

# PARADIGM-SHIFTING INFRASTRUCTURE IN CAIRO

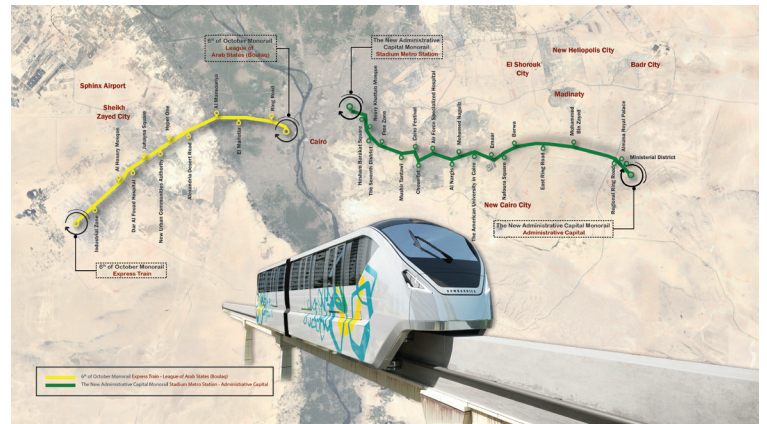
By Luke Carothers

**CURRENTLY UNDERWAY IN EGYPT** is the construction of the longest monorail system in the world. Running 57 km east of the Nile River and 45 km west, this two-line system will feature 35 stations that service the two lines. Starting in the New Administrative City and ending in East Cairo, the line east of the Nile River (EoN) will have 22 stations. The line west of the Nile River (WoN) will have 13 stations, beginning in 6th of October City and ending in Giza. When completed, this infrastructure project will drastically improve the region's transportation capacity—moving approximately 45,000 passengers per hour at peak capacity. In addition, the Cairo Monorail System will be entirely electric, which has a significant impact on the carbon footprint of the region.

The Cairo Monorail project began in September 2020 when workers broke ground on the two lines individually. According to Waleed Abdel Fattah, MD and SVP of Hill International (Africa), progress on the monorail project is approximately 40 percent completion on the EoN Line and 30 percent on the WoN Line with total rail systems being around 21 percent completed. A global leader in managing construction risk, Hill International is providing project management, design review, and implementation supervision services for the Cairo Monorail Project. Abdel Fattah points out that this project is not only unique to its region and continent, but also to the entire world. A project of this scale certainly has the potential to significantly impact the region, but its size also means there are special considerations that need to be taken into account.

When completed, the Cairo Monorail Project will extend both east and west of the Nile River for a wide distance. This means that soil composition and other geotechnical factors vary along the monorail's path. Abdel Fattah notes that the steepest learning curve was accounting for the various geotechnical conditions over the nearly 100 km long project site. There are also challenges in working in a busy city such as Cairo, which Abdel Fattah says takes considerable planning and coordination to overcome.

One of the features of an elevated system is a guideway structure. For the Cairo Monorail Project, construction of the guideway system has been rapid when compared to other transit projects. The guideway structure consists of precision cast, precast, post-tensioned beams measuring up to 28 meters in length. The foundations for the guideway structure consist of large diameter bored monopile foundations and piers. Combined with the precast superstructure, this allows for the construction of 25-30 spans per week. With such quick progress being made in the installation of the system's guideway structure, much of the work going forward will be electrical and mechanical installations such as emergency walkways, cable trays, and power rail.



An elevated system also necessitates the construction of elevated station structures. For the Cairo Monorail Project, the station structures are being constructed with a central cantilever design and consist of a concourse level and side platforms above. Additionally, passenger access is provided by sidewalks with steel over-bridges. A large portion of the construction process for the stations involves precast concrete beams and slabs as well as steel trusses for the roof structures. These components are manufactured off-site and installed at the intended site, further adding to the speed of the monorail's construction.

Another component of Cairo's new two line monorail system that is being manufactured off site are the cars. In total, the system will use 70, four-car train sets that are currently being manufactured in the United Kingdom. The first four of these sets have already been manufactured and delivered to Cairo. These first four train car sets will be assembled, tested, and commissioned into use on the Cairo system later this year.

A major consideration for a project of this scope is how proper maintenance can be built into the framework of the project. To this end, there will be a depot and maintenance facility located at the far end of each of the lines as well as structures for operational control and administration. Like much of the rest of the construction on the project, progress on these maintenance and control structures is moving along quickly with architectural and infrastructure activities currently going on.

The Cairo Monorail is scheduled to be completed in 2023, and, when finished, it will hopefully shift transportation patterns and reduce the carbon footprint of the region. Part of the design of the system, according to Abdel Fattah, is to provide enough parking at each of the stations so that it encourages people to ride into the city rather than driving. By providing a fast, reliable alternative to driving around the Cairo area, the new monorail system is shifting the paradigm for transportation and infrastructure throughout the region, and throughout the world.

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