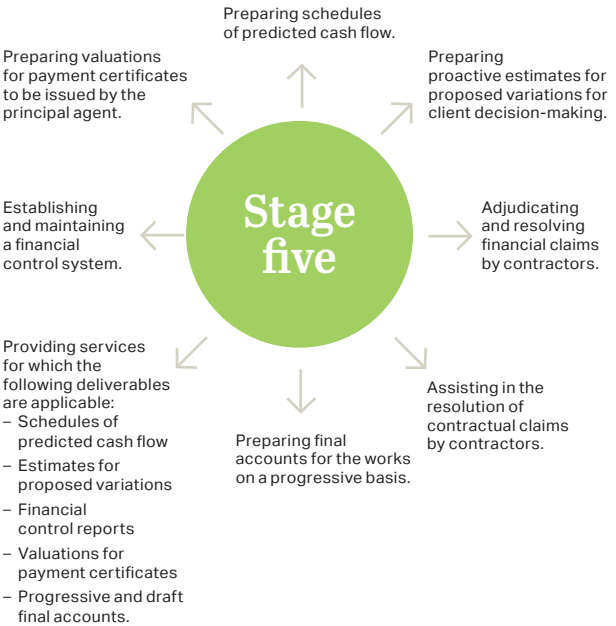
Commenting on space and accommodation allowances and preparing an area schedule.

Providing services for which the following deliverables are applicable:

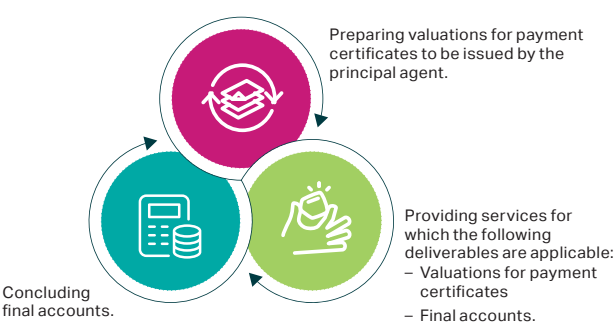
- Detailed estimates of construction cost.
- Area schedule.

Stage four


Reviewing working drawings for compliance with the approved budget of construction cost and/ or financial viability.
Procurement strategy for contractors, sub-contractors and suppliers.
Preparing documentation for both principal and sub-contract procurement.
Assisting the principal consultant with calling of tenders and/or negotiation of prices.
Assisting with financial evaluation of tenders.
Assisting with the preparation of contract documentation for signature.
Providing services for which the following deliverables are applicable:
- Budget of construction cost.
- Tender documentation.
- Financial evaluation of tenders.
- Priced contract documentation.


Preparing schedules of predicted cash flow.
Preparing valuations for payment certificates to be issued by the principal agent.
Preparing proactive estimates for proposed variations for client decision-making.
Stage five
Establishing and maintaining a financial control system.
Adjudicating and resolving financial claims by contractors.
Providing services for which the following deliverables are applicable:
– Schedules of predicted cash flow
– Estimates for proposed variations
– Financial control reports
– Valuations for payment certificates
– Progressive and draft final accounts.
Assisting in the resolution of contractual claims by contractors.
Preparing final accounts for the works on a progressive basis.

Stage six


Preparing valuations for payment certificates to be issued by the principal agent.
Providing services for which the following deliverables are applicable:
– Valuations for payment certificates
– Final accounts.
Concluding final accounts.

Engineering cost management

Engineering cost management operates as a specialist service within AECOM. It comprises specialist skills and applications that enhance the risk and value management techniques required by the mining, infrastructure, minerals, metallurgical and petrochemical sectors.

Our engineering cost management group includes dedicated independent teams specialising in, and responsible for the estimation, procurement, cost management and contract administration activities relating to the above-mentioned sectors.

The engineering cost management team operates throughout Africa using infrastructure support from our major local offices.

Our group employs professionally-qualified quantity surveyors, cost managers, cost engineers and contract administrators. Mining, infrastructure, minerals, metallurgical and petrochemical projects are generally of a high monetary value. It therefore is most beneficial to involve the mining and engineering cost management team at an early stage in the project cycle.

Imposing robust financial discipline from a very early stage will positively impact a project. This includes, accurate and structured estimating, timely and cost-effective procurement, accurate and up-to-date maintenance of costs to completion, the cost management of design changes and the prompt close-out of contracts. The implementation of these financial management principles will thereby deliver maximum shareholder value, as well as significantly influencing project outcomes to benefit all stakeholders.

Our engineering cost management group provides much experience, expertise and independence that contributes to and complements the client's team. This is critical, particularly in the early stages of a project, when the opportunity to add value, as well as recognise and define cost, is established.

Simultaneously, formalising project principles is equally critical throughout the project, with cost management continuing through to the post–contract period and final closeout.

Project controls and support services

Areas of expertise:

- Scope and change management.
- Resource and material management.
- Project cost controls and budgeting.
- Performance and earned value.

Project success is most often measured in terms of cost, schedule and budget. An effective Project Manager will oversee these vital elements through 'control'.

Timely and accurate project information empowers the decision making process, ensuring access to the right tools and skills for planning, tracking and reporting project information. AECOM provides project controls and support services with a 'project controls by design' approach.

This concept provides a powerful, cost efficient service that satisfies the unique management and reporting needs of each individual project. Our project controls specialists deliver reliable and accurate information, allowing flexibility and scalability, based on project complexity and needs.

Scope management
AECOM utilises software platforms to apply critical path management techniques to capture and organize the fundamental elements of work scope, task durations, logic ties among tasks, and key milestones.

Resource and material management
By using resource-loaded schedules and activity sequencing to facilitate contractor involvement, this minimizes work conflicts and ensure that resources, equipment, and materials are available and appropriately staged for maximum project efficiency.

Project cost controls and budgeting

AECOM uses cost-loaded schedules to integrate multiple project cost estimates and resource data to establish a budget, integrated baseline plan, and cost analysis process. This approach transforms static cost data into accurate 'time-phased' spending plans, budgets, cost forecasts, and specialty reports designed to facilitate a realistic project execution plan.

Performance and earned value measurement

AECOM establishes and facilitates a project delivery process that collects and compares actual project costs against the integrated baseline plan to obtain an objective measure of project scope, schedule, and budget performance to date using earned value methods.

Building Services Cost Management

It's essential.

Building services, such as electrical, air-conditioning, fire protection and electronic installations, typically make up 25 to 40 percent of the total construction cost, meaning effective cost management of the building services is essential to ensure the client's budget expectations are met.

The quantity surveyor, with the necessary expertise, is best placed to ensure that the Building Services are cost managed in the same way as the rest of the building works and that the cost management responsibility for the entire project remains with one dedicated consultant – rather than being spread among the various building services design consultants.

Independent cost management of building services by the quantity surveyor ensures transparency and a focused service, which in turn allows the building services consultants to focus on their primary design responsibility.

> "The most effective way to ensure that the building services are cost managed in the same way as the rest of the building works is to allocate this responsibility to the quantity surveyor."

Our expertise

The team provide financial management and contract administration of all building services including:

- Electrical installation.
- Heating, ventilating and air-conditioning (HVAC) installations.
- Fire protection systems (sprinklers).
- Fire detection and evacuation systems.
- Electronic systems such as access control, surveillance, and structured cabling.
- Lifts and escalators.

Our services

Working in close conjunction with mechanical, electrical and fire protection consultants, our team provides a comprehensive service that covers all aspects of procurement and cost management throughout all the project stages including:

- Cost planning.
- Cost studies to compare alternative designs.

Department of Agriculture, Land Reform and Rural Development
Pretoria, South Africa

- Evaluating the design as it evolves to ensure compatibility with the cost plan.
- Procurement from tender documentation to adjudication.
- Cost management, monitoring and reporting throughout the contract.
- Valuation for progress payments.
- Settling final costs with the contractor.

Image courtesy of
Boogertman + Partners

ARTICLE 2

Is your net zero commitment on track?

Engaging with your supply chain to reduce Scope 3 emissions.

Robert Spencer

Global Head of ESG Advisory Services

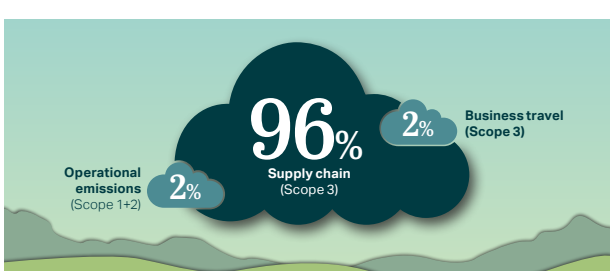
Ryan Burrows

Global Programme Manager, Corporate Net Zero

The Intergovernmental Panel on Climate Change's (IPCC) assessment report from last month sounded the alarm; we must now be moving from pledges to tangible fast-track action. No business can reach publicly declared net zero commitments without tackling their Scope 3 carbon emissions reductions now.

We know this because it's something we're keenly aware of in our own business. In our 2022 financial year, 96 percent of our total emissions were generated through our supply chain (Scope 3). Only 2 percent of our emissions come from business travel (Scope 3) which significantly reduced post-pandemic; and the final 2 percent is made up of operational emissions (Scope 1 & 2). If we focused our efforts solely on Scope 1 and 2, we would fail to make the significant climate impact that could be made by addressing Scope 3.

This is critical for us and other organizations who want to lead when it comes to climate action. Our net zero targets are validated by the Science Based Targets initiative (SBTi), a necessary step to ensure our decarbonization plans are aligned with climate science and make a real impact. To do our part, businesses like us with Scope 3 emissions comprising over 40 percent of their total carbon footprint (applicable to most organizations), are now reporting on our Scope 3 reduction efforts to achieve science-based net zero.



AECOM's scope 1,2,3 emissions

Most businesses are robustly tackling the relatively 'quick and easy' wins by reducing Scope 1 and 2 carbon emissions that are within direct control. However, there is more hesitancy around Scope 3 improvements as they are not something a business can dictate. Scope 3 reductions are achieved through influence and using increasingly stringent contractual levers to drive impact and change. By its very definition, Scope 3 is more ambiguous, and therefore less controllable as a liability and/or risk.

Key takeaways: how can businesses start addressing Scope 3 carbon emissions – based on our own experience?

Perfect is the enemy of good, so screen early with rough calculations. This will quickly allow you to start creating your plan and understanding where to focus your time and effort.

The key data already exists. Businesses know how much they spend with suppliers and subcontractors. Use this as the basis for rough calculations to assess your initial carbon emissions by proxy.

Identify and work with the right people in your organization to unlock your data (e.g., finance, operations, etc.).

