LEAN Integrated Project Delivery

Lean Leadership in Canada

The current status of AEC in Canada
A primer on Integrated Project Delivery (IPD) and LEAN
Features of an IFOA (Contract)
Moose Jaw Hospital status and accomplishments
    Discuss some of the metrics
    LEAN Construction opportunities
    Challenges and benefits of IPD

Questions and Answers

Art Winslow, Project Director, Graham
Neal Panchuk, Design Manager, Graham

A Presentation and Discussion
CSC – Tapping the Future – Kitchener, ON
May 23rd, 2014
The Current State of the AEC Industry

Construction Productivity vs. Other major Industry Productivity (non-farm) 1964 - 2012

INDEX OF LABOR PRODUCTIVITY

Industry (non-farm)

Construction
The Current State of the AEC Industry

92% of owners say architects drawings are not sufficient for construction!

37% of materials used in construction industry become waste!

30% of projects do not make schedule or budget!

Construction Management Association of America Owner’s Survey 2005
High Value Goals

Goals:

- **Efficiency** - The facility will provide services emphasizing tightly integrated services teams (rather than departments)
  - Reduce user and Staff travel by 40%
  - Reduce Energy consumption by 25%
  - 30% greater care capacity for service outcomes per unit of space.
  - **Design to Zero defects (5S) for optimal services delivery**

- **Adaptability** - Key spaces, develop space with sufficient standardized service, build with future expansion in mind.

- **High value to cost relationship** - of the built solution while preserving long term operating and maintenance efficiency.
What is LEAN?

In this context, Lean is the adaptation of the Toyota Production System to healthcare (and in our case, design and construction) operations. A central part of TPS is the discovery and reduction of waste in all facets of the system.

1) Understand the value as demanded by the customers
2) Create a map that creates the steps.
3) Flow of activities and processes to deliver.
4) Carrying out the many steps to pull the value.
5) Create a culture of continuous improvement (Kaisan)
Waste is defined by anything that does not contribute to value in the end users eyes.

1. **Overproduction** – Putting as much work in place as possible, making it harder to prioritize work
2. **Inventory** – Storage of material delivered before it is needed.
3. **Waiting** – for materials, direction, information, prerequisite work
4. **Motion** – Moving materials from one place to another before installing.
5. **Transportation** – Hunting for info. Returning to the shop to pick up plans, materials or tools.
6. **Rework** – Re-doing work because of errors
7. **Over Process** – unnecessary coordinating, reporting, expediting material.
Simply put, it’s a project delivery system that uses *LEAN* principles to Eliminate wastes while driving in Value for the client using fewer resources.
Primer – What is IPD – Approach

IPD Approach

Traditional Approach

Pre-Construction Services
Architect Hired
Engineers Hired
CM/GC Hired

Construction
Major Trades Hired

Level of Common understanding

Time

SD
DD
CD
Primer – What is IPD – Approach

- Single point of Risk
- Focus on “My” responsibility
- Win-Lose Environment
- Few Incentives
- Deliver only what is shown On drawings/specs
- Silo’d approach

- A delivery method – *not “just a contract”*
- aka “Relationship Contracts”
- Multi-Party arrangement
- Sharing of project risks
- Members are Incentivized
- Highly collaborative
- LEAN and BIM use
- Collaborative approach
Primer - Stages of IPD

- RFP
- Award/Onboarding Team
- 7 Ways and 3P/LEAN events
- Validation – go, no go
- IFOA(Contract)
- Target Value Design
- Working Drawings
- Permit and Construction
Primer – Stages - the RFP

**RFP Included:**
- Programmatic Needs Outline
- Functional Requirements
- Project Goals
- Allowable Cost (GMP)
- Basic Timeframe
- IPD Delivery Requirements
- Other Submission requirements

**Did Not Include:**
- Drawings
- Site had not been selected

**Selection:**
- The *successful team was selected using the Choosing by Advantages (CBA) method of decision making which followed the shortlisted team’s interviews and thorough proposal review.*
Primer – Stages - 7-Ways
Primer – Stages - Collaborative Design (3P events)

Production Preparation Process
Establishing a Shared Understanding,
Basis of Design, Budget and Schedule.

The Starting Point for Target Value Design
Primer – Features of an IPD Agreement

- Once Validation is approved... an IPD Agreement(contract) is signed
- A multi-party contract which is signed by Owner, Architect and CM/GC.
- The project is managed by a **Core(PMT) Team** made up of those signatory to the IPD Agreement... Owner, Architect, GC & Major Trade Partners.
- Cost plus arrangements including major Trade Partners.
- Aligns the team goals with owner goals.
- Commits all to accountability.
- **Requires participants to be:**
  - Transparent
  - Innovative
  - Collaborative
  - Use BIM
- Laddered dispute resolution
- Does not require Bonding
- Eliminates CO’s and RFI’s
- Built in Financial Incentives
  - Risk/Incentive Pool
Primer – Stages - Target Value Design (TVD)
Primer – our BIG Room

Collaborate; Really Collaborate
Increase Relatedness
Networks of Commitment
Optimize The Whole
Tightly Couple Learning w/ Action

Cluster Leaders
- Building Envelope
- Structure
- Site Improvements
- Interior/Finishes
- Vertical Transp.
- Landscape
- Material Handling
Primer – Pull Planning
**A3-018**

**Title:** Bonding Request Options

**Date:** 11.29.2012

**Draft**

---

1. **Introduction**
   - On Nov 28, 2012, the M o H via the Executive team has expressed a desire to have the GC/CM and its trade partners put together a price to provide 50% I&M & 50% Performance Bond.
   - The M o H, through the executive team, wishes to evaluate the cost of bonding vs. perceived risk.
   - A Performance Bond would trigger the IPD team to ask for Bonding on subtrade/trade partners.
   - The Core team reminded the Executive team that the cost of bonding has not been included in the estimate.
   - Subguard is a product that can provide 100% subtrade coverage, also addresses the limits of Liability and Latent defect concerns.

