Work zone traffic impact analysis software can help improve the efficiency of implementation and management of work zones. Due to the wide use, this study calibrated and validated a microscopic software (VISSIM) model as well as a macroscopic software (QuickZone) model. The calibration was demonstrated using two case studies: a long-term work zone located on I-44, and a short-term work zone located on I-70. Both work zones involved one lane closure on a three-lane freeway. The calibrations and validations of the two work zone software programs were based on the measures of travel time, queue length, delay and capacity. The calibrated parameter values are recommended for future calibration applications.

VISSIM is one of the most commonly used microscopic simulation software programs. It usually needs complicated calibration and validation processes before providing meaningful simulation results. Thesis developed a process of using regression models to quickly get candidate parameter sets. And statistical tests was used to compare hourly performance measure values from simulations (i.e. travel times) with field data, instead of just comparing the maximum daily measure value. Although QuickZone is as commonly used as a macroscopic work zone tool, its calibration has not been documented in previous studies. This thesis calibrated QuickZone using field data by treating work zone capacity as the calibration parameter. Two types of calibration were performed, delay-based and queue length-based. Least squares estimation was used to determine the parameter capacity value that generates the least total delay error. Sensitivity analyses of VISSIM driving behavior parameters Headway Time (CC1), Following Variation (CC2), Oscillation Acceleration (CC7) and Safety Distance Reduction Factor (SRF) were conducted on travel time and capacity by applying the X-Y Plot and the ANOVA test. The results showed CC1, CC2 and CC7 exhibited effects on travel time, while CC1, CC2 and SRF had negative effects on capacity. Regression models representing the relationship between travel time, capacity and delay and driver behavior parameters (CC1, CC2, CC7 and SRF) were developed and recommended for future calibration efforts. The calibrated driving behavior parameters were CC1=1.0 sec CC2=50 ft CC7=1.2 ft/s2 for I-44 work zone and CC1=1.5 sec CC2=35 ft CC7=0.4 ft/s2 for the I-70 work zone. The QuickZone calibration based on delay was more accurate than that based on queue length. The delay-based calibration result was 1750 veh/hr/ln for the I-44 work zone and 1550 veh/hr/ln for the Blanchette work zone. For the I-44 work zone, the calibrated delays were 2.36 min in VISSIM and 2.22 min in QuickZone, field data was 2.37 min. For the I-70 work zone, the calibrated delays were 5.18 min in VISSIM and 8.53 min in QuickZone, the field data was 5.33 min. The VISSIM results were considerably more accurate.