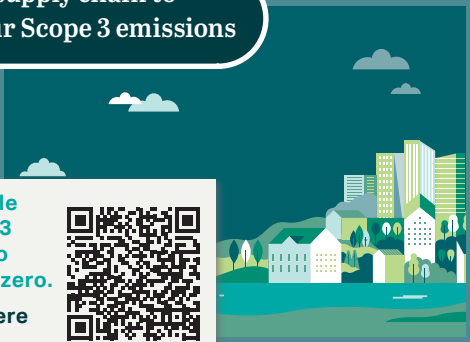
Set realistic expectations and reduction plans with suppliers. Reducing Scope 3 carbon emissions cannot solely be the responsibility of your supply chain. Organizations have a duty of care and responsibility to raise their expectations incrementally with phased plans for implementation and an open supportive approach that bring suppliers with them. Awareness and training are the watchwords.

Make the most of publicly available tools. Both the GHG protocol and SBTi initiatives provide helpful guidance and webinars for businesses wanting to tackle Scope 3.

Replace rough calculations with real data. As your supplier engagement process progresses, real data can replace the rough data used initially. As you develop learnings and more robust data, carbon intensity criteria can then form part of future procurement and supplier selection processes.

For a more in depth look at this article, scan the QR code below.

How AECOM is working with our supply chain to reduce our Scope 3 emissions



How to tackle your Scope 3 emissions to achieve net zero.

Watch here

How AECOM is working with our supply chain to reduce our Scope 3 emissions.

Read here

ScopeX™: accelerating carbon reduction to reach net zero together.

Read here

SOUTH AFRICAN COST DATA

40

South African cost data

SECTION 4

Building cost rate influences – inherent difficulties and pitfalls

This section highlights the inherent difficulties and pitfalls that may occur when inclusive or single rates are used to establish the estimated cost of a particular building. Construction cost estimation is complex. Comprehensive exercises based on detailed and accurate information are required to achieve reliable levels of comfort. For various reasons, however, decisions are often based on inclusive rate estimates, i.e. rate per square metre (m²) of construction area or rate per unit in number.

The most widely used and quick method to obtain an indication of the construction cost of a building is by the rate/m²-on-plan method. This is often also referred to as the 'order of magnitude' method of cost estimation. It certainly is both quick and convenient, but it can be very misleading if used indiscriminately and without taking care when calculating the construction area and selecting the rate.

Cost comparisons of various buildings are often made by comparing the individual rates/m² without due consideration of a number of factors that can affect the rate/m² to a substantial degree.

Very often the cost of a building is expressed in rate/m² and the unit cost is ignored, if calculated at all. This rate/m² is then used as the sole yardstick for the building costs.

For example, a security guard's shelter measuring 2m x 2m, consisting of brick walls with windows, one door and a simple roof construction may cost R9,000/m². This rate, when compared with the rate for a 200m² house containing plumbing, carpets, etc., at R7,000/m² would seem very expensive. However, the unit cost of the shelter is R36,000, compared with R1.4 million for the house.

Below are some criteria to be considered when determining rates/m².

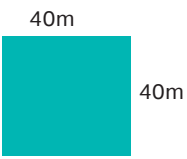
Specification

Two buildings of the same shape with identical accommodation can have vastly different rates/m², as one building may have finishes of a different standard. For example, expensive carpets in lieu of vinyl floor tiles can increase the rate by R150/m².

Wall-to-floor ratio — plan shape

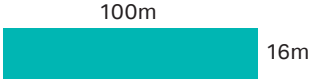
The most economical shape for a building is square. This shape requires the minimum wall length to enclose a given floor area. For example:

Case A



Area	1,600m²
Wall length	160m
Wall height	3m
Wall area	480m²
Wall-floor-ratio	480/1,600
Cost of external façade in terms of rate/m² of floor area to each rate/m² of façade area	30.0%

Case B



Area	1,600m²
Wall length	232m
Wall height	3m
Wall area	696m²
Wall-floor-ratio	696/1,600
Cost of external façade in terms of rate/m² of floor area to each rate/m² of façade area	43.5%

The rate/m² on-plan of a façade costing R800/m² on elevation in each case is:

Case A R800 x 30.0% = R240/m²

Case B R800 x 43.5% = R348/m²

A reader with a good knowledge of mathematics will fault the above argument correctly by stating that a circle is the geometric shape requiring the minimum wall length to enclose a given floor area. However, in very few cases, this is the most economical plan shape of a building as, due to various reasons, the cost of constructing a circular, as opposed to a straight external envelope, is generally greater than the saving in terms of the quantities required by the envelope.

Floor-to-ceiling heights

Two buildings of an identical plan, shape and area, but with different floor-to-ceiling heights will have different rates/m² due to the additional cost of walling, finishes, etc., in the building with the greater floor-to-ceiling height.

Plumbing, mechanical and electrical installations

The concentration of plumbing installations has a marked effect on the rate/m² of the building. The cost of a toilet block per square metre is much greater than that of a house containing one bathroom as the high cost of the bathroom area is spread over the less expensive remaining areas of the house.

Similarly, in commercial and industrial buildings the rate/m² will depend greatly on which air-conditioning, security systems, sprinklers, smoke-detection systems, electrical installations, acoustic treatment or other specialised installations are incorporated into the design.

Construction areas

The rate/m² for a building with large balconies or access corridors included in the construction area cannot be compared with the rate/m² for a building without similar low cost areas.

Internal subdivisions

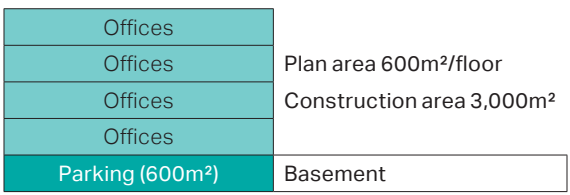
The rate/m² for open plan offices should not be compared directly with the rate/m² for offices with internal partitions without the relevant adjustments being made. The inclusion of partitions can increase the overall rate/m² by up to R300/m² of office area.

Parking

Should the building contain parking areas, the average rate/m² will be less than that of a building with identical accommodation, but with parking outside the building structure. For example:

Case A

Building with parking in the building area.

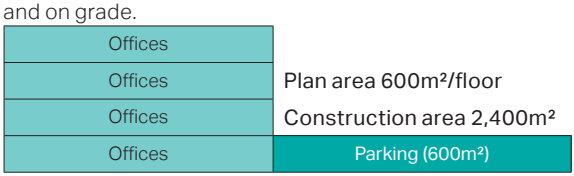


Cost of building

Offices	2,400m² @ R15,000	= R 36,000,000
Parking	600m² @ R6,000	= R 3,600,000
Total		**R 39,600,000**
Average rate/m²		R 13,200

Case B

A building with parking outside of the building area and on grade.



Cost of building

Offices	2,400m² @ R15,000	= R 36,000,000
Parking	600m² @ R 800	= R 480,000
Total		**R 36,480,000**
Average rate/m²		R 15,200

Under Case B, the parking area is not included as part of the construction area for the purpose of calculating the rate/m². Similarly, the rate/m² for a supermarket or shopping centre should be qualified as to whether the cost of on-site parking and ancillary site development has been included, a cost which could be in the region of R800/m² of construction area.

There are further points that need to be taken into consideration. Amongst these are site works particular to each contract, the number of storeys, floor loadings, column spans, concentration of joinery and other fittings, overall height of the building, open-atrium upper volumes, etc.

In conclusion, rates/m² must be used with circumspection. The degree of accuracy of the answers provided must be in direct proportion to the research and surveys undertaken to establish the rate for the building in question.

Approximate inclusive building cost rates

Building cost rates

This section provides a list of approximate inclusive building cost rates for various building types in South Africa. Rates are current to 1 July 2022, and therefore represent the average expected building cost rates for 2023. It must be emphasised that these rates are indicative only, and should be used circumspectly, as they are dependent upon a number of assumptions. See inclusive rate estimates herein.

The area of the building expressed in square metres is equivalent to the construction area where appropriate, as defined in Method for Measuring Floor Areas in Buildings, Second Edition (effective from 7 November 2007), published by the South African Property Owners' Association (SAPOA).

“

It must be emphasised that these rates are indicative only, and should be used circumspectly, as they are dependent upon a number of assumptions.”

Sol Plaatje University
South Africa

Regional variations

Construction costs normally vary between the different provinces of South Africa. Costs in parts of the Western Cape and KwaZulu-Natal, specifically upper class residential areas, for example, are generally significantly higher than Gauteng due to the demand for this type of accommodation. However, these rates are based on data received from Gauteng, where possible. Be mindful that cost differences between provinces at a given point in time are not constant and may vary over time due to differences in supply and demand or other factors. Specific costs for any region can be provided upon request by any AECOM office in that region.

Building rates

Rates include the cost of appropriate building services, for example, air-conditioning, but exclude costs of site infrastructure development, parking, any future escalation, loss of interest, professional fees and value-added tax (VAT).

Offices	*Rate per m² (excl. VAT)*
Low-rise office park development with standard specification	R 10,000 – R 12,300
Low-rise prestigious office park development	R 12,900 – R 19,200
High-rise tower block with standard specification	R 14,500 – R 19,200
High-rise prestigious tower block	R 19,200 – R 24,200

Office rates exclude parking and include appropriate tenant allowances incorporating carpets, wallpaper, louvre drapes, partitions, lighting, air-conditioning and electrical reticulation.

Parking	*Rate per m² (excl. VAT)*
Parking on grade, including integral landscaping	R 700 – R 900
Structured parking	R 4,900 – R 5,400
Parking in semi-basement	R 5,400 – R 7,300
Parking in basement	R 5,700 – R 10,000

Retail	*Rate per m² (excl. VAT)*
Local convenience centres (Not exceeding 5,000m²)	R 9,800 – R 12,900
Neighbourhood centres (5,000 – 12,000m²)	R 10,800 – R 14,200
Community centres (12,000 – 25,000m²)	R 11,800 – R 15,000
Minor regional centres (25,000 – 50,000m²)	R 12,500 – R 16,000
Regional centres (50,000 – 100,000m²)	R 13,200 – R 16,000
Super regional centres (exceeding 100,000m²)	R 14,500 – R 18,700

Super regional centres and regional centres are generally inward trading with internal malls, whereas convenience, neighbourhood and community centres are generally outward trading with no internal malls.

Retail rates include the cost of tenant requirements and specifications of national chain stores.

Retail costs vary considerably depending on the tenant mix and sizing of the various stores.

