The aim of this research is to examine the resilience capacity of transportation networks of highly populated cities located in an earthquake prone region, after enduring an extreme event, to assess loss of connectivity right after the earthquake, and monetary losses due to direct building damage and the corresponding impact in the city economical activities. A strategic area in Mexico City is used as case study. Initially the seismic hazard associated to extreme events within the studied area is characterized throughout a uniform hazard spectra obtained in nearby rock outcrops for return periods of 250, 475 and 2475 years. Probabilistic site response analyses were performed using the uniform hazard spectra computed in rock as input motion, to establish potential collapses of buildings, and critical infrastructure components of the transportation network, including tunnels, urban overpasses, and metro lines, using appropriate fragility curves. Then the network modeling is conducted. A simple building collapse/road blockage model is proposed, to take into account the possibility that the debris coming from the building collapse might block some roads. The analysis of the transportation network is carried out, initially considering only the rescue function immediately after the earthquake, to define critical sectors of the network with respect to its continued connectivity. Then, the scope of the study is widened, to include the consideration of the network capacity to accommodate flows, accounting for potential traffic congestion due to damage to the network that leads to an increase in travel time, which, in turn, is translated into monetary losses. Finally, the recovery time and post-earthquake serviceability is estimated based on city recovery scenarios.