2. **Opportunity Analysis**
   - Option 1: Bonding
     - Bonding cost options requested...
       - GC/CM 50% & I&M Bond Cost: $164,000.00
       - GC/CM 50% Performance Bond Cost: $318,000.00
       - B & M Subtrade Bond Cost: $96,614.00
       - Other Subtrade Bond Cost: $175,753.00
     - The cost for this bonding options is: $754,367.00
   - Option 2: Subguard
     - Subguard cost option suggested...
       - Coverage is for 100% of enrolled subtrades (SSBM).
       - Expediately handle claims.
       - Covers latent defects covered for up to 10 years.
       - Boldt/Graham to provide security if they self perform.
     - The premium for Subguard is: $52,000.00
   - Option 3: No Bonding
     - Option 3) No CM/PC Bonding
       - Trade Partners not in the Risk pool are fully liable under traditional bonding terms.
     - The cost for this bonding option is: $175,753.00

---

**Sponsor:** Executive Group  
**Author:** Art Winslow  
**Collaborators:** Art Winslow, Lisa Dickie

3. **Unresolved Issues**
   - Make decision to proceed with Bonding/Subguard so that the allowable cost is increased and product is ordered.
   - With full Trade Partner participation, the Risk Pool is anticipated to grow to $6.5M. It is thought that this amount is more than adequate to cover any perceived risk.
   - Prior to approval the following is required as backup to this A3.
     1. In the event that one of the JV’s entities cannot fulfill their contract, does the Graham/Boldt JV allow for the other to complete the work?
     2. Send Subguard policy language to FHR & MoII for review prior to approval.

4. **Proposal / Recommendation**
   - Executive team, along with the M of H to determine.
   - Bonding - the cost of $754,367.00 nets $35,145,578.50 worth of coverage. See attached.
   - Subguard - the cost of $52,000.00 nets $69,629,000.00 worth of coverage. See attached.
   - On board Trade Partners would be required to enroll. An addendum would have to be issued prior to Dec 10th.

5. **Action Plan**
   - If decided to, proceed with adjusting the RFP documents to reflect the decision.
   - Increase the allowable cost to incorporate the bonding requirements.
   - Champion: Art Winslow (on behalf of the executive team)

---

**Signoff** (Initial)
- FHR
- Doveney
- Stanec
- Graham
- Boldt
- Stantec Consulting

6. **Follow-Up**
   - Did it work?
   - What are the results?
   - When to follow up?
Primer – Decisions - Choosing by Advantages
LEAN Construction – Prefabrication

- Pre-fabricated wall panels! How do we do it?
- Great teamwork; great effort; great results!
Other Prefabrication opportunities

- Mechanical and Electrical racking system
- Pre-Fab Washrooms
- Prefabricated Headwalls
LEAN Construction - TAKT Time Planning – Level resources
LEAN Construction - LAST Planner System

Last Planner Overview – “Lookahead”

Last Planner System

- Master Schedule
  - Set milestones and key dates

- Phase Schedule
  - Specify handoffs between trades

- Look-Ahead Plan
  - Make ready and initiate re-planning as required

- Weekly Work Plan
  - Will Do
- Progress Tracking
  - Doing & Done

Should Do

Can Do

Improving & Learning
Status and Accomplishments - Moose Jaw Hospital

- After just one year of Design, the project started Construction ($87.5M).
- Value Add - the IPD team has absorbed 12,000ft² (worth $5.5M) of added programming into the allowable cost.
- 12 months into Construction and Project is tracking close to its aggressive schedule.
- Incorporated over 35 team innovations into design and mitigated or overcame 32 risks.
- Labour production savings from Trade Partners expected to be in the range of 5%.
- Comparable projects using traditional delivery methods cost 10% more per/ft².
- No RFI’s or Change Orders to date.
- 85% Less rework.
- Built in Quality(BIQ) is incorporated into design for better and safer Constructability.
- 3.2 years from program to open
Challenges

- Overcoming existing Paradigms.
- Learning to TRUST each other.
- Understanding and speaking the LEAN language.
- Managing a high performance team.
- Teaching and implementing LEAN tools to trade Partners.
- Adjusting to cost plus arrangements.
  - Developing the “Earned Value” reporting tools.

Benefits

- Deliver added value to the end user
- Eliminating many wastes
- More accurate Design (Revit model)
- Paperless project site (Plan Grid)
- Faster, better and safer Construction that is less expensive
- Appreciation for what other team members challenges
- Sharing risk
Summary

- Building Information Modeling (BIM) – The Technology
- LEAN – Principles are the Deliverables
- Integrated Project Delivery (IPD) – The Team Structure
IPD – the shift…

IPD
Moose Jaw Hospital
St. Jerome's University

IPD-ish
Large Canadian Bank
Major Western University
Steel Mfg. Head Office
Others

Future IPD?
Alberta Infrastructure
Ontario Hospitals
DCC
SaskBuilds
Questions?