Industrial	*Rate per m² (excl. VAT)*
Industrial warehouses, including office and change facilities within structure area (architect/engineer designed):	
Steel frame, steel cladding and roof sheeting (light-duty)	R 5,100 – R 6,500
Steel frame, brickwork to ceiling, steel cladding above and roof sheeting (heavy-duty)	R 5,700 – R 8,200
Administration offices, ablution and change room block	R 9,200 – R 11,900
Cold storage facilities	R 17,400 – R 24,700

Residential	*Rate per site (excl. VAT)*
Site services to low-cost housing stand (250–350m²)	R 63,000 – R 100,000

	Rate per m² (excl. VAT)
RDP housing	R 3,000 – R 3,200
Low-cost housing	R 3,800 – R 6,500
Simple low-rise apartment block	R 9,100 – R 12,700
Duplex townhouse – economic	R 9,100 – R 13,000
Prestige apartment block	R 17,800 – R 26,000

Cape Station
South Africa

Image courtesy of
Boogertman + Partners

Residential		*Rate per m² (excl. VAT)*
Private dwelling houses:		
Economic		R 7,000
Standard		R 8,700
Middle-class		R 10,500
Luxury		R 14,600
Exclusive		R 23,000
Exceptional ('super luxury')		R 34,000 – R 70,000
Out buildings	– standard	R 6,500
	– luxury	R 9,200

		Rate per no. (excl. VAT)
Carport (shaded)	– single	R 5,600
	– double	R 11,300
Carport (covered)	– single	R 8,800
	– double	R 17,200
Swimming pool		
Not exceeding 50 kl		R 110,000
Exceeding 50 kl and not exceeding 100 kl		R 196,000
Tennis court		
Standard		R 650,000
Floodlit		R 810,000

Student residential	*Rate per m² (excl. VAT)*
High rise tower block with standard specification	R 14,100 – R 15,500

Student residential rates include allowances for furniture, fittings and equipment (FF&E).

Hotels	*Rate per key (excl. VAT)*
Budget	R 788,000 – R 1,255,000
Mid-scale (3-star)	R 1,255,000 – R 1,884,000
Upper-scale (4-star)	R 1,884,000 – R 2,650,000
Luxury (5-star)	R 2,650,000 – R 3,550,000

Hotel rates include allowances for furniture, fittings and equipment (FF&E).

Studios	*Rate per m² (excl. VAT)*
Studios — dancing, art exhibitions, etc.	R 17,500 – R 25,000

Conference centres	*Rate per m² (excl. VAT)*
Conference centre to international standards	R 32,000 – R 40,000

Retirement centres	*Rate per m² (excl. VAT)*
Dwelling houses	
Middle-class	R 10,300
Luxury	R 14,500
Apartment block	
Middle-class	R 10,600
Luxury	R 16,400
Community centre	
Middle-class	R 13,900
Luxury	R 20,300
Frail care	R 16,500

Schools	*Rate per m² (excl. VAT)*
Primary school	R 8,200 – R 9,500
Secondary school	R 9,800 – R 10,500

Hospitals	*Rate per m² (excl. VAT)*
District hospital	R 34,000

Hospital rates exclude allowances for furniture, fittings and equipment (FF&E).

Stadiums	*Rate per seat (excl. VAT)*
Stadium to PSL standards	R 42,000 – R 65,000
Stadium to FIFA standards	R 98,000 – R 129,000
	Rate per pitch (excl. VAT)
Stadium pitch to FIFA standards	R 28,000,000 – R 33,000,000

Cape Town International Airport
South Africa

Prisons	*Rate per inmate (excl. VAT)*
1,000 inmate prison	R 733,000 – R 779,000
500 inmate prison	R 756,000 – R 872,000
High/maximum security prison	R 1,165,000 – R 1,540,000

Infrastructure airport development costs

Rates exclude any future escalation, loss of interest, professional fees, VAT and ACSA direct costs.

Apron stands (incl. associated infrastructure)	*Rate per m² (excl. VAT)*
Code F Stand (85m long x 80m wide = 6,800m²)	R 6,900
Code E Stand (80m long x 65m wide = 5,200m²)	R 7,300
Code C Stand (56m long x 40m wide = 2,240m²)	R 9,300

Taxi lanes (incl. associated infrastructure)	*Rate per m (excl. VAT)*
Code F taxi lane (101m wide)	R 231,000
Code E taxi lane (85m wide)	R 194,000
Code C taxi lane (49m wide)	R 115,000

Service roads	*Rate per m (excl. VAT)*
Service road (10m wide)	R 23,000
Dual carriage service road (15m wide)	R 29,000

Taxi ways (incl. associated infrastructure)	*Rate per m (excl. VAT)*
Code F taxi way (70m wide)	R 172,000

Runways (incl. associated infrastructure)	*Rate per m (excl. VAT)*
Code F runway (3,885m long x 60m wide = 233,100m²)	R 387,000

Parking (excluding bulk earthworks)	*Rate per bay (excl. VAT)*
Structured parking	R 237,000
Basement parking	R 355,000

Perimeter fencing/security gates	*Rate per m (excl. VAT)*
Perimeter walls with perimeter intrusion detection (PIDS)	R 10,800

Terminal buildings	*Rate per m² (excl. VAT)*
Terminal buildings (excl. baggage and X-ray systems, air bridges, seating and aircraft docking systems)	R 38,000

	Rate per unit (excl. VAT)
Telescopic air bridges	R 14,260,000
Aircraft docking system	R 2,053,000

Building services

The following rates are for building services (mechanical and electrical), which are applicable to typical building types in the categories indicated. Rates are dependent on various factors related to the design of the building and the requirements of the system.

In particular, the design, and therefore the cost of air-conditioning, can vary significantly depending on the orientation, shading, extent and type of glazing, external wall and roof construction.

Electrical installation	*Rate per m² (excl. VAT)*
Offices	
Standard installation	R 950 – R 1,400
Sophisticated installation	R 1,400 – R 1,750
UPS, substations, standby generators to office buildings	R 650 – R 850
Residential	R 850 – R 1,400
Shopping centres	R 1,400 – R 1,800
Hotels	R 1,500 – R2,000
Hospitals	R 1,950 – R 2,850

Electronic installation	*Rate per m² (excl. VAT)*
Offices	
Standard installation	R 450 – R 650
Sophisticated installation	R 650 – R 950
Residential	R 400 – R 650
Shopping centres	R 900 – R 1,200
Hotels	R 850 – R 1,200
Hospitals	R 900 – R 1,300

Electronic installation includes access control, CCTV, public address, fire detection, data installation, WiFi, CATV, PABX (Private Automatic Branch Exchange) and Building Management System (BMS).

Fire protection installation (offices)	*Rate per m² (excl. VAT)*
Sprinkler system, including hydrants and hose reels (excluding void sprinklers)	R 400 – R 500

Air-conditioning installation	*Rate per m² (excl. VAT)*
Ventilation to parking/service areas	R 400 – R 650
Offices	
Console units	R 1,050 – R 1,500
Console/split units	R 1,200 – R 1,900
Package units	R 1,750 – R 2,600
Central plant	R 2,150 – R 3,350
Residential–split units	R 1,200 – R 1,900
Shopping centres	
Split units	R 1,400 – R 2,000
Package units	R 1,750 – R 2,600
Evaporative cooling	R 1,100 – R 1,650
Hotels — public areas	R 2,150 – R 3,350
Hospitals central plant	R 2,800 – R 4,450

Hotels	*Rate per key (excl. VAT)*
Console units	R 27,000 – R 36,750
Split units	R 36,700 – R 56,150
Central plant	R 73,450 – R 110,150
Hospitals — operating theatres	R 800,000 – R 1,350,000

GLOBAL SENTIMENT AND BUILDING COSTS

Global sentiment and building costs

SECTION 5

Africa outlook 2023

In recent years, Africa's economies have generally remained resilient. Sound macroeconomic policies have enabled the continent to maintain its expected growth.

Africa's overall economic performance remains one of the fastest growing continents. Ethiopia, Ghana and Côte d'Ivoire are three of the fastest growing economies globally in terms of increased GDP. Africa's growth is further helped by several East African countries contributing collectively through increased exports and cross-border trade to grow this region's economy.

According to The Economist (7 May 2022), fuel shortages are spreading across Africa. Consequently, oil is expensive and 'not just driving up prices'. The economic cost of shortages are huge and in many instances they tend to bring commerce to a grinding halt.

A demand for fuel recently surged across the world as economies recovered from the coronavirus pandemic. Yet for the first time in 30 years, global refining capacity fell, causing fuel prices to rise. Russia's invasion of Ukraine pushed costs even higher. In most places, fuel has remained available and expensive, but not in Africa, which is going through the worst supply crisis in 40 years, according to the world's biggest independent oil trader.

Further, the problem is being aggravated by a turn in the futures market. The price for deliveries of oil at a future date has fallen far below that for immediate delivery. In more usual times, traders would park dozens of full oil tankers (known as 'floaters') off the West African coast, where they would wait for higher prices. Now, traders unload them as quickly as possible and send them to Asia through the Suez Canal, avoiding Africa altogether.

After this, things became even worse when big oil traders started reducing purchases of Russian oil to comply with European sanctions. This will further cut the flow of fuel refined in Europe from Russian oil to Africa.

In the long run, much hope is invested in a large refinery being built in Nigeria by the Dangote Group.

The Dangote Petroleum Refinery is a 650,000 barrels per day integrated refinery project under construction in the Lekki Free Zone near Lagos. It is expected to be Africa's largest oil refinery and the world's biggest single-train facility.

The pipeline infrastructure at the Dangote Petroleum Refinery is the largest anywhere in the world, with 1,100 kilometers to handle three billion standard cubic feet of gas per day. The refinery alone has a 435MW power plant that can meet the total power requirement of Ibadan DisCo.

The refinery will also meet 100% of the Nigerian requirement of all refined products and have a surplus of each of these products for export. Dangote Petroleum Refinery is a multi-billion-dollar project that will create a market for 21 billion-dollars per annum of Nigerian crude. It is designed to process Nigerian crude with the ability to also process others.

There is an ever-growing need to finance infrastructure on the continent. Several countries are now prioritising this after realising the importance of industrialisation, to not only maintain growth in their economies, but to also diversify through the exportation of goods and services. This has consequently created jobs that are needed for an increasing younger population. A developing industrial sector on the continent will require more infrastructure investment, particularly in power, water and transportation services that are already over stretched.

Predictions of collective growth are around three percent for 2023/24, with individual countries increasing by as much as five percent.

In sub-Saharan Africa, we are seeing steady growth in the infrastructure and construction sectors, as well as in East and West Africa. After following favourable environmental impact studies and subsequent government approvals, in Mozambique we have seen the signing of mega gas deals for Liquefied Natural Gas (LNG) development contracts.

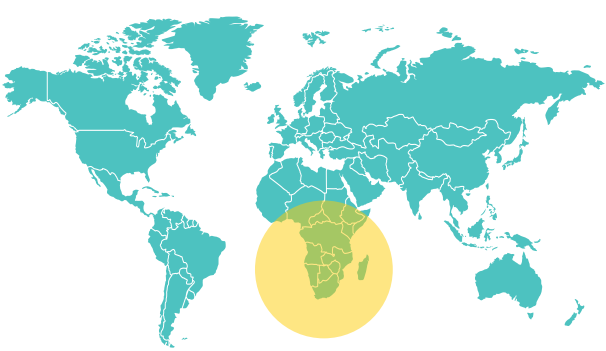
The expected results are estimated to create thousands of job opportunities, impacting significantly on Mozambique's GDP, as well as creating collaborative opportunities for neighbouring countries. Although, most of these projects are currently 'on hold' due to unforeseen circumstances, the immense future potential growth of the region cannot be ignored.

Feedback from our colleagues in Eastern Africa indicate that the impact of the coronavirus slowed down all planning, construction and other related activity. Recovery after the easing of lockdown levels is still slow. They are, however, confident that productivity will return to normal soon.

