



South Carolina
Department of Transportation



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SUMMARY REPORT

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South Carolina
Department of Transportation
955 Park Street
PO Box 191
Columbia SC 29202

Development of a Process To Forecast Construction Staffing Levels

STATEMENT OF THE PROBLEM AND SCOPE OF REPORT

The South Carolina Department of Transportation (SCDOT) will significantly increase its construction program in the next five years. This program increase will require the SCDOT to maximize the efficiency by which SCDOT field engineering and inspection personnel are allocated to the various projects.

A research project was conducted for SCDOT to determine a process to forecast and optimize the allocation of personnel to construction projects. This study included the collection of historical manpower expenditure data by employee classification, project type and cost, and project location by district. Two Microsoft ACCESS database files were created, one of which contained data for over 130 projects, and a second data file that contained approximately 11,000 employee records. After creating the database files, a series of regression analysis exercises were performed to predict required staffing levels given an anticipated project type and cost.

The research also investigated linking the output of the regression analysis to commercially available CPM scheduling software. The report describes the use of Primavera Project Planner (P3) to accomplish resource leveling. Resource leveling permits the rescheduling of project start times to smooth the "peaks and valleys" in the demand for various employee classifications. An example of using Primavera Project Planner to accomplish resources leveling using regression analysis output is included in the report. The report also includes six appendices that contain forms used to enter data into the ACCESS database, sample DOT district survey forms, project cost data, regression analysis plots, and other data.

SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

It was determined that there is an exponential relationship between project cost and employee

labor hours required to execute a project of a given type. The relationship improves when data outliers are deleted. The regression analysis tool developed as part of the research will permit SCDOT to plan labor resource allocations for future projects. The allocations can be optimized using Primavera Project Planner.

It was originally anticipated that SCDOT could compare their labor resource allocations to those of other states. However, the states that were contacted and asked to share data did not have the data readily available. If SCDOT could secure this data from other states, comparisons could be made. Likewise, other states could use the SCDOT plots for comparisons.

It is recommended that SCDOT continue to expand the two databases (11,000 employee labor records, 130 projects) developed as part of the research and generate updated regression equations that include the additional data. It is also recommended that selected SCDOT personnel be given formal training in the use of Primavera Project Planner.