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Preconstruction Support Cost Hours Estimating on Caltrans Pavement Rehabilitation Projects

Project 2148
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Introduction

The California Department of Transportation (Caltrans) budgets approximately $600 million per year for preconstruction work on the State Highway Operation and Protection Program. In the 2020–2021 Fiscal Year, $169 million of this money was spent on preconstruction work on pavement rehabilitation projects. Caltrans and the California Transportation Commission (CTC) are required to manage this money wisely, both as a matter of law and as a fiduciary duty. This research provides Caltrans and the CTC with tools, based on some of the currently recognized best practices in cost estimating, to assist in evaluating the cost estimates on their pavement rehabilitation projects. Further research could expand this research to a wider array of projects.

Study Methods

The study followed a four-step process, namely, (1) a literature review, (2) data collection, (3) data analysis, and (4) model development. In the literature review, the case was developed for using two types of models for estimating preconstruction hours, namely an Artificial Neural Network (ANN) and a Parametric Model. Data for 139 pavement rehabilitation projects was obtained from Caltrans and a data set was developed that combined the preconstruction hours for each project with the primary bid items for the projects. The two models were developed, and they succeeded in explaining 85% and 80%, respectively, of the variation in the preconstruction hours. The report then concluded with suggestions for further research.

Findings

As noted in the Study Methods, the models explain 85% and 80% of the variation in the preconstruction hours. The ANN has a slightly higher coefficient of determination than the Parametric Model. This is consistent with prior findings on similar research

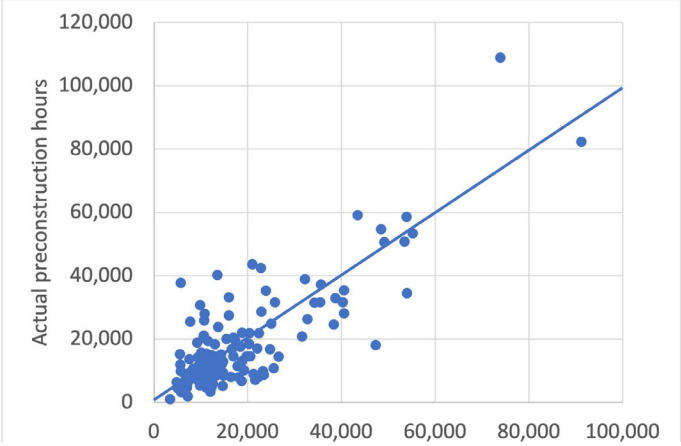
projects. The Parametric Model, however, is easier to understand and requires only the basic spreadsheet software, which is available on most computers today. The ANN, by contrast, requires special software.

The figure below compares the actual preconstruction hours on the projects in the parametric version of this study to the hours predicted using the multiple regression analysis.

Policy/Practice Recommendations

The models as developed can be used to evaluate the preconstruction cost estimates on SHOPP pavement rehabilitation projects. The authors advise that they be considered as portfolios in the manner discussed in Section 6.1.4.

Comparison of Actual to Predicted Preconstruction Hours



About the Authors

This project brings together a team of faculty members from the California State Universities who have special expertise in the estimating of project costs at the early conceptual stage of work. Caltrans refers to this stage as the Project Initiation Document, or Project Study Report, Phase. Nigel Blampied teaches at San José State University, while Tariq Shehab and Elhami Nasr are professors at California State University, Long Beach. Laxmi Sindhu Samudrala recently received her master's degree from San José State University.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2148

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