



Integrated Design Build and a Lean Delivery

Managing a complex business case while
delivering a lean project

Holly Cindell , Jim Bostic and John Vaught





Agenda

- Background
- Contracts and Creating an integrated team
- Lean in design phase
- Lean in construction-tools and team development
- Final outcomes



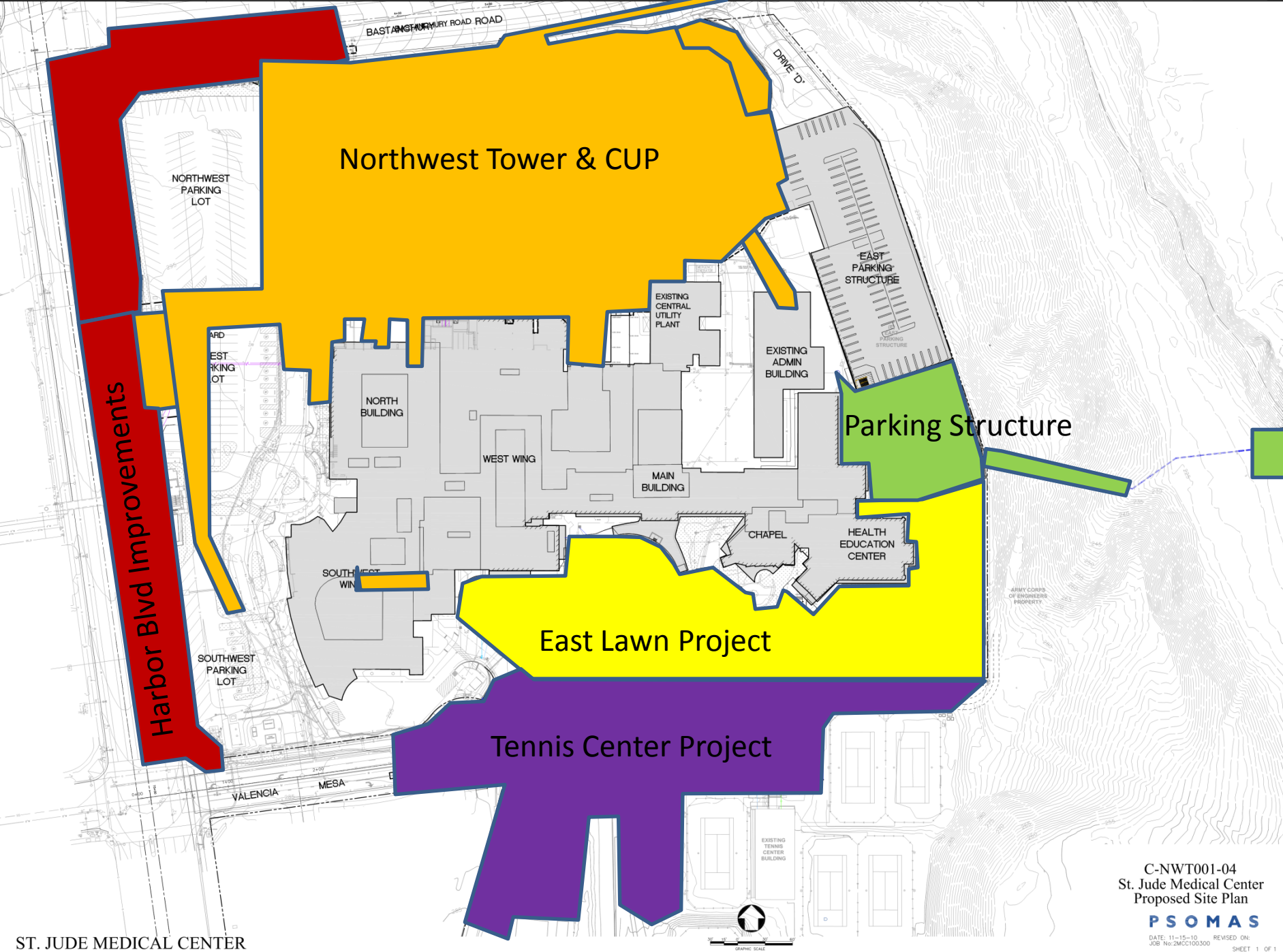


Project Background

- Contract Value \$231M
- 200,000 sq. ft Acute Care Tower
- Dining, Cafeteria, Kitchen, Pathology, 14-OR's, Patient Rooms
- 14,000 sq. ft Central Utility Plant
- Harbor Blvd. Redevelopment

