A mobile reconfigurable suspended cable-driven parallel robot (MCDPR) is presented for dragline-style autonomous excavation in support of NASA's Artemis lunar surface preparation program. The system employs four independently navigable mobile bases with telescopic masts. A Model Predictive Controller (MPC) explicitly parameterized by real-time effective mass estimates derived from onboard load cell feedback addresses the challenge of continuously varying payload during excavation, eliminating the need for prior knowledge of collected material mass. A horizontal compensation force of 200 N is applied throughout each excavation cycle to counteract terrain drag and soil resistance forces. Cable tension feasibility is enforced throughout each cycle through a quadratic programming (QP) tension solver layer. The system was validated over ten indoor excavation cycles, achieving an average collected mass of 2.12 kg per scoop at a throughput of approximately 36.0 kg/ hr over a 2 m excavation distance, with an average cycle duration of 212 s. Mass estimation errors of 8--23\% were observed in the payload ranges tested. Outdoor trials were also conducted in an unstructured environment to demonstrate the deployment of the systems.