Mission Bay Block 25 Building -
An Exercise in Target Value Design

*Workshop presented at the **Lean in Public Sector Construction Conference**)*
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Hosted by the Project Production Systems Laboratory (P2SL)
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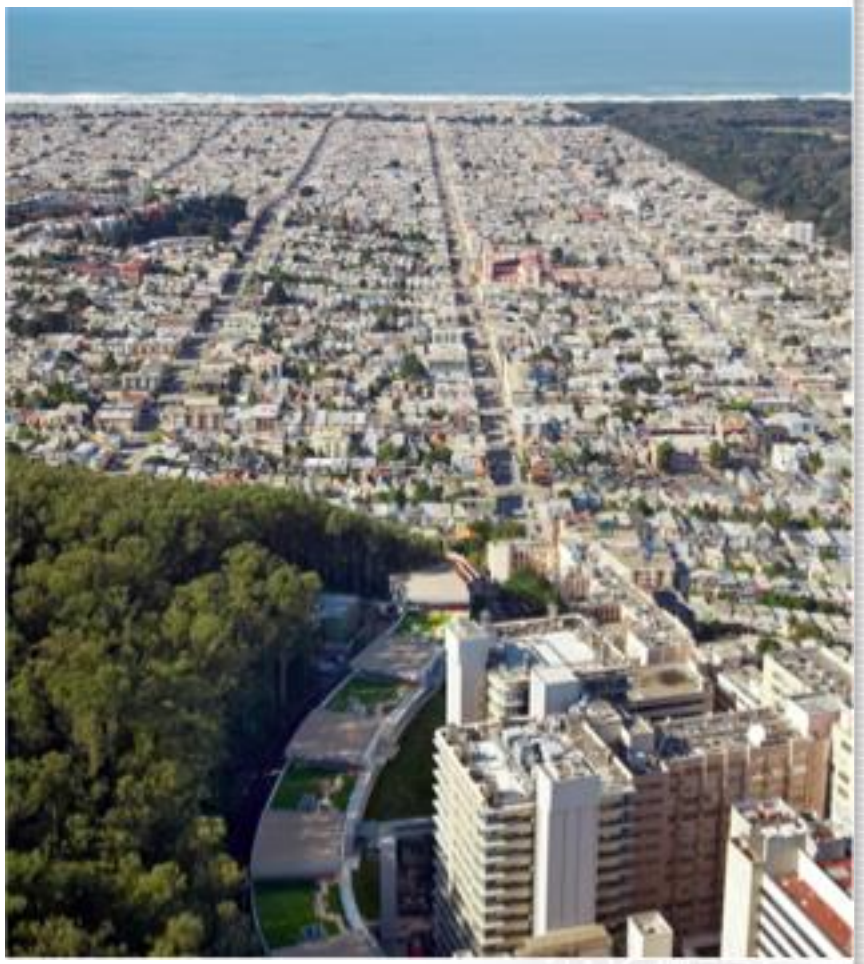
UCSF Use of Available UC Delivery Methods

1. Private (P3) – MB Neurosciences
2. **Best Value** DBB – many small projects
3. **Best Value Lean** CM@Risk (w/ DB Prime Subs)
4. **Best Value Lean** Design / Build (Performance-Based)
5. Modified Design / Build (not used)
6. Design Consultants & Joint Ventures (not used, open to appropriate use)
7. Multiple Prime (not used)
8. IPD (incorporated into **Lean** approach)
9) **Best Value Lean** JOC – (developing for small projects)



Where UCSF Started (2006-2009)

- Connected with P2SL at UCB, Glenn Ballard
- Joined Lean Construction Institute (Greg Howell and Glenn Ballard
- Saw results of early Lean projects for Sutter Health, others
- Developed CM@Risk w/ D-B subs and incentives contract for $254 million Cardiovascular Research Building
- Developed D-B contract for $123 million Regeneration Medicine Building with lean elements
- Expanded upon these for $1.5B Mission Bay Med CTR

Current Lean Project Delivery Options – Major Projects

- CM@Risk w/DB Subs for Parnassus Seismic Program (Completion in 2019)
  - Renewal and seismic retrofit of 2 80 – 100 year old buildings (110 KGSF, 147 KGSF
  - 4 x 12 KGSF lab remodels
  - ~60 other much smaller projects being delivered traditionally for the most part
- Performance Design/Build (Completion in 2014)
  - 265 KGSF Mission Hall office building at Mission Bay
  - Possible Future 175 KGSF at San Fran General
  - Possible Future ~300 KGSF office building at Mission Bay

