Urban buildings consume a large portion of the U.S. energy use (LLNL, 2021). To reduce the energy use in urban buildings, Urban Building Energy Modeling (UBEM) has been developed and used to model the performance of buildings at the urban scale (Reinhart & Davila, 2015; Nutkiewicz et al., 2018; Ferrando et al., 2020). UBEM is currently being used by the U.S. government to assess energy efficiency improvements in the U.S. building stock. However, most of the current UBEM simulations that are in use by the U.S. government use a simplified description of a building. Such simplified descriptions do not always represent all buildings, especially atrium-type buildings. Atrium buildings usually have a large open, indoor space that provides well-lit, comfortable conditions for the building occupants. Atriums have been widely used in commercial and residential buildings. This study reports on an effort to develop an atrium model that can be used in the UBEM effort. This model was developed using measured indoor environmental data and whole building energy use data from an atrium building on the Texas A&M campus.