

# Lean coaching and tools to maximize the potential of an IPD team

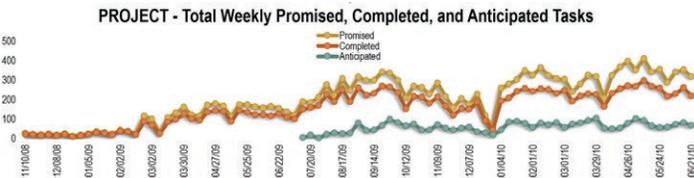
Realizing the dream of a lean team pulling towards one goal takes training and tried-and-tested tools

Sutter Health/CPMC developed the St. Luke's Replacement Hospital as a seismically compliant facility as part of their master plan for the City of San Francisco, California. Boulder Associates was teamed with SmithGroupJJR expressly to provide expertise in lean thinking and integrated design practices. With SmithGroupJJR as the architect of record and medical planner for the project, Boulder Associates focused on integrating the design team with the design assist trade partners and general contractor, as well as developing and deploying integrated methods of project management, BIM development and model management, and design production.

## PROJECT MANAGEMENT

BA coached the team in the elements of the Last Planner™ system, including reliable promising, pull planning, and weekly work planning. The team implemented the BA Way design process, our design-based version of Last Planner™, including the following management and control components:

- **Individual Weekly Work Planning** - each team member maintained a work plan of weekly activities and measured plan percent complete, tasks anticipated, and captured reasons for variance. Plans were updated daily and reported weekly.
- **Team Weekly Work Planning** - The design team met weekly to plan their work and to confirm proper staffing. Team members reported on their individual work plans and discussed reasons for variance together.



- **Daily 5-minute standup meetings** - The team leader met with individual team members at their desk for daily standup meetings. This allowed the leader to keep the pulse of the team as well as providing each team member with one-on-one time to ask questions and receive direction.

These project management methods allowed the integrated team to shorten a 16-month design schedule to 13 months, a 19% improvement in time to deliver the permit package. During that period, the team reached a PPC average of 81%.

### Annual Summary | Team Performance

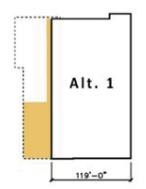
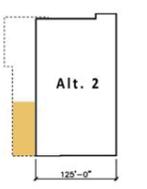
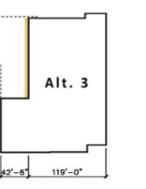
- **1,920** tasks have been promised to date on the project
- **1,408** of those tasks have been completed
- **551** completed tasks were planned more than a week in advance
- 40% of all reasons for variance were number 9 "incorrect time estimate"
- We have now used Last Planner for 39 consecutive weeks
- The high mark for tasks in a week
  - Promised: **99** (38.3 avg.)
  - Completed: **67** (27.8 avg.)
  - Anticipated: **56** (21.0 avg.)
- PPC: **73%**    TA: **39%**

*Using Last Planner™ in the design phase resulted in a 19% improvement in design production duration, a net 3-month savings.*

Replacement Hospital at St. Luke's Campus – A3 Report

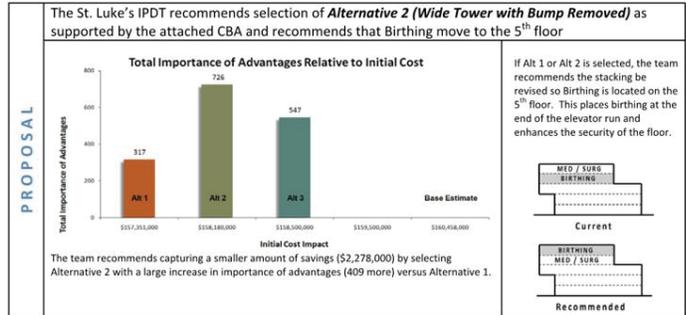
**Program Alignment – Evaluation of Birthing and Bed Tower Configuration**

