In modern day construction practice, repair and rehabilitation of structures have taken a prominent role. Indeed, the recent trend of rehabilitating and strengthening unreinforced masonry reinforced with glass fibers. In this paper, the use of fiber-reinforced-mortars (FRMs) is proposed for construction rehabilitation and reconstruction applications. A single type of fiber (glass fiber) with different length is considered; short, long and mixed. Several specimens mortars reinforced with fibers are tested in compression and flexure. Also, the stack and the microstructure of the interface glass fibers-matrix cementitious of the reinforced specimen, was examined. The results showed a remarkable increase in the mechanical resistances (50%), an important reduction of the brittleness of the reinforced mortars (lengthening higher than 40%) and a good ductility. That made it possible to increase considerably the safety of our constructions with a better esthetic aspect