Over recent years, we have seen several national elections across Africa that have been free and fair, and the transition of leadership has been stable, including some of Africa's more high-profile leaders. This has shown the world Africa's willingness to implement good governance and curb corruption at all levels.

Further foreign direct investment across the continent is therefore encouraged. This type of investment has been increasing steadily over several years and is a catalyst for growth in demand for Africa's imports and exports.

Africa continues to grow. There is a steady increase of larger infrastructure and construction projects coming to market for the needs of over 1.2 billion people and this will provide opportunities for investment and service providers for 2023 and beyond.

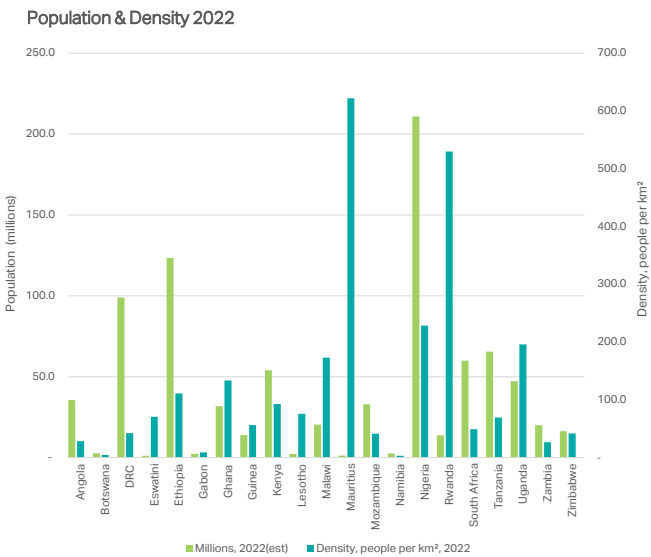


Africa in figures
Area and population

Country	Land area (000km²)	Population		
		Millions, 2022 (est)	Average annual % population growth rate, 2020–2022	Density, people per km², 2022
Angola	1,247.0	35.6	3.1	28.5
Botswana	581.0	2.6	1.6	4.5
DRC	2,345.0	99.0	3.2	42.2
Eswatini	17.0	1.2	0.8	70.7
Ethiopia	1,112.0	123.4	2.5	111.0
Gabon	267.0	2.4	2.0	8.9
Ghana	238.0	31.7	2.1	133.3
Guinea	245.7	13.9	2.4	56.4
Kenya	582.0	54.0	1.9	92.8
Lesotho	30.4	2.3	1.1	75.9
Malawi	118.0	20.4	2.6	172.9
Mauritius	2.0	1.3	-0.3	621.9
Mozambique	799.0	33.0	2.7	41.3
Namibia	824.0	2.6	1.4	3.1
Nigeria	923.0	210.9	2.5	228.5
Rwanda	26.0	13.8	2.3	529.9
South Africa	1,219.0	59.9	0.8	49.1
Tanzania	945.0	65.5	3.0	69.3
Uganda	241.0	47.2	3.0	196.1
Zambia	752.0	20.0	2.8	26.6
Zimbabwe	390.0	16.3	2.0	41.8

Source: World Development Indicators 2022

Population and density 2022



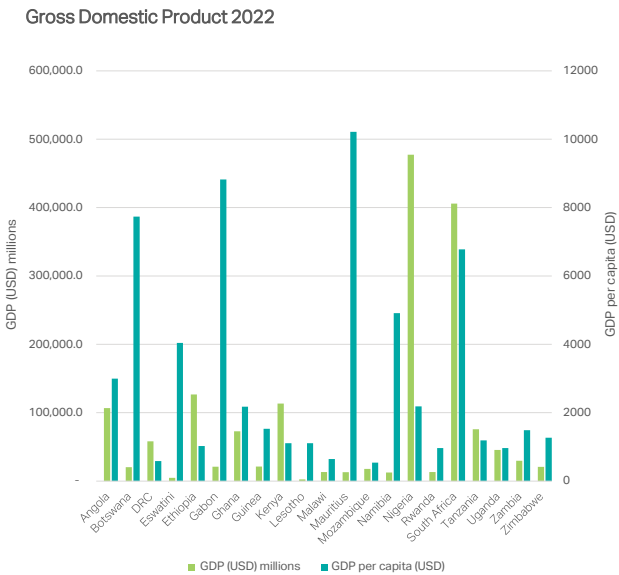
Source: World Development Indicators 2022

Gross Domestic Product (At constant 2,000 prices)

Country	GDP (USD) millions	GDP growth (annual % since 2000)	GDP per capita (USD)	Gross capital formation (% of GDP)	Inflation, consumer price (annual %)
Angola	106,713.6	3.0	2,998.5	-	-
Botswana	20,352.3	5.8	7,737.7	25.0	11.7
DRC	58,066.0	8.9	586.5	-	-
Eswatini	4,854.2	3.9	4,039.5	-	-
Ethiopia	126,783.5	5.3	1,027.6	25.3	0.0
Gabon	21,071.7	3.0	8,820.3	15.6	4.2
Ghana	72,838.8	3.2	2,175.9	16.6	31.3
Guinea	21,227.7	4.7	1,531.7	29.8	10.5
Kenya	113,420.0	0.6	1,107.4	19.2	7.7
Lesotho	2,553.5	0.6	1,107.4	-	8.3
Malawi	13,164.7	0.9	645.2	-	21.0
Mauritius	12,898.3	8.7	10,216.3	20.0	10.8
Mozambique	17,851.5	4.1	541.5	-	10.3
Namibia	12,607.4	4.6	4,911.3	17.4	6.1
Nigeria	477,386.1	3.3	2,184.4	-	18.8
Rwanda	13,312.8	8.2	966.3	24.5	17.7
South Africa	405,869.7	2.0	6,776.5	15.1	7.0
Tanzania	75,709.3	4.6	1,192.4	40.9	4.4
Uganda	45,559.2	4.7	964.2	24.2	7.2
Zambia	29,784.5	4.7	1,487.9	-	11.0
Zimbabwe	20,678.1	3.4	1,267.0	-	104.7

Source: World Development Indicators 2022

Gross Domestic Product 2022



Source: World Development Indicators 2022

Africa building costs

This section makes provision for the comparison of Africa's building costs, international building costs and international rental rates.

The Africa Building Cost Comparison table (page Page 69), summarises the estimated building costs for different types of buildings in various locations in Africa. Rates are based on costs from 1 July 2023 and provide an indicator for the expected building cost rates during 2023. Exchange rates are based on those from 1 May 2023.

Rates include the cost of appropriate building services, such as air-conditioning and electrical, but exclude costs of site infrastructure development, parking, any future escalation, loss of interest, professional fees and VAT. These rates are of an indicative nature and therefore the qualifications dealt with elsewhere in this publication would apply.

These are estimated costs and should only be considered in the context of acceptable building standards in each relevant country. These standards, both at a technical level and pertaining to quality, do vary from country to country. Therefore, the building costs must be seen as the normal standards prevailing in each particular region and must be used circumspectly.

Cape Station
South Africa

Image courtesy of
Boogertman + Partners

Africa Property & Construction Cost Guide
Africa Building Cost Comparison

Costs based on 1 July 2023
Exchange rates to US$ as of 1 May 2023

Building Type		Botswana Gaborone	Ghana Accra	Kenya Nairobi	Lesotho Maseru	Mozambique Maputo	Namibia Windhoek	Nigeria Lagos	Rwanda Kigali	South Africa Johannesburg	Tanzania Dar Es Salaam	Uganda Kampala	Zambia Lusaka
Residential	**(US$ / m²)**												
Average Multi Unit High Rise		1,066	2,031	738	1,113	1,376	1,113	2,997	1,283	968	946	984	1,820
Luxury Unit High Rise		1,515	2,395	1,094	1,371	1,759	1,371	4,149	1,712	1,192	1,260	1,576	2,511
Individual Prestige Houses		2,279	2,293	1,343	1,439	1,894	1,439	3,653	1,842	1,251	1,357	1,860	2,457
Commercial/Retail	(US$ / m²)												
Standard Offices High Rise		1,130	1,860	995	1,055	1,324	1,055	2,997	1,577	917	1,157	1,395	1,874
Prestige Offices High Rise		1,899	2,735	1,726	1,358	1,583	1,358	4,159	1,993	1,181	1,466	2,361	2,522
Major Shopping Centre		1,581	1,531	836	1,038	1,583	1,038	4,152	1,462	903	1,080	1,166	2,372
Industrial	(US$ / m²)												
Light Duty Factory		1,002	1,094	721	363	908	363	1,660	1,181	316	867	972	945
Heavy Duty Factory		1,541	1,356	1,144	435	1,376	435	2,237	2,103	378	1,550	1,564	1,047
Hotel	(US$ / key)												
Mid-scale (3 Star)		160,871	354,265	362,076	98,201	158,230	98,201	410,481	217,995	85,392	164,208	519,249	485,290
Luxury (5 Star)		519,340	497,794	626,671	193,961	285,333	193,961	749,574	521,564	168,662	387,436	905,665	626,500
Resort Style		580,015	632,571	746,037	Not available	565,996	Not available	910,199	697,501	Not available	511 937	1,098,271	658,919
Other	(US$ / m²)												
Multi Storey Car Park		840	886	478	322	882	322	2,142	900	280	692	676	837
District Hospital		Not available	1,772	1,005	2,128	3,139	2,128	2,994	Not available	1,850	Not available	1,552	1,736
Primary & Secondary Schools		1,453	1,146	880	585	1,230	585	Not available	Not available	509	Not available	1,232	1,216
(As at 1 May 2022)		BWP	GHS	KES	LSL	MZN	NAD	NGN	RWF	ZAR	TZS	UGX	ZMW
US$1 =		**13,22**	**10,95**	**136,00**	**18,38**	**63,20**	**18,38**	**460,35**	**1115,50**	**18,38**	**2351,00**	**3728,00**	**17,76**

Prices exclude land, site works, professional fees, tenant fitout and equipment. Rates exclude GST/VAT. Hotel rates include FF&E.

Global building cost comparison

The international cost data shown is a comparison of local construction costs converted to US Dollars to enable differentiation.

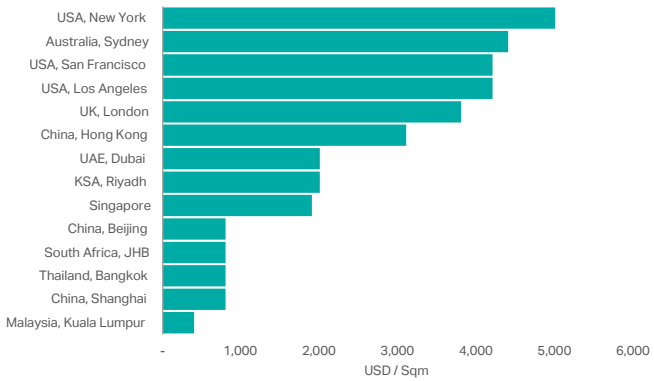
The building costs, for their respective asset types, are averages based on local specifications. The actual cost of a building will depend on among other things, such as unique site conditions, design attributes and applicable tariffs. In addition, the standard for each building varies from region to region, which may have a significant impact on cost.

