

## Quantitative Analysis on Project Change

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### Introduction

The Ibbs Consulting Group has just concluded the largest study of construction project change, with the results to be summarized in a series of essays that will be published on our website. We conducted this study to better understand project change and its consequences. The study also investigates the impact of critical project factors on change.

These findings can help construction professionals benchmark their project against a large set of peer projects and thus improve their decision-making and project effectiveness. These essays are based on analysis of more than 2000 construction projects.

In this study design change % was defined as the ratio of design cost change and original design adjusted for change orders. Construction change % is the ratio of construction cost change and the adjusted construction budget, and total project change % is the ratio of total project cost change and the overall adjusted project budget.

### Essay #1: How Much Change Do Projects Typically Encounter?

How much change do projects typically encounter? Though a very basic question, there was not a good reliable answer to that question till now. With a detailed study of a large set of projects, we have been able to provide an answer to that question.

Namely, the

- design projects suffer 25.7% change on average,
- construction project 7.0%, and
- amount of change for the combined design and construction phases was 8.5%.

Design incurs more change (25.7%) than construction (7%) partly because construction phase often has a larger baseline budget.

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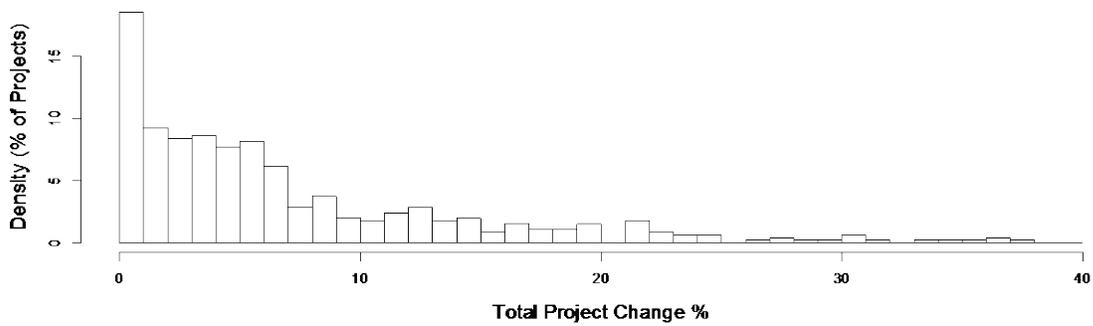
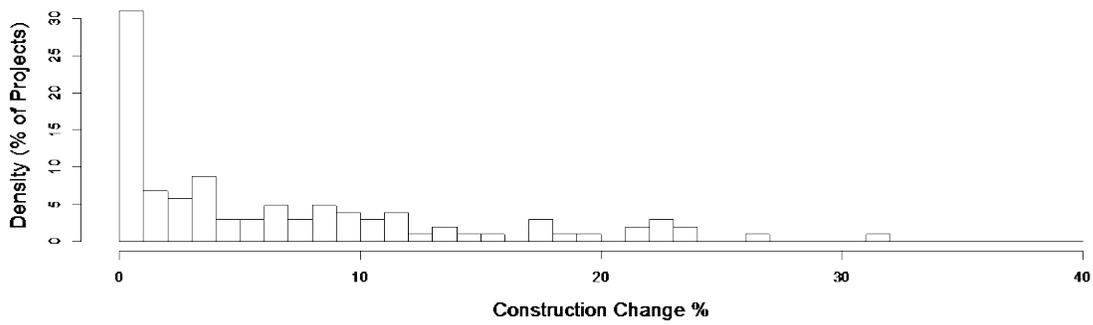
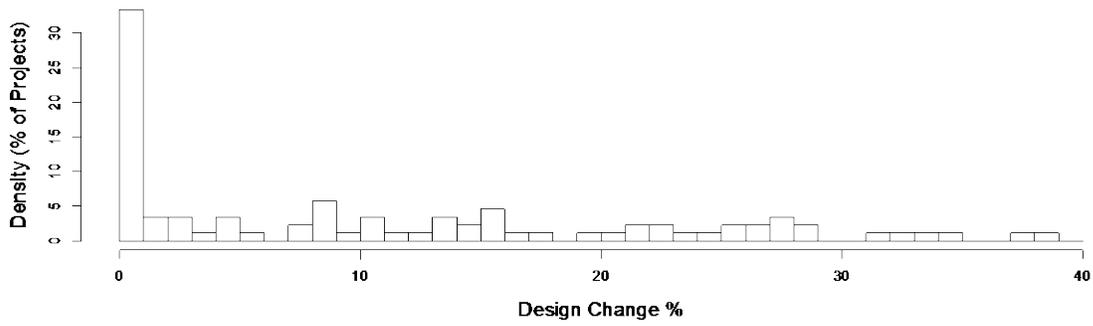
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Median values, which are the point at which 50% of the projects fall below a value and 50% range above that point, are generally lower than averages because the statistical distribution of change is a skewed distribution.