S.E. Lawn Conversion to Surface Parking





Northwest Tower & CUP

Parking Structure

East Lawn Project

Tennis Center Project

Harbor Blvd Improvements

NORTHWEST
PARKING
LOT

EAST
PARKING
LOT

SOUTHWEST
PARKING
LOT

NORTH
BUILDING

WEST WING

MAIN
BUILDING

CHAPEL

HEALTH
EDUCATION
CENTER

EXISTING
CENTRAL
UTILITY
PLANT

EXISTING
ADMIN
BUILDING

EAST
PARKING
STRUCTURE

EXISTING
TENNIS
CENTER
BUILDING



In the beginning.....

From: [Chris Hickman](#)
To: [Mynott, James](#)
Cc: [Howell, Marc](#); [Marc Whinnem](#); [Steve Gilbert](#); [Wesley Okamoto](#)
Subject: RE: SJMC NW tower - building costs
Date: Friday, July 11, 2008 8:51:18 AM

Hi Jim, Here is what we think the project scope needs to be:

200,000 sf, 4 stories above grade;
First floor: Kitchen (shelled - preliminary design only), Imaging (shelled - preliminary design only), Pharmacy, other functions etc (per PDR's program) fully built out;
Third floor: 14 surgeries (4 shelled but fully designed) plus support;
Fourth and fifth floors - 60 bed floors x 2 = 120 beds per option A1 (30 bed units per side) with one of the 30 bed units shelled (fully designed), approx 90% private beds;
Connections from the Northwest tower to the existing hospital at Basement, first and fourth floors;
Central Plant 17,000 - 18,000 sf two stories above grade.
Northwest Parking structure - 1000 spaces

Our intent is to retrofit the Main building to allow the kitchen and dining to remain until 2030.
The intent is to have the Northwest tower building meet the 2009 SB 1661 deadline.
We are meeting with the Hospital Administration next week to obtain consensus on this approach.
We can meet next week to identify an appropriate target unit cost for the building.





Target Budget Fundamentals

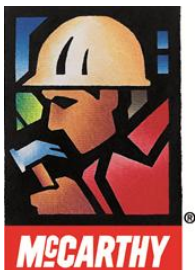
- Start with a rough scope
- Develop a base framework for cost
- ...But understand where you pull numbers from and what they represent
- Build the detail (example)
- Manage to the detail





The Proposition

- Find the most qualified team and incentivize them;
- Manage the *decision architecture*;
- Foster a culture of teamwork, creativity and excellence





