

### MAMMOET'S TITAN BRIDGE LIFTING SYSTEM

The attached written statement describes the MAMMOET TITAN Bridge Lifting System, a device that our company developed in 2000 for the removal of old and installation of fully assembled new bridges. This system has now been successfully utilized on several projects, and has proven to be an invaluable rapid construction technique.

Anticipating growth in the bridge demolition and reconstruction market, MAMMOET designed and built a system that could accomplish the following tasks utilizing our existing equipment with minimal modifications.

- Transport new bridge spans.
- Rotate the spans.
- Lift or lower the spans vertically.
- Lift an old bridge from its foundations and promptly transport it away to provide clearance for new spans during a short shutdown.
- Quickly move and set new spans onto the existing foundations during a shutdown.

**MAMMOET's TITAN Bridge Lifting System** is a tool that MAMMOET continues to utilize on a regular basis for replacing or transporting fully assembled bridges. The two main features of this system are:

***Self-Propelled Modular Transporters (SPMTs):*** The backbone of the TITAN Bridge Lifting System, these high-capacity transport vehicles enable bridges to be moved, lifted, shifted, and rotated. The transporters are modular (typically modules have a payload capacity of 120 to 200 tons each) and can be interconnected in accordance with the weight requirements of each particular project. Controlled remotely by one operator, hundreds of wheels can be simultaneously driven, rotated, and steered for precise positioning within millimeters. Vehicle speeds of up to 10 km/h can also be achieved when it is required to transport bridges over long distances. Since large bridge spans can weigh between 200 and 4000 tons, vehicle configurations typically have between 80 and 1200 wheels.

***TITAN Climbing Towers:*** Since bridge replacement projects almost always require that bridge spans be raised or lowered, MAMMOET developed a high-capacity climbing tower that utilizes the SPMTs' suspension for raising and lowering. A typical tower is comprised of four modular column legs, each with 250 tons weight capacity. During a typical lifting operation, the hydraulically powered loading platforms of the SPMTs are raised approximately 0.5 metres, creating a gap under each column. A modular column section is then inserted under each column and is structurally connected by bolting. The tower is then set down and the SPMTs are reconnected to the climbing tower at a lower level so that the process can be repeated. Considering the large size of the items being lifted, this process is relatively quick. Even a very large bridge can be jacked up 4-6 metres in a matter of a few hours, even on dynamic platforms such as barges. To date, the maximum lifting height that has been executed on a project is 25 metres, however much higher heights can easily be achieved with this system.

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3<sup>rd</sup> Avenue Bridge – New York City



Rail Bridge – Philadelphia PA



Rail Bridge – Montreal Quebec