INDOT Research

TECHNICAL *Summary*

Technology Transfer and Project Implementation Information

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An Analysis of Cost Overruns and Time Delays of INDOT Projects

Introduction

A commonality among state Departments of Transportation is the inability to complete projects on time and within budget. This is a chronic problem for the Indiana Department of Transportation (INDOT) as well. Time delays, cost overruns and change orders are generally due to factors such as design errors, unexpected site conditions, increases in project scope, weather conditions, and other project changes. In 2001, INDOT incurred approximately $17,028,000 in cost overruns, representing approximately 9% of the total amount for all contracts in 2001. As the construction program grows this is causing planning and budgeting problems within INDOT, For example, with a current annual construction program of $700 million at this percentage, this is costing INDOT in excess of $60 million. The money has to be set-aside and creates scheduling problems for determining what projects cannot be let. For these and other reasons, INDOT requested a study to analyze the extent of the cost overrun and time delay problem and to make appropriate recommendations.

Findings

The results of the agency survey showed that with regard to the problem of cost overruns, INDOT has an average rank compared to other states. The overall rate for cost overrun amounts for INDOT projects between 1996 and 2001 was 4.5%. It was found that 55% of all INDOT contracts experienced cost overruns. Also, 12% of all INDOT contracts experience time delays, and the average delay per contract was 115 days. The study also determined average cost overrun amount and arte and time delay for each type of contract. From the various statistical analyses, it was determined that factors influential to cost overruns, time delays, and change orders are contract bid amount, difference between the winning bid and second bid, difference between the winning bid and the engineer's estimate, project type and location by district. The study also found that the dominant category of reasons for change orders is "errors and omissions", a finding which is suggestive of possible shortcomings in current design practices. The study found that in the past, change orders were typically not recorded until the end of the contract.

For addressing the problem of change orders, the following recommendations are proposed: a Change Order Management process should be developed and implemented. This will consist of: (i) developing a mindset geared towards monitoring and addressing the problem of change orders, in the department, (ii) developing procedures and instructions for recording change order information in the existing contract management tool (*SiteManager*), (iii) developing a system of controls that routes change order information to the appropriate personnel in Operations Support and Design Divisions. With implementation of these recommendations, it would be possible for *SiteManager* to record and monitor change order information as it develops. The incidence of so many "no-recorded-reason" change orders is suggestive of lapses in the identification and recording of appropriate reasons for some change orders. Bidding documents for most projects (with the exception

resurfacing projects) are typically prepared by consultants. A system of instructions and more definitive definitions can help assign appropriate reasons for all change orders and improve documentation. Therefore, a standard report for each consultant and for each contract could be prepared to identify preventive change orders and how such situations may be avoided in future. Moreover, "real time" recording of change orders would likely accelerate the process of feedback to designers and field personnel. If data about change orders is collected on a daily basis, it is possible to create a "weekly change order report" and route it to the appropriate personnel.

INDOT personnel should be given ample opportunity to carry out a detailed review of change orders reports and their consequences. Also, such personnel should be encouraged to continually improve their methods. Obviously, implementing additional requirements will be a challenge, given the current staffing levels and work loads at INDOT. However it is expected that an electronic routing system that collects and distributes change order information would lessen this burden.

It is recommended that INDOT should design an annual report that reviews the performance of consultants. Such a report would assign "grades" to each consultant, taking into account the frequency and dollar amount of preventable change orders that are attributable to the consultant. If grades are to be assigned in such manner, INDOT's change order classification may be adapted to this new objective in order to better distinguish the responsibilities of each change order type. Finally, INDOT's current change order classification code can be improved such that an appropriate change order code can be assigned to any situation.

Implementation

In evaluating the problem of cost overruns, time delays, and change orders at INDOT, this research effort is consistent with INDOT's strategic objectives for resource management which include reduction in INDOT overhead costs and increase in the efficiency of the capital program expenditures. The present study provided some initial answers to address problems in the present system. Using the results herein as a starting point, it is possible to carry out future work such as the implementation of a methodology to enhance contract management at INDOT. Another activity is to develop an evaluation procedure to efficiently manage the collection, analysis, and presentation of information on change orders, cost overruns, and time delays. At the present time, there are indications that INDOT is mulling the establishment a new online system that would directly record change orders from the construction site. The next step would be to enhance the organization of an accompanying database to facilitate monitoring and analysis of change order information and preparation of periodic consultant performance reports.

Implementation assistance will be available from Purdue University by contacting the JTRP office or Dr. Bob McCullouch (bgm@ecn.purdue.edu, 765-494-0643).

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