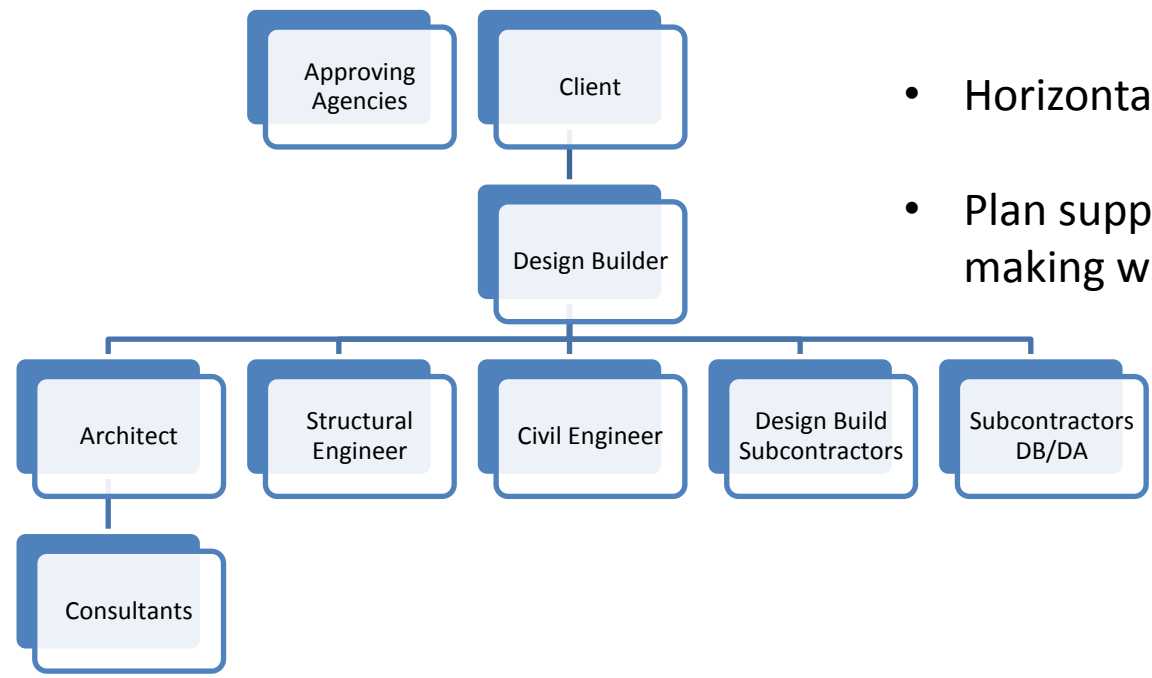
Team Assembly

- Selected subs on concept documents and GMPs
- Others added as scope developed
- Experience working together was key
- Used a common work space to build team





The Integrated Project Team



- Horizontal Organization
- Plan supports decision making with equal weight





The Contract

- Design build agreement
- Target budgets defined at concept design
- Incentives for performance of whole team
- Not “tri-party” Agreement
- Developed trust and accountability across the delivery team (including client)





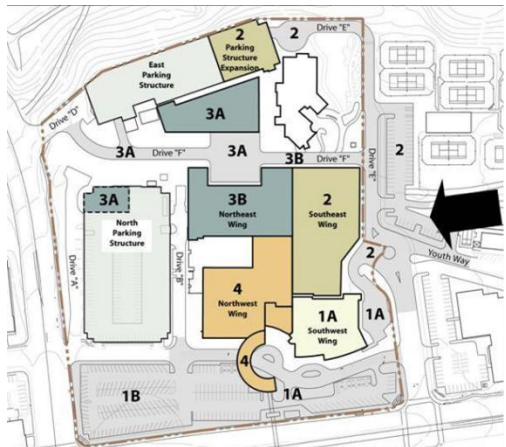
Keys to Develop Project Solution

- Pricing and constructability acumen of integrated team(s)
- Ability to understand unforeseen conditions
- Design that supports approaches and sequencing
- Informed stakeholders with end cost visibility





Hospital Replacement Plan Solution



First Response



Alternate Response





Solution Attributes

- Cost and functionally driven
- Result of designing to NTE target budget for scope
- Uncoupled problem from solution
- Comparison to original solutions





Target Budget Design Thoughts

Lean Approach

- 50% of cost is fixed in Programming
- 75% in Schematic
- Get the right building
- Get the right cost to complete
- Get an efficient operating facility
- **FOCUS ON GETTING THE RIGHT FACILITY**





Target Budget Design Build

- Developed with base cost histories and deep understanding of cost drivers
- Functionally managed across all parties
- Designer and Contractors tied to each other in terms of the ability to manage/monitor/maintain.
- Incentives rewarded team performance






Cost Management

- Understand and reconcile metrics
- Understand your detail trade breakdowns
- Compare the detail breakdown at estimate milestones
- Develop process for managing the detail between the milestones
- Tracking back to the main budget





Manage the Changes

Design Change Estimate - Summary					
St. Jude Medical Center - NW Tower Project					
Fullerton, CA.					
Value Alternative - 41					
Description:		Revise headwall from HillRom Integris to HillRom Elements			
Summary of Costs:					
Trade:	Date:	Description of Work:		Cost:	
Architectural Design Fees	12/21/09	Revised architectural, interiors and medical equipment plans	\$	33,813	
Structural Design Fees	01/15/10	None	\$	-	
Civil Design Fees	01/15/10	None	\$	-	
Mechanical / Plumbing Design Fees	12/22/09	Revised medical gas plans	\$	3,614	
Electrical Design Fees	01/29/10	Revised electrical plans	\$	1,225	
Fire Protection Design Fees		None	\$	-	
Pneumatic Tube Design Fees		None	\$	-	
Elevator Design Fees		None	\$	-	
Exterior Enclosure Design Fees		None	\$	-	
Other		None	\$	-	
McCarthy Design Management	02/19/10	None	\$	-	
Subtotal Design			\$	38,652	
		Reimbursable Expenses #	\$	3,865	
		Liability Insurance	\$	475	
		Builder's Risk		Excluded	
		McCarthy Bond		Excluded	
		Permits, Fees & Assessments		Excluded	
		Testing & Inspections		Excluded	
		Contingency #	\$	6,449	
		General Contractor Fee (Less MCC Design Management Services)	\$	2,719	
Total Design Change Request			\$	52,160	
General Construction ROM	02/01/10	Remove all wall treatments from the patient headwall wall	\$	(168,000)	
	02/05/10	Installation of OFCI medical equipment	\$	30,000	
			\$	-	
			\$	-	
			\$	-	
Subtotal Construction			\$	(138,000)	
		Contingency #	\$	-	
Total Potential Construction Value			\$	(138,000)	





