For the past several decades, pedestrian safety has been an oncoming issue that has thrown the area of transportation engineering into a frenzy. Pedestrian safety has become predominantly one of the leading causes of fatalities in traffic accidents. Florida has been reported as one of the leading states in pedestrian fatalities with 2.56 fatality rate and about 20 percent of all traffic fatalities in the state of Florida. Nonetheless, as research is being done and hypotheses are being calibrated and produced, there has to be a way of measuring and determining without having to yet apply the system on the field with further validation. Moreover, pedestrian-to-vehicle conflicts have been a rising issue in correlation to the pedestrian fatalities. Thus, having the capability to analyze various surrogate safety measures within the confines of microsimulation would be a great contribution to real-world application. As a result, the purpose of this thesis is to determine the feasibility of using micro simulation to assess safety of pedestrian crossings using specifically VISSIM and SSAM. During this study, a great deal of data extraction was taken from videotapes collected at eight various intersections, each with its own environmental and geometrical factors. Various parameters were taken from the different sites in order to calibrate and validate VISSIM and SSAM. The parameters included the traffic and pedestrian volumes, walking speeds, crossing times, signal timings, pedestrian-to-vehicle conflicts, and queue lengths. During this study, it became apparent that it would be necessary to do a sensitivity analysis for the time to collision (TTC) and post encroachment time (P.E.T) thresholds. With further analysis, the results came to be a TTC of 2.7 and a P.E.T of 7. These thresholds were determined to be used for the calibration and validation of the SSAM model. Data results displayed that the simulated conflicts and the observed conflicts had significant correlation. Furthermore, it was observed that the increase of pedestrian volumes resulted in increase in the number of conflicts. However, even with the feasibility of VISSIM and SSAM being validated, there still are questions that arise pertaining to whether VISSIM and other micro simulation can assess real-world driver behavior and the unpredictability of driver maneuvering such as illegal lane-changing. More tests are recommended to be done, but within the confines of the parameters set in this study, the calibration and validation of VISSIM and SSAM demonstrated good results.