This can be seen by the frequency distributions of Figure 1-1. For instance, about 30% of all construction projects finish with 1% or less change whereas a relatively few number of projects have more than 10% change.

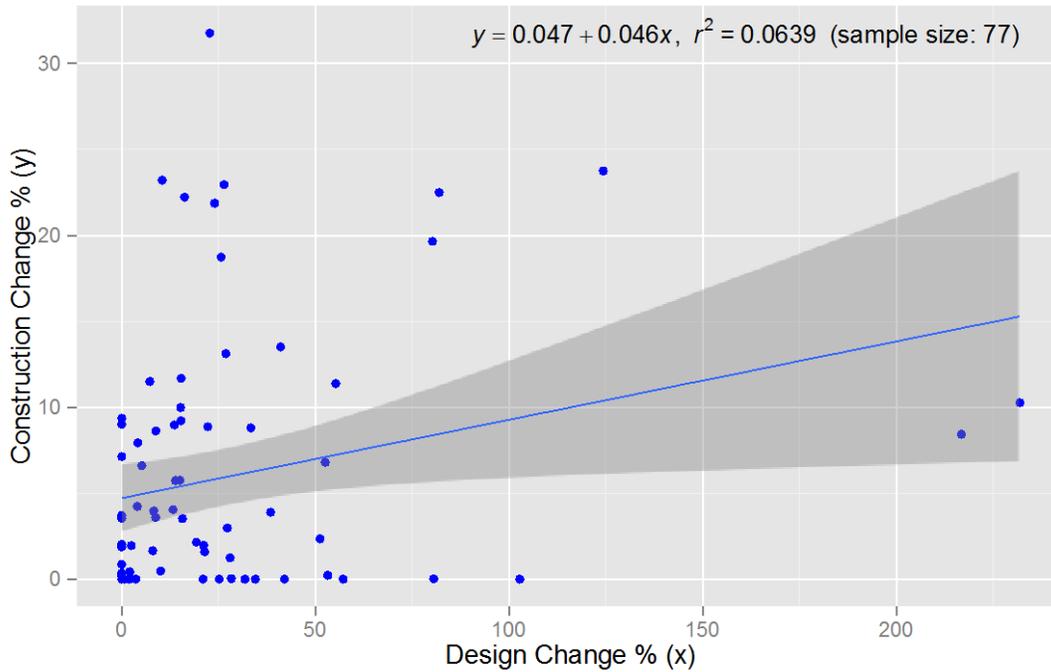
|                           | <b>Design change<br/>%</b> | <b>Construction<br/>change %</b> | <b>Total project<br/>change %</b> |
|---------------------------|----------------------------|----------------------------------|-----------------------------------|
| <b>Average</b>            | 25.7%                      | 7%                               | 8.5%                              |
| <b>Median</b>             | 12.7%                      | 3.9%                             | 4.8%                              |
| <b>Standard deviation</b> | 41%                        | 8.1%                             | 13.8%                             |

**Table 1-1 Summary statistics of change metrics**



**Figure 1-1 Histograms of change metrics**

We also determined that there is a positive correlation between the amount of change in a project's design phase and the amount in its construction phase. This is seen in Figure 1-2.



**Figure 1-2 Design change and construction change**

As any reader of this essay and website know, project change is common in construction industry and often leads to cost increases and schedule delays. But opinions varied widely and generally without much factual foundation. This study of a large number of projects provides insight into this question and thus what might happen to your project. That insight may be transformed into a contingency.

Subsequent essays in this series will provide more information that help managers plan and control their projects.