With the development of construction robotics and cutting-edge technologies, building sustainable habitats on the lunar surface has become a feasible goal. However, full-automation technology and utilization of construction robots are limited, and collaboration with operators is inevitable in an uncertain and dangerous space construction environment. This research studied the effect of communication delay on work performance, operator’s cognitive workload, and behavior change during construction teleoperation work. This study will contribute to understanding the operator's situation perception and behavioral changes in latency and to improving human-robot cooperation in space construction work when working on teleoperation under delayed conditions.