Costs are subject to considerable variations due to factors such as:

- Local market conditions
- Complexity of project
- Commodity price movements
- Building specifications
- Exchange rates
- Contractors appetite for securing work
- Contractual risk apportionment

Residential

Average building cost for a standard residential high-rise



Source: AECOM

Average building costs (USD/sqm)

Building type	Sydney Australia	Hong Kong China	Beijing China	Shanghai China	Kuala Lumpur Malaysia	Singapore Singapore	Johannesburg South Africa	Bangkok Thailand	Dubai UAE	Los Angeles USA	San Francisco USA	New York USA	London UK	Riyadh KSA
Average multi-unit high-rise	**4,400**	**3,100**	**800**	**800**	**400**	**1,900**	**800**	**800**	**2,000**	**4,200**	**4,200**	**5,000**	**3,800**	**2,000**
Luxury unit high-rise	6,100	4,200	1,600	1,500	800	3,300	1,000	1,200	2,400	5,400	5,300	6,300	5,400	2,400
Individual prestige houses	6,300	5,900	900	900	1,000	3,200	1,100	1,300	-	5,100	5,400	5,900	5,300	-

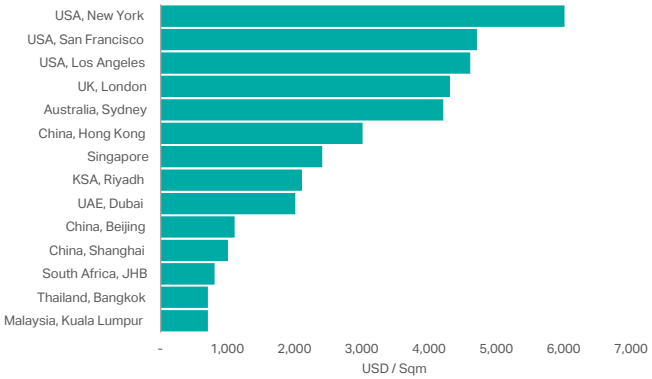
(As of Q3 2022)	AUD	HKD	CNY	CNY	MYR	SGD	ZAR	THB	AED	USD	USD	USD	GBP	SAR
US $1 =	1.50	7.85	7.00	7.00	4.57	1.41	17.45	36.91	3.67	1.00	1.00	1.00	0.87	3.75

Source: AECOM

Note: Prices exclude land, site works, professional fees, tenant fitout and equipment. Rates exclude GST/VAT. International costs based on Q3 2021 and exchange rates to USD as of Q3 2022. UAE/KSA costs based on Q3 2022 and exchange rate to USD as of Q32022.

Commercial

Average building cost for a standard office high-rise



Source: AECOM

Average building costs (USD/sqm)

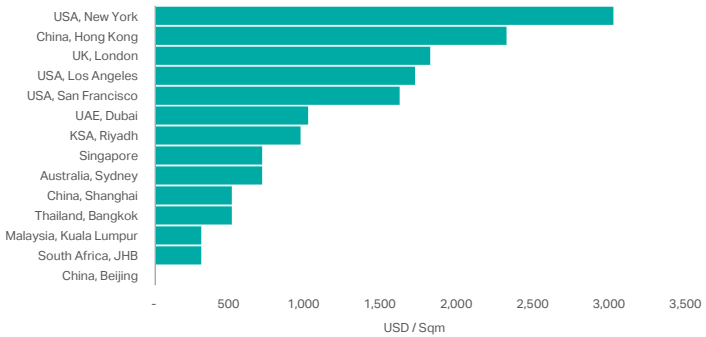
Building type	Sydney Australia	Hong Kong China	Beijing China	Shanghai China	Kuala Lumpur Malaysia	Singapore Singapore	Johannesburg South Africa	Bangkok Thailand	Dubai UAE	Los Angeles USA	San Francisco USA	New York USA	London UK	Riyadh KSA
Average standard offices high-rise	**4,200**	**3,000**	**1,100**	**1,000**	**700**	**2,400**	**800**	**700**	**2,000**	**4,600**	**4,700**	**6,000**	**4,300**	**2,100**
Prestige offices high-rise	6,100	3,700	1,500	1,600	1,100	3,000	1,000	900	2,400	5,100	5,000	6,500	5,300	2,700
Major shopping centre (CBD)	4,200	4,200	1,300	-	800	3,300	800	700	1,800	3,800	4,000	4,400	4,700	1,900

(As of Q3 2022)	AUD	HKD	CNY	CNY	MYR	SGD	ZAR	THB	AED	USD	USD	USD	GBP	SAR
US $1 =	1.50	7.85	7.00	7.00	4.57	1.41	17.45	36.91	3.67	1.00	1.00	1.00	0.87	3.75

Source: AECOM

Note: Prices exclude land, site works, professional fees, tenant fitout and equipment. Rates exclude GST/VAT. International costs based on Q3 2021 and exchange rates to USD as of Q3 2022. UAE/KSA costs based on Q3 2022 and exchange rate to USD as of Q32022.

Industrial and other
Average building cost for a light duty factory



Source: AECOM

Average building costs (USD/sqm)

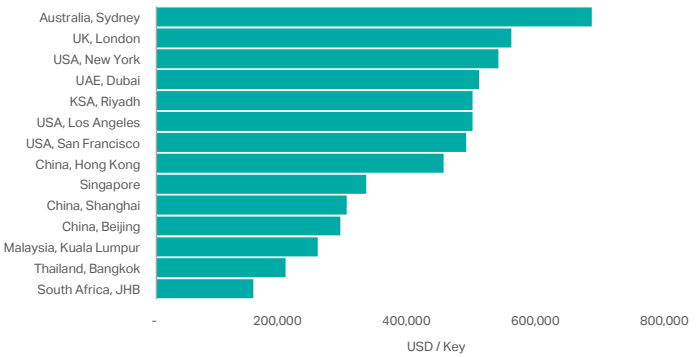
Building type	Sydney Australia	Hong Kong China	Beijing China	Shanghai China	Kuala Lumpur Malaysia	Singapore Singapore	Johannesburg South Africa	Bangkok Thailand	Dubai UAE	Los Angeles USA	San Francisco USA	New York USA	London UK	Riyadh KSA
Light duty factory	**700**	**2,300**	**-**	**500**	**300**	**700**	**300**	**500**	**1,000**	**1,700**	**1,600**	**3,000**	**1,800**	**950**
Heavy duty factory	-	-	-	-	500	900	300	700	1,550	2,100	2,100	3,900	3,000	1,350
Multi-storey car park	1,000	1,600	-	400	300	-	200	500	750	1,700	1,600	1,600	900	-
District hospital	6,700	5,400	-	1,500	800	-	1,600	-	3,100	7,800	7,500	9,100	4,300	2,500
Primary and secondary schools	2,600	2,600	-	1,000	300	-	400	-	1,800	4,800	4,700	4,900	2,800	-
(As of Q3 2022)	**AUD**	**HKD**	**CNY**	**CNY**	**MYR**	**SGD**	**ZAR**	**THB**	**AED**	**USD**	**USD**	**USD**	**GBP**	**SAR**
US $1 =	**1.50**	**7.85**	**7.00**	**7.00**	**4.57**	**1.41**	**17.45**	**36.91**	**3.67**	**1.00**	**1.00**	**1.00**	**0.87**	**3.75**

Source: AECOM

Note: Prices exclude land, site works, professional fees, tenant fitout and equipment. Rates exclude GST/VAT. International costs based on Q3 2021 and exchange rates to USD as of Q3 2022. UAE/KSA costs based on Q3 2022 and exchange rate to USD as of Q32022.

Tourism

Average building cost for a five-star luxury hotel



Source: AECOM

Average building costs (USD/sqm)

Building type	Sydney Australia	Hong Kong China	Beijing China	Shanghai China	Kuala Lumpur Malaysia	Singapore Singapore	Johannesburg South Africa	Bangkok Thailand	Dubai UAE	Los Angeles USA	San Francisco USA	New York USA	London UK	Riyadh KSA
Three-star budget	350,000	205,000	-	-	140,000	60,000	75,000	50,000	120,000	85,000	85,000	85,000	90,000	115,000
Five-star luxury	**675,000**	**445,000**	**285,000**	**295,000**	**250,000**	**325,000**	**150,000**	**200,000**	**500,000**	**490,000**	**480,000**	**530,000**	**550,000**	**490,000**
Resort style	-	-	470,000	-	195,000	215,000	-	240,000	650,000	305,000	300,000	300,000	335,000	630,000
(As of Q3 2022)	**AUD**	**HKD**	**CNY**	**CNY**	**MYR**	**SGD**	**ZAR**	**THB**	**AED**	**USD**	**USD**	**USD**	**GBP**	**SAR**
US $1 =	1.50	7.85	7.00	7.00	4.57	1.41	17.45	36.91	3.67	1.00	1.00	1.00	0.87	3.75

Source: AECOM

Note: Prices exclude land, site works, professional fees, tenant fitout and equipment. Rates exclude GST/VAT. International costs based on Q3 2021 and exchange rates to USD as of Q3 2022. UAE/KSA costs based on Q3 2022 and exchange rate to USD as of Q32022.

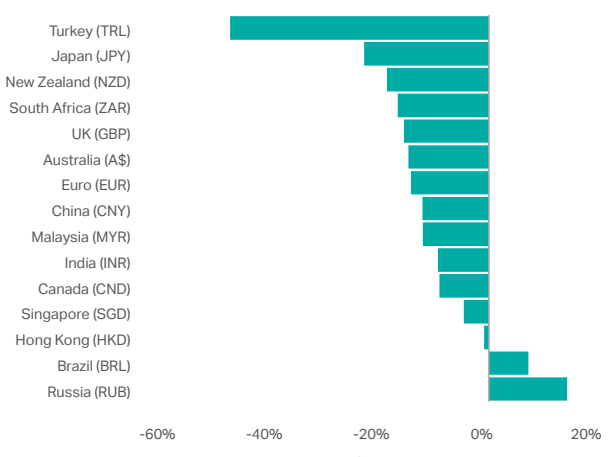
International exchange rate trends

In recent years, exchange rate movements have been significant as diverging economic performance has led to many major currencies experiencing significant shifts against the US Dollar. The Forex rate illustrates a country's economic stability with leading factors that can influence fluctuations and those that are constantly analysed, including:

- Interest rates.
- A country's current account balance.
- Government debt.
- Political stability (Brexit, trade uncertainty and shifts, elections).
- Recessions.
- Commodity markets.
- International trade.

Currency depreciation against the US Dollar translates into a relative drop in building costs when expressed in US Dollars, making these locations/ regions relatively cheaper in US Dollar terms.

Exchange rate trends
Currency movements of the US Dollar against major currencies Q3 2022 compared to Q3 2021.



