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TECHNICAL SUMMARY

EVALUATION OF CONTRACT TIME ESTIMATION AND CONTRACTING PROCEDURES

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INTRODUCTION

Contracting practices and procedures used by DOTD are intended to give the citizens of the state a high quality transportation system at a reasonable cost. Accurate and objective contract time estimation minimizes the total cost of a constructed project. Minimizing construction contract time generally minimizes construction costs. However, contract duration that is too short may increase the total cost of construction and decrease the quality of the final product. Existing procedures for estimating contract duration rely heavily on the estimator's knowledge and construction experience. This study develops a systematic computer-based approach to contract time estimation.

Innovative contracting practices are designed to improve the quality of construction and to minimize costs and delays associated with construction disputes. Nearly all construction done for the public must be done under public bid laws that generally require the contract to be awarded to the lowest responsible bidder. Awarding contracts under these laws has not eliminated problems and often creates problems. This study is DOTD's initial research of ways to improve the contracting process.

OBJECTIVE AND SCOPE

The objective of this research was (1) to provide the DOTD with a systematic approach to the determination of contract duration, and (2) to explore innovative contracting procedures that may prove beneficial in DOTD projects.

The scope included four principal tasks. These tasks included a review of the literature and survey of current practice in contract time determination and innovative contracting procedures; a review of current DOTD practice and procedures in these two areas; a review of available innovative contracting options; and development and implementation of a computer-assisted method for contract time determination.

RESEARCH APPROACH

The project was separated into two sub-projects which could proceed in parallel. Sub-project A concentrated on improving the contract time determination process, while sub-project B evaluated innovative contracting procedures.

Contract Time Determination

The researchers began by reviewing relevant FHWA requirements for contract time determination as well as published procedures used by other state DOTs. Personal interviews with the contracts engineers and technicians in the DOTD Contracts and Specifications Section were also conducted to gain a clear understanding of the procedures currently used to determine contract time. Several methods for contract time determination were evaluated. The method most consistent with the current practice of DOTD was the Quantity-Production Rate (QPR) method.

The previous method used by DOTD required considerable construction experience and judgment and was based on production rates that had not been well verified. To remove these limitations, a template-based scheme was developed. DOTD project and construction engineers attended a workshop where their collective expertise led to the development of twenty-three construction project templates representing most of the recurring types of construction projects undertaken by the department. Each template includes a list of typical work items and a typical construction sequence that includes work item phasing and overlap. Once the templates were finalized, a thorough review was undertaken of the daily field reports for approximately one hundred DOTD construction projects completed in the past three years. From

these daily reports, actual production rates for work items in each template were developed.

Innovative Contracting Procedures

Several innovative contracting procedures were identified through a review of the literature. Personal interviews were held with several DOTD engineers and attorneys to determine which procedures should be included in subsequent surveys and studies.

Following the staff interviews, four questionnaires were prepared and mailed to different target groups of professionals. The responses were collected, summarized, and analyzed using non-parametric statistical tests.

CONCLUSIONS

Contract Time Determination

A template-based Contract Time Determination System (CTDS) was developed using the templates designed by DOTD engineers and production rates gathered from analysis of completed construction projects. The system was implemented using Lotus 1-2-3, Release 5 for Windows. Contract times for four completed construction projects were analyzed using CTDS and compared to the contract time prepared using the manual method and to the actual construction time. In each case, the contract time calculated by CTDS was less than the manual estimate and the actual duration.

Innovative Contracting Procedures

Response to the four postal surveys was excellent. Several survey items yielded results statistically significant at the 95% confidence level. Among the significant findings are the following:

- Owners were very satisfied with several innovative contracting concepts.
- Innovative contracting concepts are perceived to have a positive effect on design quality.
- Some of the concepts also improved owner-contractor and engineer-contractor cooperation.

Other findings suggest that while Louisiana engineers and contractors are familiar with many innovative contracting concepts, most felt that steps need to be taken to improve communication among the parties in construction projects and to improve the way disputes are handled.

Based on the survey results, the project report includes proposed implementation methodologies for some of the more promising innovative contracting procedures. A discussion of the statutory considerations is also included.

RECOMMENDATIONS

Contract Time Determination

Early user experiences with the CTDS during system testing were positive. The contract times being calculated were reasonable and the system required little personnel training. To assure the continued usefulness of the system, DOTD should continue to gather and update work item production rates for items often reported in daily diaries as lump sum items. Changing from a working day basis to a calendar day basis would further enhance the reliability of contract time calculations.

Innovative Contracting Procedures

Based on the results of the surveys and statutory analysis, the following innovative contracting procedures are recommended for adoption by DOTD on an experimental basis:

- Design/Build
- Privatization
- Contractor Prequalification
- Time Incentives/Disincentives
- Quality Incentives/Disincentives
- Dispute Review Board
- Cash Allowances

Expanding the use of the following procedures is also recommended: Guarantee/Warranty, Partnering, and Value Engineering.

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