<b>BASELINE</b>	<p>The team is seeking opportunities to align the program area of the building by test fitting the approved program within a smaller building envelope</p> <ul style="list-style-type: none"> <li>The team presented a pro forma, program, and estimate to Grant Davies in January 2010 without an aligned blocking or stacking diagram (Program BGSF = 162,058 SF).</li> <li>The team began the TVD process and quickly identified that there were discrepancies between the validation estimate, approved program, and shell building design. (Building BGSF = 172,416 SF, Δ = 10,358 SF)</li> <li>The team initiated a process to align building area with the approved program while maintaining the overall building design as previously put forward to the neighbors and to the planning department and working within the constraints of the building site.</li> <li>The team was also asked by Mark Farrar and Geoffrey Nelson to explore alternatives that reduce or eliminate the need for the bump out on the 4<sup>th</sup> floor as the current building geometry increases the impact of shadow and massing on adjacent neighbors.</li> </ul>	<p><b>The 4<sup>th</sup> Floor "Bump Out"</b></p> 
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<b>ANALYSIS</b>	<p>The team defined alternatives for evaluation: <b>Alternative 1</b> (Narrow Tower with Bump Removed), <b>Alternative 2</b> (Wide Tower with Bump Removed), and <b>Alternative 3</b> (Narrow Tower with Bump)</p> <ul style="list-style-type: none"> <li>Mark Farrar believes the 4<sup>th</sup> floor bump represents a significant obstacle preventing neighborhood support of the project.</li> <li>The team studied more radical alternatives (4-story scheme, 6-story scheme, reduced program) before settling on alternatives that align with the "must" criteria identified for the project.</li> </ul>		
	<p><b>Must Criteria:</b></p> <ul style="list-style-type: none"> <li>Align with the approved program</li> <li>Operationally functional</li> <li>Rooftop equipment with maintenance and service clearances must fit on the roof</li> <li>5-story scheme as shown in EIR</li> </ul>	<p><b>Should Criteria:</b></p> <ul style="list-style-type: none"> <li>Align building area with required program space</li> <li>Provide future flexibility where possible</li> <li>Maintain operational distribution of bed units</li> <li>Allow for flexibility in ongoing planning and design</li> <li>Remove the bump from 4<sup>th</sup> floor</li> <li>Desirable building massing on Cesar Chavez façade</li> <li>Reduce building impacts on adjacent neighbors</li> </ul>	
	<p><b>Alternative 1</b> This alternative removes the bump and narrows the tower by shifting grid line C by 6'-0" to the east</p>  <p>BG SF = 162,335 SF</p>	<p><b>Alternative 2</b> This alternative removes the bump only</p>  <p>BG SF = 165,011 SF</p>	<p><b>Alternative 3</b> This alternative narrows the tower by shifting grid C by 6'-0" to the east only</p>  <p>BG SF = 165,085 SF</p>

Author: Nickerson	Participants: STL IPD Team	Reviewed: Cluster Ldr _____ Value Mgr _____ Op Mgr _____
A3 No.: 00026	Doc Date: 06/29/10	File: STL-A3-0000-00026-Program Alignment – Evaluation of Birthing and Bed Tower Configuration.doc

<b>ADVANTAGES</b>	<p>The team identified the following advantages for each alternative:</p>		
	<p><b>Alternative 1</b></p> <ul style="list-style-type: none"> <li>Somewhat better layout efficiency</li> <li>Better building geometry</li> <li>Less building mass</li> <li>Less structural detailing complexity</li> <li>Better building massing</li> <li>More support from neighbors</li> </ul> <p>Total Importance = 317</p>	<p><b>Alternative 2</b></p> <ul style="list-style-type: none"> <li>Better operational effectiveness</li> <li>Better program flexibility</li> <li>Better bed configuration</li> <li>Better planning flexibility</li> <li>Less building mass</li> <li>Less structural detailing complexity</li> <li>Better building massing</li> <li><b>More support from neighbors</b></li> <li>Better rooftop equipment layout</li> </ul> <p>Total Importance = 726</p>	<p><b>Alternative 3</b></p> <ul style="list-style-type: none"> <li>Better operational effectiveness</li> <li>Somewhat better layout efficiency</li> <li>Better bed configuration</li> <li>Better planning flexibility</li> <li>Better building geometry</li> </ul> <p>Total Importance = 547</p>
<p><small>The recommended alternative is shown in black. The paramount advantage is shown in bold. Duplicated advantages in other alternatives are shown in grey and in italics. Unique advantages in other alternatives are shown in black.</small></p>			



<b>ACTION PLAN</b>	<p>The path forward consists of:</p> <ul style="list-style-type: none"> <li>Present A3 and CBA to Core Group and Senior Management and proceed per approved direction</li> </ul>
	<ul style="list-style-type: none"> <li>Pending approval, the Programming and Medical Planning cluster will declare their criteria design work complete, freeze the floor plans, and release mechanical and electrical engineering. This releases the structural constraint and allows work to continue toward the OSHPD Increment 2.2 submittal.</li> <li>Approval will also for the first time align program, estimate, pro forma, and building geometry as the basis for the ongoing TVD effort.</li> </ul>

APPROVAL SIGNATURES (Please initial and date)

Kathleen Lassie _____	Romano Nickerson _____	David Long _____
Carlie Hernandez _____	Phil Clawenger _____	Paul Reiser _____
Tim Hernaez _____	John Koga _____	Steve Pepler _____

A3 report summarizing results of CBA exercise

**SOUND DECISION-MAKING**

Boulder staff also facilitated sound decision-making through the use of A3 Thinking and Choosing By Advantages. Use of this methodology ranged from design decisions to the selection of trade partners.