BIM –Lean–Design Build





Challenges

- Owner structure and contract
- Fast track design/construction with limited user group input
- Cohesive document repository
- Designer and subcontractor software integration
- Integrating design, detailing and coordination





Team Alignment Using BIM - (Design Phase)

- Early focus on Basis of Design narratives
- Develop Approach to Lock Down Scope with High Confidence
- Coordinate Equipment and Technology with User Groups
- Provide Robust Platform for Prefabrication of Systems





Scope/Program/Technology Confirmation

- Interactive Platform for Room Layouts and Equipment Placement
- Equipment Tags Created
- Design Team Functions with Content Reliability
- Used as Sign-Off Document



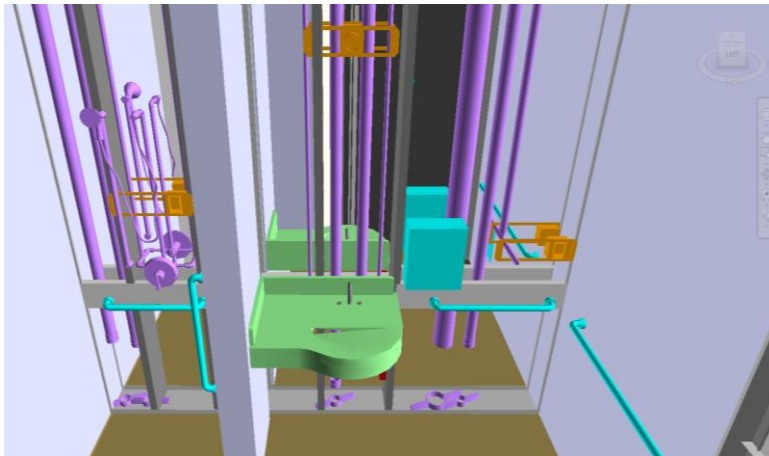
Patient Bed (BED0062)	
Manuf.	Hill-Rom
Model	Versacare VC300
Size	40"W x 94.5"L x 41"H
PATIENT ROOM 4110	





Using Same Content for Different Discussions

Coordination of Design and Construction Models



Coordination of Final Use



Designers & Subcontractors

Designers & Users

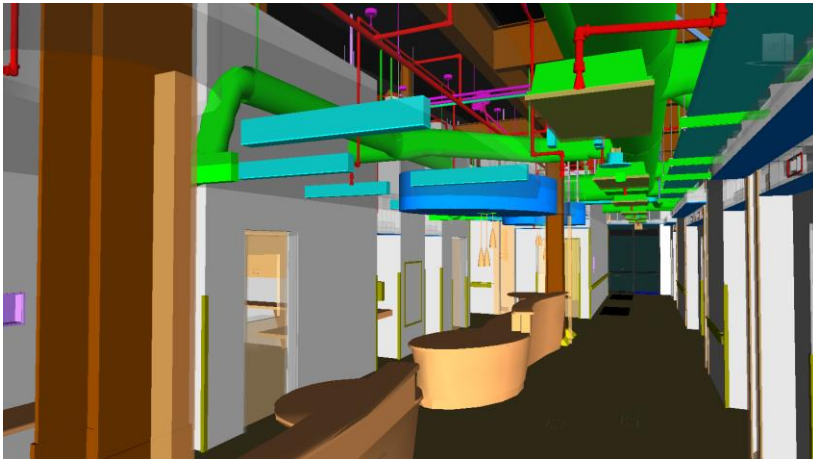




Using Same Content for Different Discussions

Lighting and Mechanical Placement

Ergonomics, Line of Sight and Work Flow



Designers & Subcontractors

Designers & Users





Team Alignment Using BIM (Coordination/Construction Phase)

- Coordination of Systems Between Various Contributors
- Subcontractors BIM Content as Permit Documents
- Prefabrication Advantages
- Planning/Sequencing and Quality Valuations





The development of a team in creating a lean culture

1. VISION

facilitate new levels of culture capabilities and performance ... by balancing the traditional focus on process and results **-with people development**

It starts at the bottom....

