Imaging with a cubic-foot muon tomography station and analysis of future station geometries. N. MERTINS, J. LOCKE, W. BITTNER and M. HOHLMANN. Department of Physics and Space Sciences, Florida Institute of Technology, 150 West University Blvd, Melbourne, FL 32901. Muon tomography uses multiple Coulomb scattering of cosmic-ray muons in high-Z materials to image them. By placing at least two position-sensitive muon detectors above and below an active volume, incoming and outgoing muon tracks can be reconstructed. The scattering angles and locations within the volume as calculated from these tracks yield tomographic images of the materials. Because denser and higher-Z materials scatter muons more, also the composition of the probed material can be inferred from scattering angles. In 2011, a muon tomography station (MTS) using gas electron multiplier (GEM) detectors with an active volume of about one cubic foot was constructed and is currently being tested. Animations in 4-D (3 spatial and 1 color dimension representing muon scattering angle) for reconstructions of iron, lead, and tantalum targets imaged with this MTS are presented. Using Monte Carlo simulations the efficiency of a GEM detector for detecting x-rays or gamma rays from various radioactive sources is estimated by tracking the locations where Compton scattering and photoelectric effects occur within a GEM detector. Simulations investigating new possible detector geometries for a larger MTS are also presented. The new geometries are better adapted to the most likely muon incidence angle of 30° from vertical to increase the station's active volume and its tracking precision. The goal is to create a MTS big enough to image an object the size of a package or suitcase using largely the same detectors that make up the current cubic-foot MTS.