Source: www.xe.com

INTERNATIONAL PRESTIGIOUS OFFICE RENTAL COMPARISON

09

International prestigious office rental comparison

SECTION 6

Region	Country	City	USD/m² per annum
Africa			
	Algeria	Algiers	240
	Angola	Luanda	600
	Botswana	Gaborone	127
	Cameroon	Yaoundé	360
	Chad	N'Djamena	324
	Cote D'Ivoire	Abijan	396
	Democratic Republic of Congo	Kinshasa	420
	Egypt	Cairo	360
	Ethiopia	Addis Ababa	192
	Equatorial Guinea	Malabo	360
	Gabon	Libreville	240
	Ghana	Accra	336
	Kenya	Nairobi	156
	Madagascar	Antananarivo	132
	Malawi	Lilongwe	115
	Mali	Bamako	240
	Mauritania	Nouakchott	192
	Mauritius	Port Louis	240
	Morocco	Casablanca	240
	Mozambique	Maputo	384
	Namibia	Windhoek	162
	Nigeria	Abuja	300
		Lagos	660
	Rwanda	Kigali	192
	Senegal	Dakar	258
	South Africa	Cape Town	136
		Durban	115
		Johannesburg	144
		Gqeberha CBD	87
		Pretoria	136
	Tanzania	Dar Es Salaam	180
	Tunisia	Tunis	84
	Uganda	Kampala	173
	Zambia	Lusaka	227
	Zimbabwe	Harare	126

International prestigious office rental comparison

Region	Country	City	USD/m² per annum
Asia			
	China	Beijing (CBD)	1,163
		Guangzhou (ZJNT)	678
		Hong Kong (Central)	1,076
		Shanghai (CBD	1,023
	India	Bangalore (CBD)	398
		Chennai (CBD)	172
		Mumbai (SBD BKC)	926
		New Delhi (CBD)	829
	Indonesia	Jakarta (CBD)	280
	Japan	Tokyo (5 Kus)	689
		Osaka (2 Kus)	797
	Malaysia	Kuala Lumpur (City Centre)	258
	Philippines	Manila (Makati)	388
	South Korea	Seoul (CBD)	592
	Singapore	Singapore (CBD)	1,066
	Taiwan	Taipei (Xinyi)	689
	Thailand	Bangkok (CBD)	291
	Vietnam	Ho Chi Minh City (CBD)	700
Australasia			
	Australia	Adelaide (CBD)	258
		Brisbane (CBD)	388
		Melbourne (CBD)	420
		Perth (CBD)	463
		Sydney (CBD)	388
	New Zealand	Auckland (CBD)	398
		Christchurch (CBD)	215
		Wellington (CBD)	344
Europe			
	Austria	Vienna	361
	Belgium	Brussels	398
	Czech Republic	Prague	312
	Denmark	Copenhagen	331
	England	Birmingham	377
		Bristol	431
		Cardiff	372
		Leeds	355
		London (City)	721
		London (West End)	1,302
		London (Carary Wharf)	517
		Manchester	366
		Newcastle	360
		Sheffield	353
	France	Paris	441
	Germany	Berlin	581

International prestigious office rental comparison

Region	Country	City	USD/m² per annum
		Frankfurt	560
		Hamburg	334
		Munich	614
	Greece	Athens	304
	Hungary	Budapest	226
	Ireland	Dublin	646
	Italy	Rome	560
		Milan	549
	Luxembourg	Luxembourg	689
	Netherlands	Amsterdam	431
	Norway	Oslo	657
	Poland	Warsaw	237
	Portugal	Lisbon	323
	Romania	Bucharest	205
	Scotland	Aberdeen	459
		Edinburgh	409
		Glasgow	344
	Spain	Barcelona	441
		Madrid	538
	Sweden	Stockholm	904
	Switzerland	Geneva	775
		Zurich	840
Middle East			
	Bahrain	Manama	167
	Lebanon	Beirut	354
	Oman	Muscat	187
	Qatar	Doha	533
	Saudi Arabia	Jeddah	319
		Riyadh	560
		Makkah	169
	Turkey	Istanbul	452
	United Arab Emirates	Dubai (Central Dubai)	578
		Dubai (New Dubai)	433
		Dubai (Old Dubai)	429
		Abu Dhabi	581

International prestigious office rental comparison

Region	Country	City	USD/m² per annum
North America			
	Canada	Montreal	237
		Toronto	366
		Vancouver	409
	USA	Atlanta	398
		Austin	570
		Baltimore	280
		Boston	657
		Chicago	474
		Houston	388
		Los Angeles	624
		Miami	990
		New York (Manhattan)	1,450
		Philadelphia	323
		Richmond	237
		Salt Lake City	291
		San Francisco	969
		Seattle	560
		Silicon Valley	1,356
		Washington DC	570
South America			
	Argentina	Buenos Aires	312
	Brazil	Sao Paulo	398
		Rio de Janeiro	129
	Bolivia	Santa Cruz de la Sierra	162
	Chile	Santiago	172
	Columbia	Bogota	248
	Costa Rica	San Jose	256
	Mexico	Guadalajara	221
		Mexico City	463
	Paraguay	Asuncion	162
	Peru	Lima	190
	Puerto Rico	San Juan	280
	Uruguay	Mentevideo	349

Rates are applicable as of 1 January 2023 and exclude VAT, but include GST where applicable. All rentals are net effective. Rents and capital values are on a net lettable area basis and pertain to the major submarket in each city.

Cogmanskloof Pass
Western Cape, South Africa

07

BUILDING COST ESCALATIONS

Building cost escalations

SECTION 7

Building cost

The meaning of 'building cost' depends on the application and context. A building contractor, for example, may refer to it as the cost of labour, material, plant, fuel and supervision. In contrast, a developer may refer to either the tender price from the contractor or the ultimate cost of the project, which could include professional fees, plan approval fees, escalation, loss of interest etc.

For the purpose of this document, building cost shall be deemed to mean the tender price (or negotiated price) submitted by the building contractor.

Escalation rate

There seems to be two popular methods for calculating and expressing percentage annual increases, the average rate and the year-on-year rate. The average rate has no real use in calculating escalation and is of general interest only. The year-on-year rate should be used in escalation calculations, taking cognizance of actual project programmes.

The average rate compares the indices for each month (or quarter) of the year with those of the corresponding months (or quarters) of the preceding year. The average of these is then calculated and then quoted as the average annual increase for that year.

The year-on-year rate compares the January (or December) index with the index for the corresponding month of the previous year and reflects the increase over that year.

There may be a significant difference in the two rates in question. For example, in 2021 the year-on-year rate (January 2020 to January 2021) of the building cost inflation in South Africa was only 2.4 percent, while the average annual rate (comparing monthly indices) was 3.6 percent.

Calculation of estimated escalation of construction contracts

Pre-contract

Construction cost changes are on an ongoing basis for various reasons. Provision should therefore be made for changes in tender prices during the date of the estimate to the expected tender date. Adding the estimated current building cost to the total equals the anticipated tender amount.

This is calculated by multiplying the estimated current building cost by the average estimated monthly percentage increase and by the number of months from date of estimate to tender date.

Contract price adjustment

Provision is made for escalation in building costs during the contract period. The Contract Price Adjustment Provisions (CPAP) formula provides for 85 percent of the contract amount to be subject to escalation adjustment with the remaining 15 percent fixed. Furthermore, a factor must be introduced to take account of the cash flow payments during the construction period and 0.6 is often acceptable if a short method of calculation is employed.

> “The Contract Price Adjustment Provisions (CPAP) formula provides for 85 percent of the contract amount to be subject to escalation adjustment with the remaining 15 percent fixed. ”

The total escalation during the contract period is therefore calculated by multiplying the anticipated tender amount by 0.85 and 0.6. After this, it is then calculated by the estimated monthly percentage increase as indicated by the relevant indices in the CPAP formula, and by the contract period expressed in months.

Tender price escalation

The annual year-on-year increase in building costs (i.e. tender prices) are based on the indices published by the Bureau for Economic Research (BER), University of Stellenbosch (January to January of each year), and for CPAP formula (Work Group 181 Commercial/Industrial buildings). It is published by Statistics South Africa (P0151), and is as follows:

Cost indices applicable to the building industry

YEAR	BER		CPAP		TMI
	Index (Jan=100)	Year-on-Year Increase	Index (Jan=100)	Year-on-Year Increase	
2018	100.0		100.0		1.00
2019	104.3	+4.3%	103.8	+3.8%	1.00
2020	107.8	+3.4%	107.5	+3.6%	1.00
2021	110.4	+2.4%	114.0	+6.0%	0.97
2022	116.7	+5.7%	130.1	+14.1%	0.90
2023	123.4	+5.7%	138.0	+6.1%	0.89
2024	131.4	+6.5%	145.9	+5.7%	0.90
2025	139.8	+6.4%	152.9	+4.8%	0.91
2026	147.6	+5.6%	159.7	+4.5%	0.92
2027	155.2	+5.1%	167.4	+4.8%	0.93

The average annual increases indicated by the BER publications are the average of the quarterly increases for that particular year and will not correspond to the above year-on-year increase.

The difference between tender price escalation and escalation according to the indices incorporated in the CPAP formula for any one period, may be attributed to the market factor, which incorporates the contractor's mark- up, productivity, availability of materials, etc.

This forecast is based on information provided by the Bureau for Economic Research, Stellenbosch University.

Moses Mabhida Stadium
South Africa

Tender climate

The column marked TMI (Tender Market Indicator) gives an indication of the tender climate. The building cost index, as published by the BER, is based on tender prices and has been deflated by the index for CPAP Work Group 181, which is based on the cost of labour and materials. The result is that the movement of tender prices (excluding the influence of market costs of labour and material), gives an indication of the competitiveness of tendering. It represents a comparison, or rate of change, of BER and CPAP indices.

When the TMI (see graph on page Page 89) shows a downward gradient, this indicates a favourable tender market, i.e. the next point is numerically less resulting from the calculation of BER divided by CPAP. This indicates that the increase in BER (tender index) is less than the increase in the CPAP index. Therefore, there is a favourable tender market from the viewpoint of the employer.

Alternatively, if the graph has an upward gradient, the increase in BER is greater than the increase in CPAP indices. This indicates an unfavourable tender market from the viewpoint of the employer. Therefore, it would be prudent to recommend negotiation as opposed to tendering.

This tendency is also apparent on the cost indices graph (see page Page 89). When the two lines (CPAP and BER) converge, i.e. CPAP is decreasing and BER is increasing, you should negotiate. When the two lines diverge, i.e. CPAP is increasing and BER is decreasing, proceed to tender instead.

Base dates: To allow for the comparison of indices, a factor has been introduced resulting in an equal base for both BER and CPAP indices (i.e. January 2018 = 100).

Unique large-scale projects

Building cost estimation seems to become more complex when unique circumstances prevail. For example, when a FIFA World Cup, Olympic Games or similar events take place in a particular country, many new construction works and associated infrastructure projects are awarded.

