



Feasibility of Using Video Image Detectors for Ramp Signal Operations and Performance Monitoring

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Current Situation

I-95 in South Florida serves hundreds of thousands of drivers on a daily basis. A number of traffic management strategies have been employed to reduce congestion on the most heavily used portions of I-95, including ramp signaling, which helps to promote an overall smoother flow on the freeway. Currently, a combination of inductive loops and other sensors are used for vehicle detection for the ramp signals. However, these detectors do not collect traffic measures such as queue length and wait time, which are important for monitoring ramp signal operations and determining their overall performance.

Research Objectives

Florida International University researchers identified and tested candidate video monitoring systems to determine which of the systems could be used to replace existing vehicle detection systems for both ramp signal operations and performance monitoring.

They also developed a detector data visualization tool for performance monitoring.

Project Activities

The researchers selected three existing video detection systems for field evaluation at an actual ramp signal location. Twenty-two metered ramps were available for field testing the video detection systems. After examination of the ramps, one ramp was selected for the tests. The manufacturers of the video detection systems installed their units at the ramp for testing on separate days. After evaluation of the collected data, one system was selected as the most viable. It provided the most complete and accurate data, which included vehicle counts, vehicle occupancies, and average and maximum vehicle queue lengths.

The selected video system was further evaluated for its ease of integration with the SunGuide software and its deployment and maintenance requirements and costs. A pilot test was subsequently conducted separately from this project by the Florida Department of Transportation (FDOT) to ensure that the video system could be integrated with the SunGuide system and could replace the current ramp signal loop detectors for ramp signal operations. The pilot test provided positive results.

The researchers also developed a Web-based system for visualizing SunGuide detector data for the purpose of performance monitoring and analysis. The system is able to dynamically aggregate and display detector data on a chart. The system can also display the nearby traffic incidents that occurred within the selected time periods and days. As the detector data structures in the SunGuide database are standardized across all detectors throughout the state, the system is applicable to all detectors in all FDOT districts.

Project Benefits

Improved ramp monitoring operations will allow more strategic use of ramp signaling across the state, resulting in improved safety and efficiency of freeways.

For more information, please see www.fdot.gov/research/.



Ramp metering improves traffic flow on highways at peak hours.