# Freeway Work Zone Lane Capacity

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## ABSTRACT

The focus of this report is a capacity analysis of two long-term urban freeway Work Zones. Work Zone #1 tapered four mainline lanes to two, using two separate tapers; Work Zone #2 tapered two mainline lanes to one. Work Zone throughput was analyzed throughout the day over multiple days and traffic operations conditions were analyzed up to a distance of five miles upstream of the Work Zone entrance. Historical data from pavement-embedded detectors were used to analyze traffic conditions. The database consisted of five-minute volume, speed and occupancy data collected from 78 detectors for a total of 50 days.

Congestion during each analyzed Work Zone existed for more than fourteen hours each day; Work Zone impacts adversely affected freeway operations over distances of 3.7 to 4.2 miles. Speed and occupancy conditions further upstream were, however, not affected, or even improved due to significant trip diversion.

Work Zone capacity was defined based on the maximum traffic flows observed over a one-hour period; throughput values were also compiled over longer periods of time when traffic was within 90% of the maximum observed one-hour flows, as well as over the multi-hour mid-day period. The Highway Capacity Manual freeway capacity definition based on the maximum observed 15-min period was not used, since it would have no practical application in estimating Work Zone throughput when congested conditions prevail for the majority of the hours of the day.

Certain noteworthy changes took place for the duration of the analyzed Work Zones: per-lane throughput dropped; morning peak periods started earlier, evening peak periods ended later and lasted longer; mid-day volumes dropped accompanied by the highest occupancies of the day.

Trip diversion was evident in lower volumes entering the analyzed freeway corridor, higher volumes using off-ramps and lower volumes using on-ramps upstream of the Work Zones. The majority of diverted traffic comprised smaller vehicles (vehicles up to 21 feet in length); combination truck volumes increased and their use of the median lane increased, contrary to smaller vehicles that shifted toward a heavier use of the shoulder lane.

Numerical findings are presented in summary tables and extensive Appendices provide supporting information.