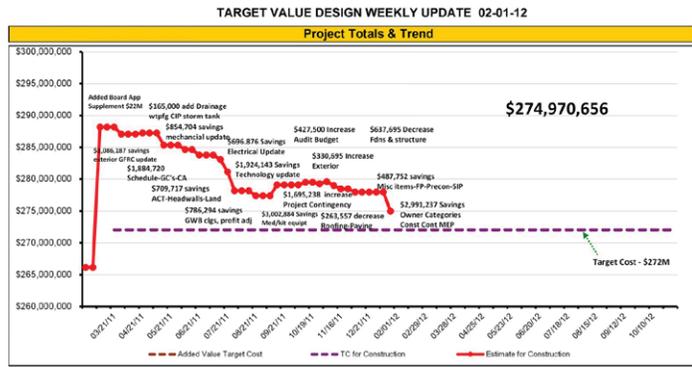
The team used CBA to select between multiple alternatives for building configuration. The decision study incorporated elements of medical planning, building massing, neighborhood requirements, and budget requirements. The team made a sound decision that incorporated multiple, complex requirements and saved the project \$2.3 million.

*We used Choosing By Advantages to save the project \$2,300,000.*

**TEAM STRUCTURE**

Boulder Associates helped establish an integrated structure for the team. The structure allow the team to maximize the interaction between design and related trades. It included the following elements:

- Task Forces** – these working groups were organized around specific design or scope topics and we are populated by relevant stakeholders from both the design and construction teams.
- Target Value Design** – each task force was charged with driving down the cost of their scope of work through the use of target value design. Cluster groups reported weekly in a target value design meeting for tracking the overall progress of the team. Over the course of the design phase, the project team realized more than \$12,000,000 in savings.



Target Value Design weekly report



Parametric visualization uses data to help designers easily identify code compliance such as fire ratings versus door requirements.

- **Integrated Project Delivery Team Meeting** – each week, the team convened an all hands meeting. This venue was used for training, development, and other needs of the overall team. Emphasis was placed on treating the team as a temporary organization and the IPD team meeting was the venue for monitoring and maintaining the health of the organization.
- **Core group** – a delegate from BA sat on the core group with SmithGroupJJR and the builder and the owner. This group was responsible for leadership decisions on the team.
- **Integrated Form of Agreement** - The contracting method selected by Sutter Health/CPMC was the Integrated Form of Agreement. Among other things, this required the team to put their profit at risk.

LEAN BIM

BA developed numerous tools and methods designed to improve the overall quality of modeling while reducing time required during the production phase of the project. All improvements were grounded in a philosophy of built in quality, achieved by way of reducing the opportunity for human error by mistake proofing. This included:

- A script that extracts interior elevations from the model, crops views, place views on a sheet, labels and references them, and formats the sheet for printing. The script ran automatically overnight and represented a labor savings of \$15,000 to the project.
- A method for embedding door hardware information in the parameters of door families within the model. This allowed for "checking views" that used color coding to check door hardware status.

- A method for embedding a work process parametrically into room spaces in the model, allowing the team to track work progress visually in a floor plan view. As work progressed, areas of the model change color giving a dashboard view of work completed and work remaining.
- A method for linking Navis views with corresponding issues in BIM360 or vPlanner, all automatically linked, updated, and hosted in the cloud. This allowed any team member to look at an issue and have full access to the model, all via a web based portal.

MISCELLANEOUS

Additionally, BA also supported the team from a technology perspective. We develop tools and methods grounded in lean principles of visualization and transparency.

**Plan Check** - we collaborated to help OSHPD perform electronic review of the project. This involved setting up remote stations at OSHPD's office in Sacramento and maintaining BlueBeam studio sessions. We developed dashboards that live linked comments, allowing team leadership to review progress and see trendlines to milestones.

**Burn Rate** - we pioneered use of Tableau software as a means for conducting the monthly burn rate meeting. With a variety of accounting interfaces, our tool aggregated labor information into a live dashboard. What began as a three hour monthly meeting conducted in Excel became a 30 minute weekly meeting conducted in Tableau.



*The team used Target Value Design to save the project more than \$12 million*

## OPERATIONAL EXCELLENCE AT BOULDER ASSOCIATES

Operational Excellence is a catalyst for improvement and innovation.

Our expertise comes from more than two decades of using process-driven design to deliver healthcare facilities. In that time, the ideas of optimizing flow, reducing inefficiencies, and operational assessments have informed the design services we provided. From our years of full engagement with the concept of lean, we have now established Boulder Associates Operational Excellence as a consultancy that provides a range of services from training to assessments to custom data visualizations to clients in various sectors worldwide.

We believe that being a lean organization is an advantage in the marketplace. We teach lean, but we also act lean. When we provide coaching, we anchor our work in the real world solutions that have benefited us in our design practice. While we are quite comfortable working with our clients at a strategic level, we are at our best when we join our clients and team members in the trenches, rolling up our sleeves and collaborating on tactical solutions that add value.

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