5. PERSONAL LEADERSHIP

- To support the personal growth process, personal leadership workshops were conducted during lunch time

- Examples of strategies and tools introduced:
 - oDeveloping the best self and a best place to work
 - oManaging time (80-20 principle, pausing, managing the moments)
 - oRelationship building & collaborating (almond growing)

6. OUTCOMES

- Personal Growth:** Team members experienced significant growth in their personal leadership capabilities – leading to enhanced problem-solving, time management, and teamwork.
- Culture Capabilities:** The emphasis on new thinking and empowerment contributed to a more adaptive and less conforming work culture.
- Business Results:** The St. Jude project has been acknowledged as an internal best practice for project outcomes, owner satisfaction levels, and people development.

Personal leadership is the new foundation!

- Leading: Creating meaningful change
- Managing: Making things run well
- Personal Leadership: Facilitating "my best self"

4. EARLY PROGRESS

- New individual behaviors: Deeper levels of problem-solving & higher levels of job engagement
- More collaboration: More willingness to work across job boundaries & solve problems as a team
- New culture emerging: Broad recognition that "how we do things around here" was improving

2. STRATEGIES

- Not just continuous improvement **but continuous personal growth**
- Not just operating standards & controls **but encouraging new ways of thinking**
- Not just traditional lines of authority **but encouraging leadership at all levels**

3. EARLY EFFORTS

Encouragement from leaders:

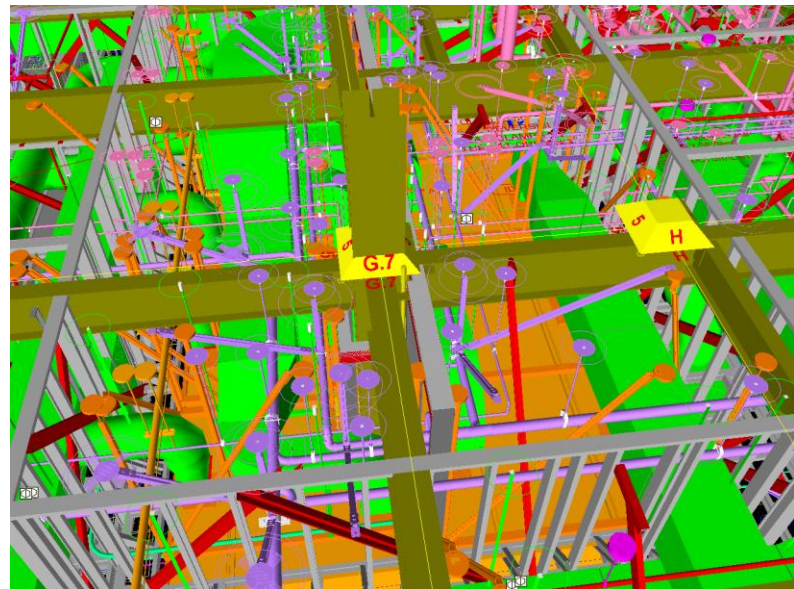
- oThink differently – **don't be limited by how we currently do things**
- oIf you have a better way – **take time to do it**
- oNot just what's next – **but what's possible**





Construction Models (Role of the Team Members)

- Master Model Includes 42 Separate Contributors
- Dense Model Content
- Focus on Management of the Content and Role of the Team

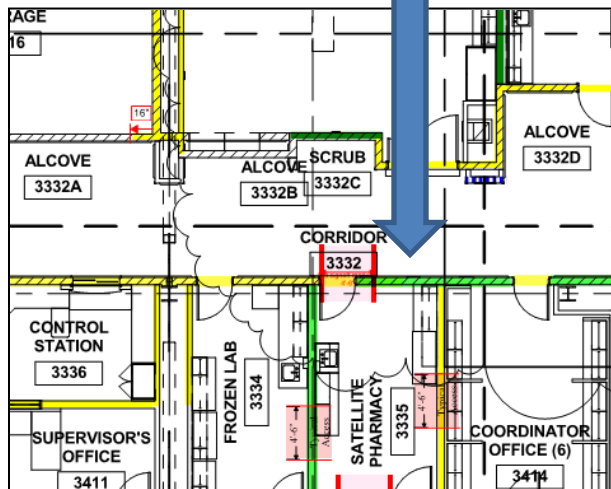




Productivity Enhancement Using BIM

Interference Walls

Framer would not be able to install gypsum board with so much overhead congestion in this corridor – wall will be framed, boarded and fire rated before the duct work goes up





