Ramp metering has been successfully implemented in many states and studies have documented its positive mobility and safety benefits. However, there have been no studies on the use of ramp metering for work zones. This thesis reports the results from the first deployment of temporary ramp meters in work zones in the United States. Temporary ramp meters were deployed at seven work zones in Missouri. Due to lack of crash data, this study uses alternative safety measures such as driver compliance, merging behavior, speed differentials, lane changing, and braking maneuvers. This evaluation suggests that temporary ramp meters should only be deployed where there is potential for congestion and turned on only during periods of high congestion. The use of a three-section instead of a traditional two-section signal produced significantly higher compliance rates. This thesis then aggregated the data into groups to further analyze the effects of different factors such as platoons, commercial vehicles, work zone type and work zone-ramp configuration. In terms of speed related measures, this study focused on findings for two different comparison groups: "between two work zones" versus "before work zone" configuration and "left-lane closed" versus "right-lane closed" work zone type. Results indicated lower mean speeds of mainline and ramp vehicles and higher differentials when ramp metering was turned on. Finally, analysis of merging headways showed that temporary ramp meters were effective in breaking up platoons. This produces more single-vehicle merging which requires shorter gaps and causes fewer impacts on the mainline traffic.