

Surveying pitfalls

in the municipal environment

SAGI is taking a multi-pronged approach as it drives home key issues that need addressing in the municipal environment when it comes to understanding the role and duties of cadastral and engineering surveyors. Ignoring the risk factors has major implications for current and future infrastructure delivery. **By Altus Strydom***

It's common knowledge that most municipalities are in dire need of service upgrades: published reports confirm that the South African government is budgeting substantial funds to effect this as it strives to meet National Development Plan goals aimed at fostering macroeconomic development.

However, before anyone can do any development, planning, design or construction work, they need up-to-date maps and data. That job rests with the surveyor, who has an intricate task to perform. By definition, the term surveying encompasses all activities that measure, model and record information about the physical world and the environment.

The term is often used interchangeably with geomatics, both of which are the science of determining the position of points on, above or below the surface of the earth. The technique is ancient and highly effective: think of the maps of the world drawn up by cadastral surveyors thousands of years ago.

SAGC-registered surveyors conduct topographical and detailed surveys of construction projects. They provide construction verification of as-built plans, the underground detection of services and the mapping thereof, as well as forensic investigations, control and monitoring surveys, and 3D scanning, among other key tasks.

The engineering survey discipline does not include cadastral work, which must be done in association with a professional land surveyor. Cadastral surveys relate to property ownership

and rights and restrictions in registered property. Inclusive to cadastral surveying is the demarcation confirmation of new townships, subdivisions, servitudes, sectional titles and mining rights.

By supplying highly accurate and current spatial data, the geomatics profession distinguishes itself as the only profession that specialises in positioning, land information and mapping.

New technologies may make it easy for a non-surveyor to try their hand, but the results will be a disaster. For example, not all drone operators and aerial survey companies employ or use SAGC-registered surveyors to sign off their plans. Quality control by means of ground control points and ground survey checks of survey data is an essential part of an aerial survey.

The check-list

Let's expand on the vital role that surveyors play by reading off the following check-list. Answering 'yes' to any of the following indicates an urgent need to refresh spatial information, survey and mapping policies:

- The current spatial/geographical data is inaccurate.
- The municipality or department doesn't have standard survey and mapping specifications.
- There's no mapping deliverables policy in place.
- The location of services cannot be confirmed
- Spatial/GIS data is not current.
- Data is not accurate enough for design purposes.
- There are different data sets with conflicting data.
- There's a clear understanding that the

organisation will function better with accurate data.

Spatial requirements encompass data that includes cadastral and boundary information, plus layout plans of sewerage, water, and electricity. This information is essential for design and construction, but equally so for effective tariff revenue collection.

Professionals that need this data cover the full built environment spectrum, from developers to architects, town planners, civil engineers and utility service providers.

Legislation

There are more than 30 Acts where the use of the survey profession is required or where the profession delivers a service. These include the Geomatics Professions Act (No. 19 of 2013), the Sectional Titles Act (No. 95 of 1986), the National Building Regulations Act (No. 103 of 1977), and the Spatial Planning and Land Use Management Act (No. 16 of 2003).

The Geomatics Profession Act is particularly significant. This makes provision for the registration of persons in the geomatics industry. In turn, the South African Geomatics Council (SAGC) is the body that safeguards the public and controls the registration of survey and geographic information science (GISc) professionals.

It is illegal for a non-registered person to execute survey work. By law, surveyors must be registered with SAGC to perform cadastral or engineering surveys. So be careful not to place your project at risk by inadvertently committing an offence and jeopardising both your development work and professional indemnity.

In general, the cost of survey versus the cost of the infrastructure installed is negligible



A SAGC-registered surveyor carrying out a survey



and estimated at approximately 0.1% of the overall construction budget. However, where poor and non-registered surveyor work occurs, this frequently means that services are incorrectly designed and installed. That often translates into millions in wasted expenditure to rectify mistakes.

Minimum requirements for tenders and appointments

The following should be part of a submission if there is a survey requirement in any tender for development and construction:

- detailed response to the brief, stating price, deliverables and timeframe
- proof of registration with SAGC and eligibility to contract in the form of a letter of good standing; alternatively, ask SAGI to investigate and confirm
- proof of current professional indemnity cover
- a proper survey specification, which details confirmation of cadastral and engineering quantities, accuracies and deliverables
- proof of quality control.

Examples of what can go wrong

Houses and small construction projects are all too

often built over building lines, municipal servitudes and boundaries. The cause: municipalities do not apply the building regulations that clearly stipulate that the boundaries need to be replaced by a professional land surveyor.

The following case study examples further illustrate what can go seriously wrong when a qualified surveyor is not employed with some common pitfalls. In some cases, working with incomplete data was a contributing factor, as illustrated in the first point below.

- Municipal pipelines were damaged and several suburbs were without water. The cause: an engineering surveyor conducted the setting out of a construction site with incorrect co-ordinates. Construction then started over a municipal pipeline that was clearly demarcated by a municipal servitude. No one checked the cadastral (surveyor general) data, which only a land surveyor can do. Plus no one checked that setting out was done from established benchmarks.
- A municipality accepted as-built plans that were not certified by a SAGC registered surveyor. The result was that its GIS data was incorrect and damage occurred when other construction projects started. There were several court

actions against fibre optic firms that damaged municipal services: the municipality could not claim because their supplied data was not up to date or correct. So what went wrong? In this instance, the municipality did not have an as-built plan policy, which would have clearly stipulated that data must be signed off by a SAGC registered surveyor.

- Piling for a multi-storey building was incorrectly set out by an unqualified surveyor and the pillars were built in the incorrect position. The problem in this case was an error on the architects' and engineers' plans. A qualified surveyor was not present to compare the setting out data with the existing plan.

- A railway line, built without calculation of transition curves, had to be re-built. On this project, neither the engineer nor the unqualified surveyor realised that they needed to do this. Obviously, a very costly mistake.

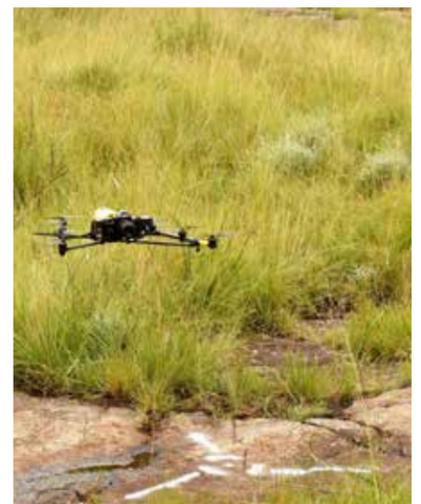
From these discussions, it's clear that there are too many examples out there of shortfalls in survey compliance. In addition, it's alarming to note that most of the currently available municipal survey data is outdated. This presents a major obstacle to infrastructure delivery.

In the interests of South Africa and the survey profession, SAGI is offering to assist municipalities in updating and drawing up new survey specifications and data management policies. It's vital for all stakeholders to understand that without this, no legally compliant development can take place. **3S**

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Farm beacon erected in 1896



Drone landing on ground control point



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