Topics of Discussion

- CH&M Project Highlights
- Current State of D&C
- ILPD Discovery
- Lean and Integrated Project Delivery
- Lean Tools
Project Highlights

- Transforming CH&MC from a regional hospital to an internationally known specialty pediatric hospital
- Lease for NICU space in Methodist Hospital ends on May 31, 2021
- Target date of hospital addition completion is February 2021

Project Highlights

- Hubbard Center for Children - $383 M Project Cost
  - 427,000 SF addition
  - 42,000 SF renovation
- East Parking Garage
  - 762 stalls
- Increasing the number of inpatient beds from 184 to 220

Important Project Considerations

- Design and construction that will meet the needs in the community for a very long time
- State of the art facility
- Children’s competes for pediatric specialists and the facility makes a big difference in attracting talent
- Hospital is full very often and children have to be transported to other children’s hospitals outside of Omaha
Project Schedule


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
<td>Preliminary Design</td>
</tr>
<tr>
<td>Schematic Design</td>
<td>Schematic Design</td>
<td>Schematic Design</td>
<td>Schematic Design</td>
<td>Schematic Design</td>
<td>Schematic Design</td>
<td>Schematic Design</td>
</tr>
<tr>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
<td>Precon/Budget</td>
</tr>
<tr>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
<td>Bid Package Preparation</td>
</tr>
<tr>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
<td>Hospital Construction</td>
</tr>
<tr>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
</tr>
<tr>
<td>First Patient Day</td>
<td>First Patient Day</td>
<td>First Patient Day</td>
<td>First Patient Day</td>
<td>First Patient Day</td>
<td>First Patient Day</td>
<td>First Patient Day</td>
</tr>
<tr>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
<td>CH&amp;A Transition</td>
</tr>
<tr>
<td>Preliminary</td>
<td>Preliminary</td>
<td>Preliminary</td>
<td>Preliminary</td>
<td>Preliminary</td>
<td>Preliminary</td>
<td>Preliminary</td>
</tr>
</tbody>
</table>

Current State of Design & Construction

Factors accounting for Poor Productivity:
- Poor Organization
- Inadequate Communication
- Flawed Performance Management
- Contractual Misunderstandings
- Missed Connections
- Poor Short-term Planning
- Insufficient Risk Management
- Limited Talent Management
Projects Over Budget and Late

Time – 70% were delivered late
Cost – 73% were over budget

Delivered On Time – 20%
Delivered Early – 10%
Delivered Late – 70%
Under Tender Price – 13%
On Tender Price – 14%
Over Tender Price – 73%


Phase Induced Ignorance – Lag of Intelligence Curve

Common Understanding

Time
Schematic Design Development Construction Documents

Pre-construction Services Construction

Architect Hired Engineers Hired CM/SC Hired Major Trades Hired

Source: Adapted from McDonough, Holland & Allen, PC, Attorney at Law

Lost Opportunities for Innovation
ILPD Intelligence Curve

Causes of Low Productivity

"Waste is like gravity – it is all around us!"

- Paul Akers, 2 Second Lean

Source: Adapted from McDonough, Holland & Allen PC, Attorneys at Law
What is Waste?

Eliminate Waste - Convert Waste Into Value

Traditional Delivery

Lean Project Delivery

Silos – Traditional Project Delivery

Brick walls from years of Adversarial Contracts and Claims
ILPD Discovery

- CH&MC was introduced to ILPD on a tour to Akron Children's Hospital in 2013
  - The team toured UHS' Henderson Hospital in June 2016
    - New 140,000 SF, 4 story hospital
    - Constructed in 13 months
      - June 15, 2015 to July 15, 2016
      - First patient day was October 31, 2016
  - CH&MC and CBRE toured Piedmont Hospital in August of 2016

Big Ideas Learned

- Established Estimated Maximum Price prior to start of construction
- One Integrated team with Owner, A/E, CM and trade partners signing agreement
- Owner’s Project schedule met
- No RFI’s (waste)
- Produce a higher quality product
- Incentivize team to meet project goals, Conditions of Satisfaction (COS)
- Decrease Claims
ILPD Discussion – September 2016

Rationale
- Value from Team
- Balance of costs and value
- Schedule is critical
- Partners had past relationship

Project Duration & Schedule
- May 31, 2021 – Critical Date
- Hospital Tower
- Parking Garage
- Recreation

