

PROJECT SUMMARY REPORT

0-7174: Develop an Interactive Statewide Production Rate Estimation Tool for Reliable Contract Time Determination

Background

Accurate production rate information of major construction work items is essential for determining contract time, evaluating contractors' baseline schedules, and monitoring construction progress throughout highway project delivery. The Texas Department of Transportation (TxDOT) manages one of the largest state highway systems in the United States and maintains extensive historical construction information through its project management systems. These historical data provide valuable opportunities to develop more reliable and data-driven production rate estimation processes.

The objective of this project was to improve the reliability and practical usability of production rate estimation by providing recommendations for updating the TxDOT Construction Production Rates Table and developing an interactive web-based production rate estimation and visualization tool.

What the Researchers Did

The research team established a statewide historical production rate database using Daily Work Report (DWR) data from 6,538 completed highway construction projects from 2014 to 2026. Using this database, researchers comprehensively reviewed the current TxDOT Construction Production Rates Table to evaluate major work items and their production rate

ranges. Statewide surveys and follow-up interviews with experienced TxDOT engineers were conducted to identify practical factors that should be considered when estimating production rates for individual construction work items.

The project developed an interactive web-based production rate estimation and visualization tool, namely InProVE, which integrates historical production rate data and location-specific factors, and creates an interactive map in a single platform. The web-based tool uses a customized spatial interpolation approach, advanced inverse distance weighting, specifically designed for interpolating production rate data for more reliable estimation.

What They Found

The study developed an expanded and updated version of the current TxDOT Construction Production Rates Table. Twelve additional major construction work items were identified and recommended for inclusion in the table.

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Project Completed:
8-31-2026

New columns were added to consider influential factors when adjusting production rates. These factors include location, weather and seasonal variations, soil type, overtime and traffic flow, project type, project size, quantity of work, and hauling distance. In addition, the current low, medium, and high production rate ranges were objectively reviewed and updated using statewide DWR data.

The study developed InProVE, an interactive web-based production rate estimation and visualization tool. Using the tool, engineers can explore historical production rate information through statewide color-based maps and obtain location-specific production rate estimates for highway projects across Texas. The tool allows users to filter historical project data by selected conditions, including work items, quantity of work, and contract amount to examine production rate distributions and spatial patterns under those conditions. To support location-specific estimation and statewide mapping, InProVE incorporates an advanced inverse distance weighting approach, which accounts for district classification and traffic volume to better reflect geographic variations of production rates.

What This Means

This project provides TxDOT with two implementation resources for improving production rate estimation practices. The expanded and updated TxDOT Construction Production Rates Table provides more comprehensive and objective production rate information by integrating statewide historical construction data with practitioner knowledge. The updated table also provides practical guidance on the key factors that should be considered when adjusting production rates.

InProVE complements the updated production rates table by enabling engineers to estimate location-specific production rates and interactively visualize statewide historical production rate data through a web-based platform. The intuitive map-based interface is particularly beneficial for less-experienced engineers, enabling them to more easily interpret historical production rate information and geographic production rate patterns than conventional tabular references. Together, these research products support more objective, consistent, and data-driven decisions for contract time determination, baseline schedule evaluation, and construction progress monitoring.

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www.txdot.gov
Keyword: Research

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