Projects of such magnitude can only be constructed by major contractors possessing the required expertise and resources. Often the unit costs of these projects are significantly higher than originally anticipated. Contractors at this level have little competition. Based on a favourable supply and demand, they price costs accordingly, resulting in client cost overruns and severe pressure on budgets.

Value-added tax

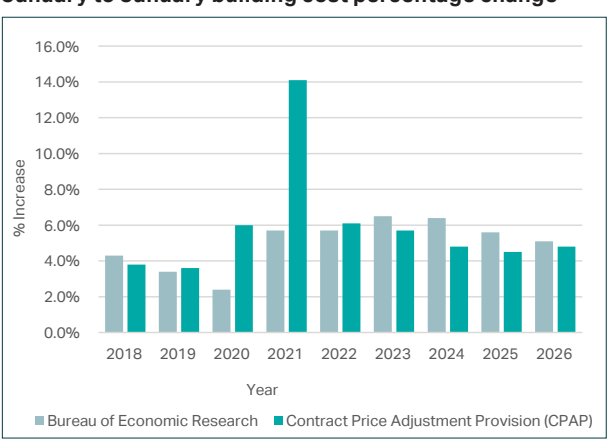
As the majority of developers are registered vendors in the property industry, any VAT on commercial property development is fully recoverable. Therefore, to reflect the net development cost, VAT should be excluded. Should the gross cost (i.e. after VAT inclusion) be required, then VAT at the ruling rate (currently 15 percent) should be added.

“As the majority of developers are registered vendors in the property industry, any VAT on commercial property development is fully recoverable.”

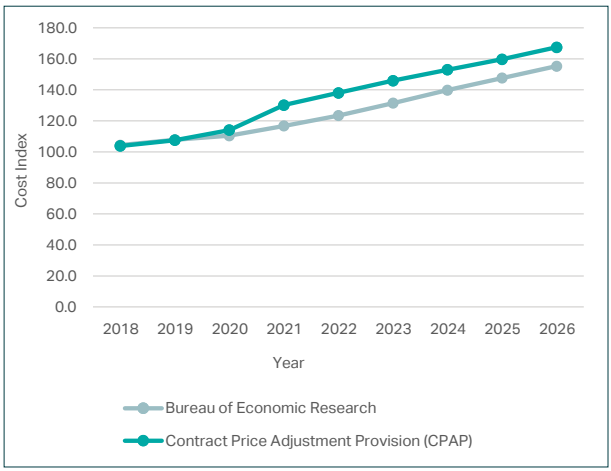
Awareness must be made of the effect that VAT has on cash flow over a period of time. This will vary according to the payment period of the individual vendor. However, in all cases, it will add to the capital cost of the project to the extent of interest on outstanding VAT for the VAT cycle of the vendor.

Graphs: BER and CPAP

January to January building cost percentage change

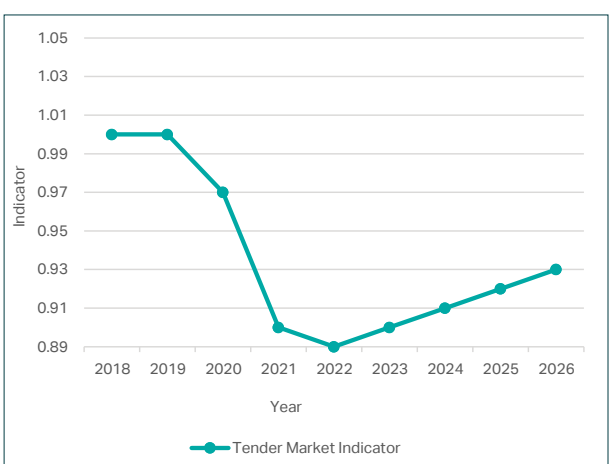


January building cost indices



Tender market indicator

BER deflated by CPAP



This graph gives an indication of the tender climate. It is the result of the relationship between BER and CPAP. Refer to the section on tender climate, page 86.

8

METHOD FOR MEASURING RENTABLE AREAS

Method for measuring rentable areas

SECTION 8

SAPOA methods

In the past, many landlords and developers have derived methods for calculating the rentable areas of buildings.

The most common method is recommended by SAPOA, entitled *'Method for Measuring Floor Areas in Buildings', Second Edition* (effective from 7 November 2007). This replaces the previous SAPOA recommendation in *'Method for Measuring Floor Areas in Commercial and Industrial Buildings'* (updated August 1991). However, it must be noted that the latest edition is approved for use from 7 November 2007 and should not be applied retrospectively.

Not detracting from the above publication, and by kind permission of SAPOA, below we have abbreviated and simplified the definitions contained in the document for easier understanding, and made our own comments on the use of rentable areas.

The document provides separate methods for measuring floor areas of:

- Offices of all types.
- Retail developments, including malls, stand-alone, strip and value centres/warehouses.
- Industrial developments, including factories, warehouses, mini-units, trading warehouses, multi-storey, etc.
- Residential buildings, including houses, flats/apartments, townhouses, cluster houses, etc.

“

The most common method is recommended by SAPOA.”

For all office types, the following definitions and explanations are applicable:

The basis

The basis used in calculating the rentable area is the measurement of usable area, together with the common and supplementary area, as determined at each level. Unless otherwise indicated, the unit of measurement is square metres (m²).

Area definitions

Construction area
The construction area is the entire covered built area. This is the sum of the areas measured at each floor level over any external walls to the external finished surface.

Only the lowest levels of the atria are included, and all openings on other levels to form the atria are to be excluded.

Rentable area

The rentable area is the total area of the building enclosed by the dominant face, adjusted by deducting major vertical penetrations. No deduction is made for columns.

The intended use is determined by the revenue-producing area of a building. This comprises the rentable area, supplementary area and parking. It is also used by those analysing the economic potential of a building.

- The rentable area has a minimum floor-to-ceiling height of 1.5 metres.
- The rentable area comprises usable area, plus common area.
- The rentable area excludes the supplementary area.
- This may produce additional revenue.

Usable area

The usable area is the area capable of exclusive occupation by the tenant. This includes the total area of the building enclosed by the dominant face, adjusted by deducting all common area and major vertical penetrations. No deduction is made for columns.

It is intended to be the essential part of the rentable area, and the basis for the apportioning common area.

Common area

The common area is an area that the tenant has access to and/or use of. It is still considered part of the rentable area. The primary common area of the building is apportioned to tenancies pro-rata to the usable area of that tenancy.

The secondary common area is apportioned only to tenancies that it services.

The common area has two components:

- The primary common area comprises all rentable area on a given floor that is not usable area. Together with remote common areas that comprise entrance foyers, plant and service rooms, or any other portion of rentable area not located on the given floor.
- The secondary common area comprises areas beyond the primary common area, giving access to multiple tenancies. Accordingly, this may vary over the life of a multiple tenancy building.

Supplementary area

The supplementary area is any additional revenue-producing component that falls outside of the defined rentable area.

Supplementary areas need not be weatherproof.

For example, it comprises storerooms, balconies, terraces, patios, access/service passages, signage/advertising areas and parking areas demarcated for tenant use. Parking bays shall be given in number.

General definitions

Atrium

An atrium is a weatherproof interior space, accessible and capable of use by the tenant at the lowest level. Voids in floors above the atrium space are not included in the rentable area.

Entrance foyer

An entrance foyer is a portion of remote common area, including associated adjacent rooms and lobby. Lift area, lobby and entrance foyers that occur together with parking floors (not adjacent to office areas) comprise remote common area.

Major vertical penetrations

Major vertical penetrations, stairs and landings, lift shafts, flues, pipe shafts, vertical ducts, and their enclosing walls, exceeding 0.5m² in area, are deducted from the rentable area.

Remote service areas and plant rooms

Remote refuse rooms, electrical sub-stations, transformer rooms, central air-conditioning plant rooms and lift motor rooms are included in the primary common area.

Storage areas

Dedicated storage areas within the usable area are included as usable area.

Dedicated storage areas are listed separately as supplementary areas.

Retail, industrial, residential and other developments

Similar provisions have been made for measuring the floor areas of retail, industrial and residential buildings. For detailed information, it is suggested that the relevant sections of the said document be studied carefully.

The above method is designed to accommodate the practical measurement of most building types. However, certain building types such as hotels, leisure and sport centres, petrol stations, hospitals, law courts, and retirement villages may only utilise the underlying principles of this method.

In general

Developers and financiers are constantly attempting to either reduce building costs or increase rental levels to achieve higher returns. When these parameters are exhausted, it becomes incumbent on the architects and designers to design more efficiently. One must therefore understand the complete SAPOA *'Method for Measuring Floor Areas in Buildings', Second Edition,* and implement the various facets of the definitions to achieve higher efficiencies between the various areas.

The initial return is more sensitive to an increase in rental income (which can be affected by increasing the rental area) than the corresponding percentage reduction in construction costs.

Once again, the above has been published as a quick guideline only, and should not be used in preference to the SAPOA publication, which is far more comprehensive and detailed.

We acknowledge and thank SAPOA for permission to use extracts from this publication.

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RETURN ON INVESTMENT

Return on investment

SECTION 9

Criteria to be employed

There are two distinct criteria generally used for evaluating the financial viability of a property investment, namely:

- The initial return.
- The cash flow analysis.

The initial return

The initial return is based on the net income during the first year of the development's operation. The return is expressed as a percentage per annum of the anticipated capital investment.

Escalation in both construction cost and cost of capital are both considered to incorporate the time value of money.

The major advantage of employing the initial return method is that expenses and income do not have to be escalated too far into the future. Therefore, these are relatively accurate and easily understood in today's monetary terms. The fact that the first year of operation may have a higher vacancy factor than subsequent years should be ignored when the initial return is calculated in order to reflect long-term potential more accurately.

The initial return should be qualified as follows:

- All expenses and income have been escalated to the construction completion date.
- Interim income received prior to the construction completion date has been deducted from the capital investment after adjusting for operating expenses and cost of capital.
- The returns are expressed as percentages of the escalated capital investment and do not take into account loans, loan repayments or interest charges on loans.

The calculated returns are for the first complete year of operation only and do not cater for the following:

- When the project may not reach full maturity during the first year of operation.
- Vacancies.
- Recoupment of capital during the income–bearing period of the investment or realisation value of the investment at the end of the investment period.
- Income tax.

Cash flow analysis over a predetermined period

In the cash flow method, the income and expenditure cash flow over the economic lifespan of the investment is taken into account. Usually an Internal Rate of Return (IRR) and/or a Net Present Value (NPV) is employed to evaluate the financial viability.

The NPV (discounted cash flow) method determines the sum of all cash flows (inflows, outflows and initial investment) and discount to present values at the project's cost of capital. With a positive NPV the project can be accepted and it should be rejected if the NPV is negative.

The IRR is the rate of interest that equates the present value of the expected future net income with the present value of the cost of the investment. The NPV would therefore be exactly zero if the IRR is used as the discount rate. The IRR of an investment is generally used by institutional investors, as it is a comparative indication of the profitability of alternative investment options.

