How to avoid common, expensive construction errors

FIDELIS SAKWA

To prevent these errors, qualified construction professionals should be engaged.

Following the collapse of three buildings in the last two months, the unfolding narrative is consistent with reasons frequently cited: a section of the professional chain decided that the rules defining building construction are mere suggestions and can, therefore, be abridged.

A more detailed examination reveals that the quality of construction materials plays a huge role in the durability of buildings. A national Construction Authority 2020 survey showed that poor workmanship accounted for 35 per cent of building failures, substandard material for 28 per cent and poor structural design for 25 per cent.

Typical case is concrete which is a key construction material made up of cement, sand, aggregates and water. The prescribed ratio to make a Class 20 concrete for example, is 1:2:4 of cement to sand to aggregate.

Cement accounts for the highest cost in a concrete mix because it is the primary binding agent. While attempting to save on costs, a common mistake made in some sites is the deliberate use of less or cheaper cement that does not meet the specifications of existing standards. This significantly affects the overall strength and quality of the concrete.

For sand, many contractors use river sand, heedless of the fact that it can be contaminated with clay and silts especially when there is a runoff due to heavy rains. Clay and silts tend to absorb water which forms air spaces in concrete. As it dries out, the spaces become weak points that compromises and hinders bonding of the cement to aggregate.

The absorptive nature of clay and silt further increases demand for water which consequently lowers the strength of concrete. A different section of sites resorts to the use of quarry sand — a waste material in aggregates which has been an acceptable construction material for years. However, it is important to be mindful of its higher content of fine material that can potentially increase absorption of water. The more water you add to concrete the weaker it becomes.

The quality of aggregates also affects concrete strength. Aggregates mined from weathered rocks or overstrained materials will have elements of soil and clay causing the issues mentioned earlier. Worse, is when one purchases flaky, crispy-like aggregates often sold to unsuspecting end users. The result is a highly compromised packing density with lots of air spaces. The ideal aggregate particle is rounded or cubicle shaped with an evenly sized particle distribution.

Quality implementation at construction sites portends another major concern. Workers, especially when tired, add more water to concrete to make application easy, losing count of the number of buckets they have used to mix individual components. Should it rain, there is no telling how much water will be in excess. They will simply use an eyeball approach to determine water levels without running any tests.

Some sites wrongfully interpret the ratio of 1:2:4 to mean 1 bag of cement to 2 wheelbarrows of sand and 4 wheel barrows of aggregates as opposed to an equal volume ratio, causing low concrete strength.

Avoiding errors at the mixing stage is critical to ensure the structure has the requisite strength. Even the best cement will make useless concrete when proportions are unknown and the workers use dirty river sand, flaky aggregates and sewage water.

To prevent these errors, qualified construction professionals should be engaged and a strict regulatory framework to verify absolute adherence to standards and consistency must be observed. Projects should conduct mix designs in approved testing laboratories using the actual materials they will use at the site. This must be supplemented by physical testing of the concrete to ascertain strengths well before the project commences. Any changes in the construction materials must be matched with a change in mix designs.

—The writer is the head of Innovation, Technical Services in Cement and Concrete Quality at Bamburi Cement