

Graduate Student Research Abstract – Construction Practice (Non-Pedagogical Content)

Change Order Analysis of Public Sector Multi Prime Design-Bid-Build Projects

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In delivering construction projects, many different project delivery methods exist today, including design-bid-build, design-build, construction management at risk, and integrated project delivery to name a few. Even with the industry changing over the past 40 years towards utilization of more collaborative delivery systems, design-bid-build (DBB) is still the most prevalently used today, especially in the public sector. Change orders are used to modify or enhance the original scope of work agreed upon by the owner and contractor at the start of a project. Change orders are seen as a necessary evil in construction, and carry a negative stigma as they can often times lead to adversarial relationships between project stakeholders. Project budgets typically include an owner controlled contingency to cover change orders, which is often times allocated based on a fixed percentage of project cost as opposed to allocation through a detailed analysis of potential risks. The focus of this research was to study a set of projects completed by one public owner using multi-prime DBB, specifically the change orders attached to those projects. Studying the scope, prevalence and reasoning behind change orders can help determine the effectiveness of this delivery system in defining project scope prior to the start of construction, and the appropriateness of fixed percentage contingencies. A public university the Midwestern United States was chosen for this study. Prior to 2011, contracting laws in the state where this University is located only allowed for the use of multi-prime design-bid-build delivery on all projects exceeding \$50,000. Full access was given to the University's project records, and it was determined that between the years of 2000 and 2011, 215 multi-prime DBB projects were completed with total project budgets of approximately \$276.5 million. 543 separate prime contracts were executed on these projects, totaling close to \$196 million. Prime contracts were broken into 4 separate categories: general contracting, mechanical, electrical, and environmental, with general contracting being the most prevalent on both a cost and count basis. On these projects, just over \$21 million in change orders were executed, which equates to just under 11% of the dollar amount of issued construction contracts. This analysis showed that change orders were heavily used on these projects, actually exceeding the standard 10% contingency used by the University. The change orders were also categorized by reason codes listed by the University, which included: error/omission, owner request, value engineering, differing condition, field resolution, and other. This analysis showed that the majority of change orders, roughly 55%, were under the owner request reason code. This illustrates that a majority of projects were not sufficiently defined at the start of construction, and change orders were necessary to bring the projects in line with the Owner's actual desires or needs. Trend analysis was also performed, but due to large variances over the 12-year period no clear trends were identified. This research shows that the multi-prime DBB delivery method was not adequate in providing this public owner with projects that were properly defined at the start of construction, necessitating heavy usage of costly change orders. These results will add weight to other research findings that more collaborative project delivery methods should be sought in the public arena, and that detailed analysis of potential project risks should be performed to more accurately appropriate project contingencies.

Key Words: Change orders, Public, Design-Bid-Build