



## Research Summary

# Calculating Road User Cost for Specific Sections of Highway for Use in Alternative Contracting Project



### **WHAT WAS THE RESEARCH NEED?**

Roadway construction projects often require a partial or full closure of the roadway. Partial closure of the road may result in a long queue while full closure will force road users to take longer detour routes to get to their destinations. If such impacts were likely to be significant, the Tennessee Department of Transportation (TDOT) required a way to quantify the impact of the road closures while making project-management decisions. The Federal Highway Administration encourages state Departments of Transportation (DOTs) to develop and implement policies and procedures to quantify the impact of construction on road users. TDOT lacked a consistent methodology and a robust tool to compute Road User Costs (RUCs) and has heavily relied on consulting service providers. A methodology and a tool to compute the RUC will enable TDOT to compute RUCs in-house quickly and consistently.

### **Project Number:**

RES 2020-21

### **TDOT Lead Staff:**

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### **Principal Investigator(s):**

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### **Project Term:**

November 2019 to August  
2021

### **WHAT WERE THE RESEARCH OBJECTIVES?**

The main goal of the study was to develop a TDOT-specific framework and accompanying tool to compute the RUC that balances the accuracy of the result and the effort required to compute it. The specific objectives of the study were:

- review existing methodologies to compute the RUC,
- conduct a nationwide survey to identify the best practices of calculating and utilizing the RUC,
- develop a framework to compute the RUC, and
- develop a tool to implement the framework.

## **WHAT WAS THE RESEARCH APPROACH?**

The study reviewed relevant manuals, spreadsheets, and desktop- or web-based tools developed and used by various states such as Colorado, Michigan, Ohio, Oregon, and Texas. Based on the findings of the literature review, a nationwide survey was conducted to identify the best practices of calculating and utilizing RUCs. Based on the findings of the literature review and the nationwide survey, a theoretical framework was developed to compute the RUC. Subsequently, a spreadsheet-based tool was developed to implement this framework.

## **WHAT WERE THE FINDINGS?**

The major findings of the study were:

- **Current Practices:** Most of the state DOTs have developed their state-specific methodologies. Over 80% of the state DOTs are utilizing spreadsheet-based tools and the majority of the respondents prefer a spreadsheet-based tool over a web-based or desktop-based tool. A web-based tool is the second most preferred tool type that is preferred by 35% of the states.
- **Major Components of the RUC:** The major components of RUCs are a) delay cost, b) vehicle operating cost, c) crash cost, d) emission cost, and e) local impact cost. The delay cost and vehicle operating cost are the two most widely used components in RUC calculation.

## **IMPLEMENTATION AT TDOT**

The key recommendations of the study include:

- TDOT should implement and start to utilize the TDOT RUC Calculation Tool to compute RUCs for various purposes including A+B bidding, lane rental cost determination, liquidated damage determination, and early completion incentives calculation. TDOT should identify and document various internal sources of project-specific data, such as crash history, that are required to use the tool.
- The RUC calculation requires users to collect various standard external datasets such as median household income and wage rate. Such data changes over time because of the factors such as inflation. While the methodology automatically accounts for the effect of inflation using an inflation factor, such data should be updated regularly to ensure higher accuracy of the results. Similarly, other data such as Crash Modification Factors (CMFs) should be updated if newer values are available. Finally, future studies should focus on developing a methodology to quantify the local impact factor with limited and easily accessible data.

## **MORE INFORMATION**

Find the final report here: [https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2020-final-reports/RES2020-21\\_Final\\_Report\\_Approved.pdf](https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2020-final-reports/RES2020-21_Final_Report_Approved.pdf).