Managing Quality

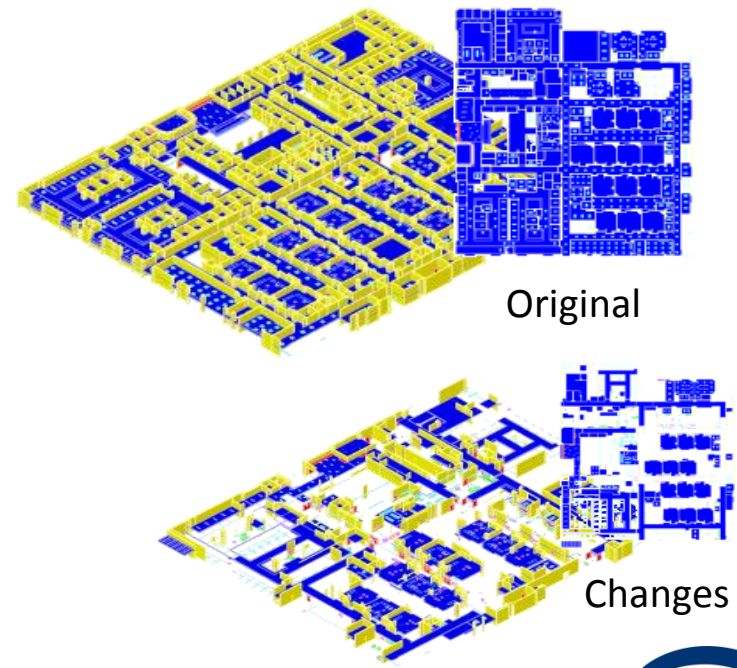
- Single Source of Truth in Documentation
- Updates to Field via BIM Platform
- Incremental Permitting is Facilitated as Workflow Process
- Inspection Process Facilitated
- Streamlined Change Implementation





Change Management

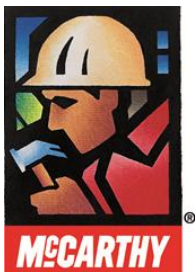
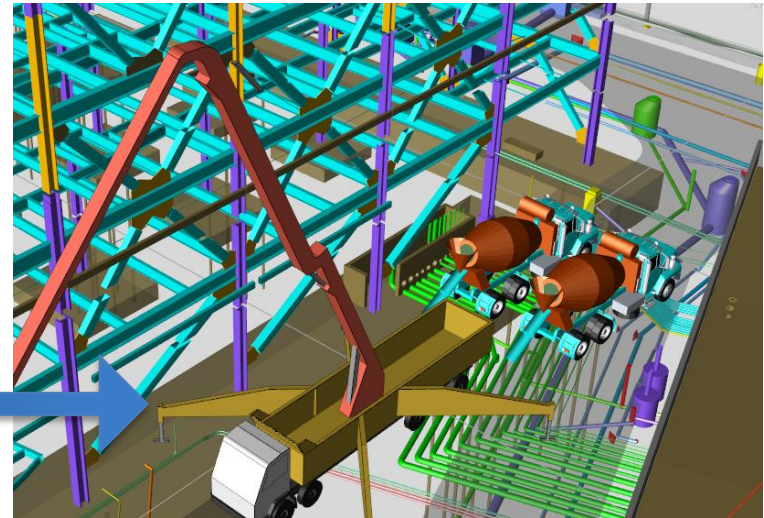
- Model-Based Visualization and Scope Change
- Validation of Quantities
- Visually See and Address Where Changes Are
- Notification and Validation of Cause





BIM as a Visual Planning Tool

- Identification of Proper Logic and Sequence Ties
- Develop Work Breakdown Structures
- Facilitate Weekly Updates and Look-A-heads
- Support Owner Planning Decisions
- Safety
- Change Management
- Improved Communication





How does a Large Construction Project Integrate Various and Very Different Scheduling Approaches?

What if that project is a 100% Design / Build Project?
And it is Hospital?

On an Existing Fully Functioning Hospital Campus?

In California under the Authority of



?

And had a diverse staff that did not know “lean”?

And had BHAGs that required out of the box approaches to traditional processes?





