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## Performance Monitoring of Traffic Critical Work Zones in Iowa

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### Abstract

The Iowa DOT has made it a priority to address mobility and safety in traffic critical work zones across the state through deploying traffic sensors, message boards, mitigation strategies, and measuring traffic performance. Through the traffic critical program (TCP) the Iowa DOT identifies key construction projects across the state and monitors the impact the work zone has on traffic through IWZ deployments. The DOT intends to reduce or eliminate any potential safety or mobility concerns using various mitigation methods.

To monitor the work zones, the Iowa DOT has partnered with the Center for Transportation Research and Education (CTRE) to develop visualization tools which track the traffic performance at all times to support daily and longer term decision making. Accommodating the large amount of traffic sensor data and conducting the data analytics in a timely manner required integration and use of several big-data techniques including Hadoop distributed file system (HDFS) and a MapReduce framework. Once processed, the data can be visualized in a web-based interface which allows for easy and concurrent access statewide. Tableau workbooks are used to visualize the traffic characteristics and work zone performance measures.

The web interfaces allows the DOT to select any TCP work zone in the state and see the weekly and daily performance. Seven key performance measures are monitored including traffic volume, delay, queue length and the number of events (speeds less than 45 mph). Other performance modules are available including the speed heatmap which can be used to get speeds in 5 minute increments through the entire work zone as well as the corresponding camera images. Hovering over the heatmap will display the average speed and will highlight the selected sensor on the map to the left. The nearest camera image for the time period and sensor will also update along the left to provide an image of the roadway conditions. The camera images have proven to be a valuable resource to district engineers and others as a way to determine what construction activities may be impacting the traffic operations. Additional performance measure tabs include daily performance measures, sensor performance and hourly volumes. These additional performance tabs also provide greater detail to assist in decision support. This big-data-driven traffic surveillance system provides the Iowa DOT a tool to understand the sensor working conditions, data stream quality, to show the work zone impacts, and to understand and support effective corrections necessary to improve work zone mobility and safety.

**Keywords: Intelligent Work Zone, Performance Measures, Mobility, Visualization, Big Data**

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