

EXECUTIVE SUMMARY

Change on construction projects is inevitable and often the effects of change are disputed amongst owners and contractors. Change orders, the contractual method of issuing a change to a construction contract, are legal and present on every job. The complete effects that change orders have on a project are noticed by the contractor but are difficult to quantify. This difficulty lies in the fact that the total and complete costs of a change are not only the direct costs of the extra material and equipment hours that are needed to carry out the change but also the effect that the change has on the flow of work (its effect on labor) and the “ripple effect” that change orders cause through the project. This ripple effect has been defined as the cumulative impact of change orders and its sources impact on both the changed and unchanged work. Some sources of change order cumulative impact are dilution of supervision, out of sequence work, rework, schedule acceleration, etc.

Each of the above examples of cumulative impact will have an effect on labor and its productivity. It is this productivity loss that is difficult to quantify and prove. Contractors often seek legal claims for their loss but fail to convince the court because of the lack of hard data. The lack of a method by which to prove a loss of productivity as a result of change orders has spawned several researches, most notably the Leonard Study (1991) and the CII-Hanna Study (2000). The past research on the impact of change orders has primarily focused on general construction and the labor-intensive trades of electrical and

mechanical construction. The current research focuses on the impact of change orders on labor productivity for a different and unique section of the construction industry: sheet metal.

The New Horizons Foundation undertook the issue of cumulative impact by forming a research team to investigate and develop a model that can estimate the productivity loss on a project impacted by change orders. The research resulted in the formulation of a regression model that can be applied to projects to generate a percentage loss of productivity due to changes. The components of the model include percent change, the type of work, project extensions, the coordination of the drawings, and the amount of owner furnished equipment. In addition to the regression model for determining lost productivity, the research also created project control tools and industry benchmarks that sheet metal contractors can use to minimize the impact of changes and help improve any project’s productivity. A summary of the research follows, including recommendations for contractors, owners, and architects/engineers based on statistical findings that will increase the likelihood of project success.