In the end.....

- Transformational project – will influence future decisions;
- Clear goals and good alignment;
- Team engaged in solving Owner's challenge;
- Under budget and ahead of schedule but staying true to original goals and expectations





Questions???





Develop Cost Basis

St Jude NWT ROM Evaluation ⁽¹⁾

Major Element Building tower	UNIT	\$ Unit	SF ⁽²⁾	Total
Patient Treatment facility ROM Budget	Sf	\$ 900	200,000	\$ 180,000,000
Escalation from Aug 2008 to Nov 2010 = 17.5%				\$ 31,500,000
Escalated ROM				\$ 211,500,000

Major Element Building Bridges	UNIT	\$ Unit	SF	Total
ROM Budget	Sf	\$ 2,000	2,000	\$ 4,000,000
Escalation from Aug 2008 to Nov 2010 = 17.5%				\$ 700,000
Escalated ROM				\$ 4,700,000

Major Element Building Basement/First floor Link Structure	UNIT	\$ Unit	SF	Total
ROM Budget	Sf	\$ 2,000	11,000	\$ 22,000,000
Escalation from Aug 2008 to Nov 2010 = 17.5%				\$ 3,850,000
Escalated ROM				\$ 25,850,000

Major Element Central Plant	UNIT	\$ Unit	SF	Total
ROM Budget	Tns	\$ 1,600	11,500	\$ 18,400,000
Escalation from Aug 2008 to Oct 2009 = 9.35%				\$ 1,720,400
Escalated ROM				\$ 20,120,400

Major Element PS	UNIT	\$ Unit	Spaces	Total
ROM Budget	Spaces	\$ 20,000	1,000	\$ 20,000,000
Escalation from Aug 2008 to Aug 2009 = 7.5%				\$ 1,500,000
Escalated ROM				\$ 21,500,000

Sitework Components				
Relocate 12 kv feeds to hospital	1	allw	\$ 4,000,000	\$ 4,000,000
Install new 12 Kv pads/feeds to NWT	1	allw	\$ 1,250,000	\$ 1,250,000
Relocate FW / DW Existing apparatus /feeds	1	allw	\$ 800,000	\$ 800,000
Right Turn pocket Harbor to EB Basantury w/ retaining wall	240	Lft	\$ 2,500	\$ 600,000
Drive approach new NWT PS	350	Lft	\$ 4,500	\$ 1,575,000
Relocate 12 kv at new PS drive approach	1	allw	\$ 1,250,000	\$ 1,250,000
Demo Existing Parking Structure	1	allw	\$ 1,500,000	\$ 1,500,000
Shoring at Utility tunnel and PS interfaces	1	allw	\$ 750,000	\$ 750,000
Flood Control Provisions (Grading/barriers walls)	1	allw	\$ 750,000	\$ 750,000
Protect brine tanks/shoring	1	allw	\$ 500,000	\$ 500,000
new FW/DW Loops	1000	Lft	\$ 750	\$ 750,000
New SD	1500	Lft	\$ 560	\$ 840,000
Fuel Tank rework/ utility protection	1	allw	\$ 750,000	\$ 750,000
Landscape	1	allw	\$ 500,000	\$ 500,000
Site Improvements (walks, curbs Furnishing)	1	allw	\$ 750,000	\$ 750,000
Phasing/ Off Hours/ Temp Provisions	1	allw	\$ 1,500,000	\$ 1,500,000
relocate Oxygen Tanks /System	1	allw	\$ 500,000	\$ 500,000
Extend Gas Service to site	1	allw	\$ 50,000	\$ 50,000
Relocate Condenser Tower Piping	1	allw	\$ 600,000	\$ 600,000
Pad Prep at New Hospital Tower (O-ex/ Recompact)	1	allw	\$ 800,000	\$ 800,000
				\$ 20,015,000
Escalation from Aug 2008 to Aug 2010 = 15.5% (assumed with PS Demo)				\$ 3,102,325
Escalated ROM				\$ 23,117,325

Project Overall ROM Valuation	\$ 264,415,000
Project Overall ROM Escalation	\$ 42,372,725
Overall Project ROM Escalated	\$ 306,787,725

Design Fees/ Precon Fees (15% of non escalated total) \$ 39,662,250.00

(1) Value Noted are **escalated** at 7.5% S.L. from 8-08 to start of Const
 (2) SF = 200,000 sf per SJHS





