GRANGER
ADVANCE THE ART OF BUILDING

Implementation of Lean Construction Principles

Lean Construction – Better, faster delivery at a lower cost

Lean Construction is a production-based project delivery system that emphasizes the reliable flow of work through the construction process. The goal is to maximize value and eliminate waste caused by unpredictable work flow. Waste is defined in seven categories: defects, waiting for upstream activities or information, over-processing, over-producing, excess inventory, unnecessary movement of material and unnecessary movement of people.

Granger was one of the first in the Michigan market to apply these proven best practices from the manufacturing industry. Applied to construction, Lean enhances the way work is performed throughout the entire delivery process.

Some fundamental principles of Lean include:

- Define value from the customer's perspective
- Understand the value stream of all steps in the process used to create the end product
- Reduce waste
- Ensure a smooth flow of value added activities
- Prefabricate and modularize building systems
- Utilize collaborative pull scheduling to ensure a predictable pace and to eliminate re-work and waiting
- Seek continual improvement in all areas of the process

For Granger, Lean is an aggressive way to build facilities. Applied to our construction projects, it enhances the way our work is performed throughout the entire delivery process. Through Lean Construction, our team members, subcontractors and suppliers are held accountable for completion of all construction tasks, ensuring timely completion and quality work.

LEAN MEANS ADDING VALUE

Team building and collaboration have always been a part of Granger's culture. Lean Construction offers a method of project delivery that brings this philosophy to every member of the project team. From the owner to the design team on through to the trades-people, we focus on maximizing value and eliminating waste. Granger accomplishes this by empowering decision making and making and keeping commitments.

Project Superintendent Tom Owens (left) takes President/CEO Glenn Granger on a tour of a project site. Owens and his crew on site implemented the use of PlanGrid, an intuitive, sheet-based mobile construction app that keeps everyone building from the most current set of drawings.

Lean doesn't mean working with less. Rather, it is about planning, communication and execution. The goal is to deliver a project of the highest quality in a reduced amount of time. We look closely at each step of the design and building process to create continuous and reliable workflow. We strive to close the gap that is typically found at the handoff between tasks.

IT'S PROVEN

How do we really know this works? We measure it. Granger is passionate about measuring and reporting progress on schedule and cost during a project. We believe in a transparent system so every member of the team can see the real status of the job at any time.

Materials testing mockup. To save on cost and time, smaller mockups of the envelope of a building will be produced to test various flashing, insulation materials, window installations and other variables to ensure proper function. Any issues are then resolved on a smaller scale prior to installation on an entire building. This particular mockup was rigorously tested for flashing installation, brick adherence and appearance, vapor barrier effectiveness and window sealant quality.

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BENEFITS TO THE OWNER

- ✓ Reliable workflow means projects are completed faster. It means that new facilities can be turned over for use sooner without sacrificing quality.
- ✓ Reliable workflow means projects can be delivered at a lower cost. When subcontractors can count on being more productive, it is reflected in their bids, resulting in a lower project cost for the owner. This is especially beneficial where bid savings are passed on directly to the client.
- ✓ Reliable workflow means fewer change orders. When the project team simultaneously designs what is to be built with how it will be built, the result is a project of the highest level of constructability, resulting in fewer change orders, a shorter duration and lower bids.
- ✓ Lean means quality. In fact, one of the core principles of Lean is that defective work is not released into the work stream. If a problem occurs, it is fixed immediately. Granger will not let the problem compound. Also, materials are installed in sequence, resulting in shorter punch lists and a seamless project closeout.
- ✓ Lean Construction is a proven "best practice" from the manufacturing industry that Granger applies to our construction projects to deliver them better, faster and at a lower cost to our clients.

We would be delighted to have the opportunity to apply these proven methods to your upcoming project.

CASE STUDY: *University of Michigan Stephen M. Ross Athletic Campus Athletics South Competition and Performance (ASCP) Project*

The Granger project team working at the $110 million University of Michigan ASCP Project, future home for men's and women's track and field, cross country, lacrosse, soccer and women's rowing, is using Lean construction methods to improve operational efficiency and to reduce waste and re-work on the job. Some key tools they are utilizing in this process include:

- Building Information Modeling provides digital models to identify and resolve clashes and other issues prior to construction
- Offsite fabrication of certain building systems reduces material waste, increases site cleanliness and safety and provides a more controlled and predictable installation process
- Utilization of the Last Planner System™ to ensure a smooth and predictable hand-off between trade contractors
- Use of tablet-based technology to make information more readily available on site for faster and more informed decision making
- Lean construction training with field personnel to create a culture of continuous improvement

Pull Planning session conducted between the Construction Manager and Subcontractors to collaboratively develop a more Lean, efficient schedule.

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