Project Participants
- Partner Subs CI&A
- Other critical subs

Agreement
- Initial agreement
- CD 300 Final agreement

ILPD Discussion – September 2016

Management
- Core Group
- Senior Executive Team

Cost of Work
- Payable Cost – actual costs
- Audited Overhead Rate
- Set Profit %

Allowable Costs
- Expense
- Expected Validation Study
- EMP
- Target Cost

ILPD Discussion – September 2016

Project Insurance
- Gen.
- Sub
- Prof. design
- Builder’s Risk
- Project policy

CD 300
Key Contractual Concepts

Lean Construction Principles
Collaborative Project Management
Project Objectives
Validation Phase
Preconstruction Phase
Cost

Key Contractual Concepts

Lean Construction Principles
• IPD Team

Key Contractual Concepts

Collaborative Proj. Mgmt.
• Core Group
• Senior Executive Team
Key Contractual Concepts

Project Objectives
• Owner’s Program
• Owner’s Responsibilities
• Contractor’s Responsibilities
• Designer’s Responsibilities

Validation Phase
• Owner’s Program
• Validation Study
• Expected Cost

Preconstruction Phase
• BIM Approach
• Cost Modeling
• Pull Based Planning
• Target Value Pricing
Key Contractual Concepts

Cost
- Payable Cost
- Risk Pool
- EMP

Lean & Integrated Project Delivery

Conditions of Satisfaction – C.O.S.

“There must be consistency in direction” – W. Edwards Deming

- Why Conditions of Satisfaction are a decision making guide and align the team’s focus.
- What – Each CoS is a commitment and all team members are responsible for delivering according to the CoS. By agreeing to and signing up to the CoS the project team members make a Reliable Promise to one another. The Project CoS define what “success” means for the project team.
- When – CoS should be co-developed as soon as possible, but should not be finalized until all the key players are engaged to have input and agree to the CoS.
Patient Satisfaction & Long Term Energy Efficiency
• New Design & Construction Standards
• Stakeholders say we are their #1 Customers
• Wow Factor – systems, means & methods
• One or more improvements each day
• Tell a good story
• Deliver the Project for $170 M
• First patient day was October 31, 2016

Conditions of Satisfaction (from Henderson Hospital)

CHMC Conditions of Satisfaction – ranked in order and percentage of incentives:
• Schedule – 50%
• Cost – 40%
• Quality – 10%

The Integrated Project Team

The Waldinger Corp. Mechanical
Electric Company of Omaha Electrical
E&K Companies Metal Stud and Drywall Contractor
Drake Williams Steel/Davis Erection
Steel Fabricator/ Erector
Cluster Formation – IPD Team Structure

Cluster Groups

Big Room Meeting
Team Building
- Monthly pot luck lunches
- Ice breaker at the beginning of each meeting
- Study action teams – book club
  - 5 Dysfunctions of a Team
  - Switch
  - Speed of Trust

Innovation – Generation of Lean ideas
- Group purchasing of commodities
- A65 grade steel in lieu of A36 grade steel for columns - $500,000 savings
- Early steel mill order package and start of steel detailing
- Unitized curtain wall – cost and schedule savings
- Owner purchase of small tools
- Project purchase of ladders and lifts – to be used by all trades
- Prefabrication – patient headwalls
- Integrated IT/OT Cyber Platform

Innovation & the Use of CbA and A3’s
- Thinking like a Designer and Contractor
  - NEC 700.15.D
- Temporary SPC power
- Central Plant Location
- Heliport Location
- Patient Headwalls
- Utility Power Options
Section 1 – Background
Section 2 – Problem Statement/Current State
Section 3 – Future State/Goal
Section 4 – Analysis
Section 5 – Proposal
Section 6 – Follow-up

Last Planner Planning System
- Produces smooth, predictable work flow
- Reveals roadblocks on system performance
- Creates capacity to do additional improvements
- Builds responsibility, judgment and confidence
- Measures and improves Team's reliability
- Daily foreman pull plan review
- Weekly Productivity meetings
Project Scope Reduction

- June 2017 – request to reduce the project cost by $50 - $60 M ($436 M to $383 M)
- IPD Team collaborated to reduce scope of project
  - Eliminate LL5 – SOE (cost and schedule)
  - Consolidate HVAC to Level 3 from LL5 and 7th Floor
  - Move Central Plant to East end of Addition
  - Construct all of Imaging within addition
  - Shell one patient floor
  - Reduce renovation
  - Overall scope of project from 587,000 SF to 469,000 SF – one and a half months to complete