Understand the Cost Basis

PROJECT (INPATIENT HEALTHCARE)	Kaiser Baldwin Park Medical Center	Huntington Memorial Hospital - Phase II	Arrowhead Regional Medical Center	LESA Company of Mary Hospital Job #7251	UCLA Westwood Replacement Hospital	Kaiser-Downey Hospital	Hoag Hospital - East Tj
Job Location				Torrance, CA	Los Angeles, CA	Downey, CA	Newport Beach, CA
Contract Type	Lump Sum	GMP	Lump Sum	GMP	Lump Sum	GMP	GMP
Job Number	77	7164	89001	7251	n/a	787345	787362
Division	Southern California	Southern California	Southern California	Southern California	Southern California	Southern California	Southern California
Start Date	8/1/1991	1/29/1997	11/1/1996	15-Nov-99	10/4/2003	16-Jan-03	19-Nov-02
Actual Site code (ENR CC)	4892	3783	3780	8127	6258	6881	6878
Projected Site code (ENR CC)	4892	3783	3780	8127	6258	6881	6878
Actual location code (Means/Market C)	100	100	100	1	100	100	100
Proposed location code (Means/Market C)	100	100	100	1	100	100	100
Future escalation (User defined)	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Total escalation factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Estimate Type	Hard Bid Results	GM/Partner Bid	Post-Mortem	GMP	Hardbid	Design Development Estimate	GMP
Job Duration	33		44	26	48	44	36
Owner	Kaiser Permanente	Huntington Memorial Hospital	County of San Bernardino	Life Company of Mary	UCLA	Kaiser Permanente	Hoag Hospital
Architect	HMC		RTA	Kaplan McLaughlin Clark	Fai Partners/Inc.	HMC	Taylor & Associates
Foundation Type	Spread Footings		Spread Footings	Delled Columns	Mat Footing	Driven Piles	Mat Foundation
Construction Type	Steel Moment Frame	Concrete/Steel	Steel Braced Frame	Concrete/Steel	Steel MF	Steel MF	Steel Moment Frame
Building System Type (SI)	Type I	Type I	Type I	Type I - FR	Type I	Type I	Type I
PROJECT COST ANALYSIS BASIC INFORMATION	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
Primary Factor One (Number of Beds)	641 remember	N/A	300	n/a	72	311	187
Primary Factor Two ()	n/a	N/A	N/A	n/a	n/a	7	7
Site Area (sf)	n/a		3,000,000	85,000	100,000	1,489,890	84,800
Building Footprint (sf)	174,342	N/A	132,000	23,632	160,000	145,633	28,219
Foundation (sq)	3,815			1,308	32,000	7,881	7,873
Supported Slabs (sf)	710,008	130,624		99,735	1,040,800	511,394	282,130
Total Building Area (sqft)	717,008	130,624	817,609	133,667	1,200,800	617,647	300,439





Develop the Details

Cost Management Detail
Sort Sequences: Section, Element, WBS1

Estimate File: ST. Jude NW Tower Program.est
Primary Project Qty:196862 SQFT
Secondary Project Qty: 0

3/11/2009 8:28:53AM

Report includes Fringes; DOES NOT include T&I or Indirect Costs.

Description	Quantity		Unit \$	Total \$
Hospital Tower				
SUBSTRUCTURE 010000				
BORED/AUGERED PILES				
TIE-DOWN ANCHORS	88.00	EACH	4,500.00	396,000
SPOILS REMOVAL	210.00	CUYD	30.00	6,300
MOVE-IN'S	1.00	EACH	15,000.00	15,000
TEST ANCHORS	1.00	LSUM	40,000.00	40,000
TOTALUndefined Items in				\$457,300.00
TOTALBORED/AUGERED PILES				\$457,300.00
CONCRETE REINFORCEMENT				
REBAR @ FOUNDATIONS - 150 #/CY	289,200.00	LBS	1.05	303,660
REBAR @ SLAB ON GRADE - 1.5 #/SF	76,811.00	LBS	1.05	80,652
REBAR @ RETAINING WALL	12,235.00	LBS	1.05	12,847
REBAR @ STEM WALLS	6,430.00	LBS	1.05	6,752
REBAR @ PITS	10,000.00	LBS	1.05	10,500
REBAR @ PADS/CURBS	1.00	LSUM	12,500.00	12,500
HOISTING	1.00	LSUM	20,000.00	20,000
TOTALUndefined Items in				\$446,909.80