A weakness of the IRR calculation is the fact that an implicit assumption is made that cash flows are reinvested at the project's own IRR. The Modified Internal Rate of Return (MIRR) overcomes this by assuming that cash flows are reinvested at the cost of capital rate (or any other given rate), and may be calculated in addition. As the cost of the capital rate is normally determined at a lower rate than the IRR, it can be assumed that the MIRR calculation will always render a lower result.

The assumptions on which the cash flow return is based upon must be listed. These should include the assumed investment period (e.g. 20 years after the construction completion date), that income has been taken into account at the beginning of each month and expenditure at the end of each month, the terminal value, and escalation in rental and operating expenses over the investment period, etc.

It is suggested that, where applicable, a comprehensive financial viability analysis should incorporate both the initial return and the cash flow method of evaluation. It is significant to note that there is a close relationship between the initial return and the IRR. However, this is to be applied with care by an experienced analyst.

Example:

Total capital expenditure (investment)		R 100,000,000
Rental in first year (net income)		R 10,500,000
Initial return in first year		10.50%
Escalation in net rental income		9.00% per annum
		Net cash flow
Year 0		-100,000,000
Year 1		10,500,000
Year 2		11,445,000
Year 3		12,475,050
Year 4		13,597,805
Year 5		14,821,607
Year 6		16,155,552
Year 7		17,609,551
Year 8		19,194,411
Year 9		20,921,908
Year 10		22,804,879
Year 11		24,857,319
Year 12		27,094,477
Year 13		29,532,980
Year 14		32,190,948
Year 15		35,088,134
Year 16		38,246,066
Year 17		41,688,212
Year 18		45,440,151
Year 19		49,529,764
Year 20 (+ terminal value)	53,987,443 560,441,075	614,428,518

The IRR with a 9.00 percent annual escalation in rental is 19.50 percent.

Motus Paarden Eiland
Cape Town, South Africa

The terminal value is subjective. In this example, it has been assumed as the capitalised value of the anticipated rental in Year 21 (i.e. R53,987,443 + 9.00% = R58,846,313) capitalised at the initial yield, i.e. 10.50 percent.

Should the terminal value be assumed to be nil (this is unlikely as the land parcel will always have a value), the IRR drops to 16.92 percent.

As a rule of thumb, the calculation of the approximate IRR of an investment is that it is equal to the sum of the initial return plus the escalation rate (assumed to be constant over the investment period). Providing that the terminal value is calculated, as in the given example, i.e. the capitalised value of the anticipated rental in the year after disposal, assuming a capitalisation rate equal to the initial return.

In the given example, the initial return is 10.50 percent, the escalation rate is 9.00 percent, and the approximate IRR is the sum of the two, i.e. 19.50 percent.

Where Green Star South Africa ratings are a requirement, cash flow analysis over longer periods of time have become essential. Capital expenses are normally higher due to investment in 'green' technology and more expensive methods employed. Therefore, the long-term effect on the operation and maintenance of buildings due to better energy efficiency should be demonstrated to building owners and tenants in order to determine the viability scientifically.

Residual land value

The formula

The calculation of the residual land value for a predetermined rate of return, i.e. what a developer can afford to pay for a parcel of land, would be given a specified return for a particular development.

The formula is determined as follows:

Return	=	Net Annual Income / Total Capital Outlay (TCO)
	=	Net Annual Income / y + x
		(Where 'y' = TCO, excluding land value and its corresponding loss of interest and 'x' = land value and its corresponding loss of interest)
Therefore x	=	Net Annual Income _ y / Return
Now x	=	Land Value + Loss of Interest
	=	Future Value of Land

Therefore, to obtain the present land value, i.e. land value excluding its corresponding loss of interest, simply discount 'x' at the interest rate and period used in the previous TCO calculations.

Example:

What price should be paid for land to obtain a return of 10.00 percent p.a. with a net annual income of R6 million and the following capital outlay?

Estimated escalated building cost	R 38,150,000
Professional fees	5,725,000
Legal and plan approval fees	45,000
Interim rates on ground during construction period	265,000
Loss of interest and/or bond interest at 10.5% p.a. compounded monthly over a 15-month construction period	3,180,000
Total capital outlay excluding land cost (y)	R 47,365,000
$x = \frac{\text{Net Annual Income}}{\text{Return}} - y$	
$= \frac{\text{R6,000,000}}{0.10} - \text{R47,365,000}$	
= R12,635,000	
Therefore land value is R12,635,000 discounted at 10.5% p.a. over 15 months = R11,087,204 (say)	R 11 million

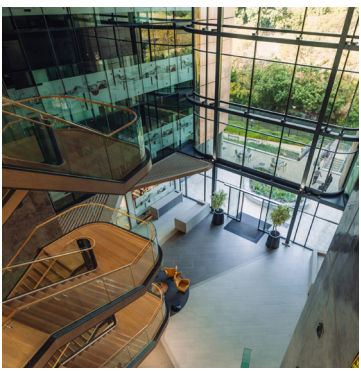
The above residual value is very sensitive to changes of the required rate of return. This is otherwise known as the capitalisation rate (CAP rate). Consideration should be given carefully, taking into account the risk profile of the proposed development.

CASE STUDY

Department of Agriculture, Land Reform and Rural Development

New Head Office

Designed by Boogertman + Partners

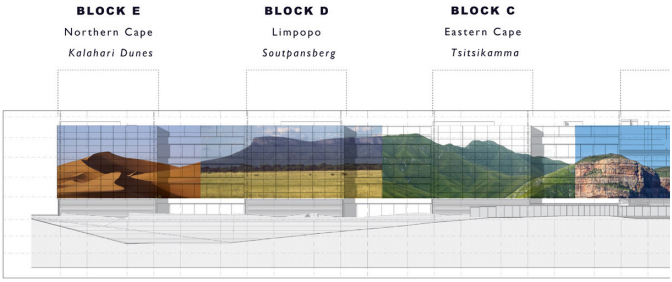


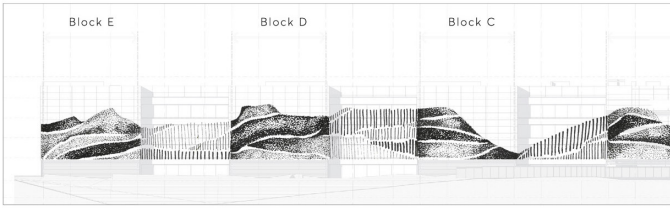
Images courtesy of
Boogertman + Partners

We are thrilled to announce the successful completion of the Department of Agriculture, Land Reform and Rural Development offices in Pretoria by Boogertman + Partners.

South Africa is renowned for its diverse landscapes, climate, flora and fauna, breathtaking natural beauty and vibrant cultural heritage. With its ability to encapsulate this remarkable diversity, our country stands out as truly unique.

Guided by the government's core values and commitment to inclusivity, we firmly believe that 'South Africa belongs to all those who live in it.'





Images courtesy of
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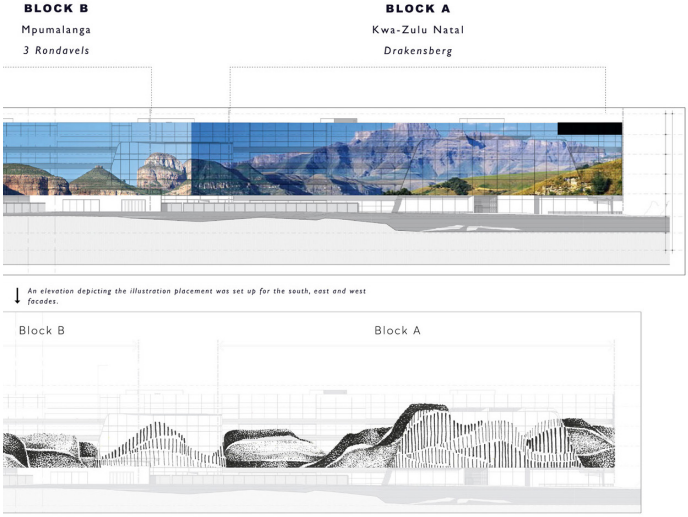

An elevation depicting the illustration placement was set up for the south, east and west facades.

Design concept

The distinctive and pure geographical composition of our renowned country's landscape serves as the foundation for our design concept. The grids, urban mapping and diverse topography of South Africa have influenced our design thinking and execution. Extracting forms and shapes from these elements, the project was created as an organic aesthetic that reflects the natural moulds found in our land. Blurring the boundaries between architecture and interior spaces, the aim was to incorporate these natural and external influences, reinterpreting the principles, visuals and processes observed in nature. The approach reinstates these principles, drawing inspiration from the contours, landscapes and urban grids that shape our cities.

Through the integration of organic shapes derived from South Africa's topography, the building layout, architecture and interior finishes resonate with the essence of our unique land.

Telling a story through a building's skin:

The façade of the Department of Agriculture, Land Reform and Rural Development building draws inspiration from a harmonious fusion of diverse landscapes, placing special emphasis on the patterns found in urban and rural environments. The primary goal was to create a captivating piece of art that visually encapsulates the department's key focuses: agriculture, forestry, rural development and land reform. By bringing these priorities together, the team sought to provide a compelling visual representation that embodies their significance and interconnection.

With a deep appreciation for South African landscapes and their intrinsic beauty, the façade artwork of the building draws inspiration from these natural surroundings. Employing laser-cut techniques, the artwork skillfully incorporates linear and pointillist patterns into the surface panels, creating a captivating visual effect. From a close perspective, the artwork showcases a harmonious fusion of diverse forms and lines.

Image courtesy of Boogertman + Partners

However, when observed from a distance, the façade artwork seamlessly unifies into a single composition that portrays landscapes from each of South Africa's nine provinces.

These artistic interpretations adorn the south, east and west façades of the building, reflecting the rich diversity of the country. By employing a linework approach, urban South African landscapes are visually referenced, while the pointillist technique symbolizes rural landscapes.

In conclusion, just as South Africa continuously evolves, so does the building itself, serving as an inclusive and humane environment that aligns with the Department's mandate and commitment to enhancing the quality of life for all.

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10

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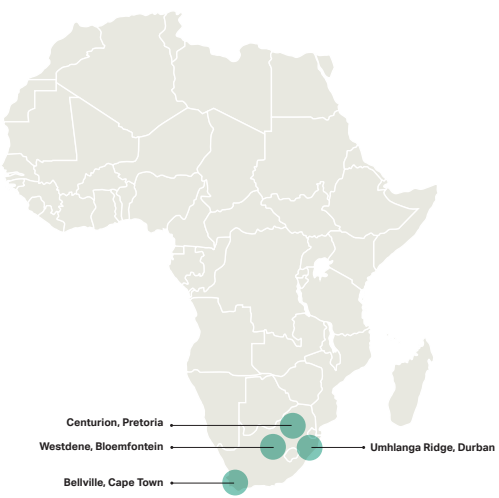

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AECOM would like to thank all clients, partners and project teams for their contribution in producing this publication.

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