

North Carolina Department of Transportation

PROJECT INFORMATION

High Value Project Title	Planning-Level Extensions to NCDOT Freeway Analysis Tools
Project ID	2015-09; FHWA/NC/2015-09
Project Cost	\$94,555
Duration	12 months

SUBMITTER

Submitter Agency	North Carolina Department of Transportation
Submitter Contact	Ernest Morrison, P.E.; Research Staff Engineer, NCDOT Research and Development 1549 MSC, Raleigh, NC 27699-1549 919 508 1874 eemorrison@ncdot.gov

RESEARCH PROGRAM

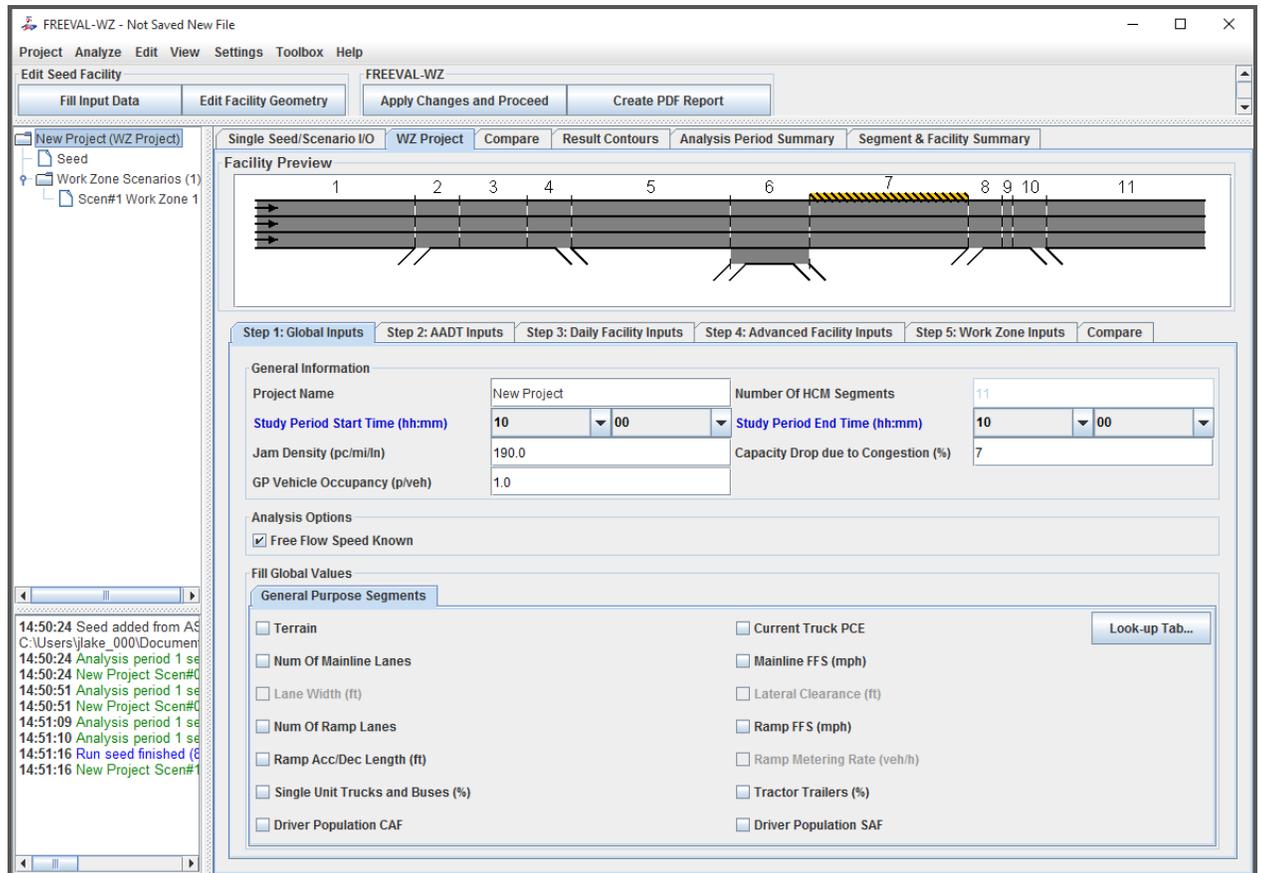
Sponsoring Agency	North Carolina Department of Transportation
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RESEARCH AND RESULTS

Brief Summary of the Research Project	<p>Background:</p> <p>Conducting a full operational analysis of freeway facilities is a challenging undertaking, as most available methods either lack the necessary detail for specific geometry and demand patterns, or are very data and cost-intensive to implement. For the past few years, NCDOT has been using a customized software application for conducting in-house analyses of freeway facilities, with a special emphasis on work zones. The analysis methodology and associated software tool, FREEVAL-WZ, were deliverables from a prior NCDOT research effort (2010-08). The methodology is founded on the analytical method for evaluating freeway facilities in the most recent Highway Capacity Manual, but has been enhanced to incorporate work-zone analysis details, as well as some state-specific defaults for its application in North Carolina.</p> <p>The particular focus of this project is on implementing a series of planning-level analysis extensions to the methodology. Planning-level freeway (work zone) analyses are oftentimes performed in a "data poor" analysis context, where the available data is limited to basic freeway geometry characteristics and daily traffic demand patterns. Detailed peak-hour volume estimates are oftentimes not available at the early stages in a project. Further, in a planning-level application for work zones, a key decision of interest is when to close lanes and for how long, which ultimately calls for a full-day analysis context. Finally, customized output reports are needed to present key performance metrics in a standardized and readily usable format.</p> <p>Specific Research Objective:</p> <p>The objectives of this project was to :</p> <ol style="list-style-type: none">1. Develop traffic volume distributions by freeway facility type and time of day for North Carolina freeways;2. Enhance the FREEVAL-WZ tool through additional planning-level enhancements, including customized output features such as PDF reports; and3. Improve the user-friendliness, reliability and computational performance of the FREEVAL-WZ tool.
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What research work was done?

The research team collected and investigated the hourly volume data from permanent and temporary traffic count stations across North Carolina. By investigating the traffic volumes, the research team has developed a set of default hourly traffic distributions that can be used to analyze freeway facilities based on HCM context with only AADT. Also, the research team has used new work zone analysis methodology based on NCHRP 03-107 in the FREEVAL-WZ tool.



Impact, or Potential Impact, of Implementing Research Results

The research product (FREEVAL-WZ) will provide NCDOT with a comprehensive planning level work zone analysis tool for freeway facilities. The customized reports and enhanced Graphical User Interface (GUI) of the FREEVAL-WZ will enable NCDOT to conduct work zone analysis quicker and with more accuracy. It will be much easier to run multiple scenarios in a shorter amount of time to find an optimal solution to workzone traffic control.

Benefits of Research Results

All findings of the project are incorporated into FREEVAL-WZ tool. The FREEVAL-WZ tool and associated manual will aid NCDOT in maximizing the use and value of the tool. The tool shows promising in helping to understand and minimize user delay during large construction projects on existing facilities. North Carolina has many highways with greater than 100,000 AADT and reductions in travel times of even minutes per driver per day in large urban areas can add up to millions of dollars saved annually in user delay cost.

Web Links (if available)

<https://connect.ncdot.gov/projects/planning/Pages/ProjDetails.aspx?ProjectID=2015-09>