CASE STUDY: Mission Bay Block 25
Project Drivers

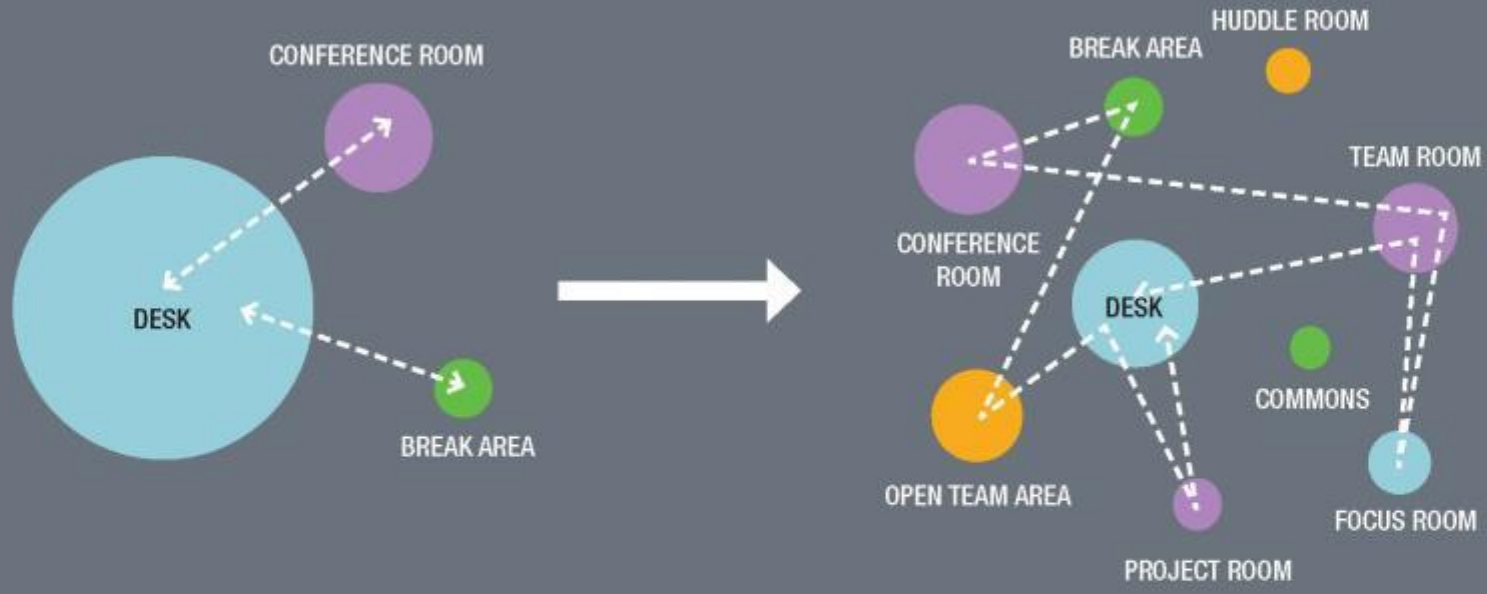
UCSF is investing $1.5B in a new Women's, Children's, and Cancer Hospital at Mission Bay. Where will the researchers and clinicians have their academic workplace?

- *Hospital site too valuable for future hospital expansion to commit to academic workplace*
- *Fixed amount to invest*
- *Must be completed in time for move into new hospital*

San Francisco's economy is hot, driven by the Internet software industry. Rents are rising, and UCSF dry research and educational programs long housed in rental space are being priced out of the market for leased space.

- Opportunities for synergy with existing programs at Mission Bay research campus, new hospital

Work Evolution



TRADITIONAL WORK MODE

- Majority of workday is spent at desk
- Some trips away from desk for meetings and interaction with others
- Little variation or flexibility throughout the day

EVOLVING WORK MODE

- Work hours are distributed between desk, meeting spaces, and informal collaboration spaces.
- Experience activity "highs and lows" throughout the day
- Numerous choices in how to engage in productive work

Risk Management

- UCSF wanted high degree of certainty that the building would be:
  - *Completed on time*
  - *Support the emerging research, teaching, and patient care community*
  - *Have a long-term value horizon*
- UCSF was willing to trade control of the process for certainty of outcomes
- UCSF decided to emphasize performance objectives that deliver long-term value
- A performance-based Design/Build delivery model was selected to engender innovation in design and construction

How to Design & Deliver?

- Design/Build Competition
- Three-level performance specification:
  - *Base (mandatory minimum) level of performance*
  - *Tier 2*
  - *Tier 3*
- Fixed cost of $93.8 M (including furniture and IT)
- Fixed program
- Best Value Contractor award

Mission Hall Contract

- Dependable Programming Information used as basis for Design-Build competition
- Whole-Building Performance Specification
  - Contractual obligation is to build building that exhibits agreed-upon performance characteristics
- Emphasis on QA/QC, which has deep roots in Lean
- QA/QC Process Reqts based on Shingo model


KORET QUAD
CAMPUS WAY
BYERS HALL
4TH STREET
ARCADE
LOBBY
CAFE
GARDEN COURTYARD
GATEWAY PLAZA
3RD STREET
16TH STREET

Measuring Value

PROJECT GOALS

A Quality Work & Learning Environment	A Model of Architectural & Urban Design	A High Performing Building	Environmentally Sustainable	Durable & Long-lasting	Efficiently Serviced & Maintained

BUILDING EXTERIOR

- Design the identity and urban presence of the building to reinforce UCSF's mission of caring, healing, teaching and discovering.
- Develop passionate, innovative, contemporary yet timeless architecture through the composition of architectural elements and arrangement of materials.
- Imaginatively reinterpret the context of the UCSF campus and city through architectural design.
- Employ high performance design and innovative sustainability strategies to enhance the experience and productivity of the building users.
- Create meaningful spatial interactions between indoors and outdoors to enrich the experience of the building occupants, members of UCSF, and the public.

BUILDING INTERIOR

- Support UCSF's mission of excellence in academics, health care research and clinical care by developing a gathering place that facilitates a rich professional and community life.
- Foster an interactive, collegial, and collaborative environment that fuses the clinical programs with dry, basic and translational research.
- Set a model for the future of UCSF workplace through an Activity-Based Workplace tailored to the function, activities, and tools of UCSF faculty, staff and students.
- Achieve optimal efficiencies in the use and organization of space, circulation and core functions.
- Integrate building functions, technology and systems for high performance, maximizing function, serviceability and durability.
- Connect the exterior, interior, office and learning program elements to create a rich and full experience for the building users.
- Design the building interior to be imaginative, contemporary yet timelessly elegant, cohesive and meaningfully transparent.

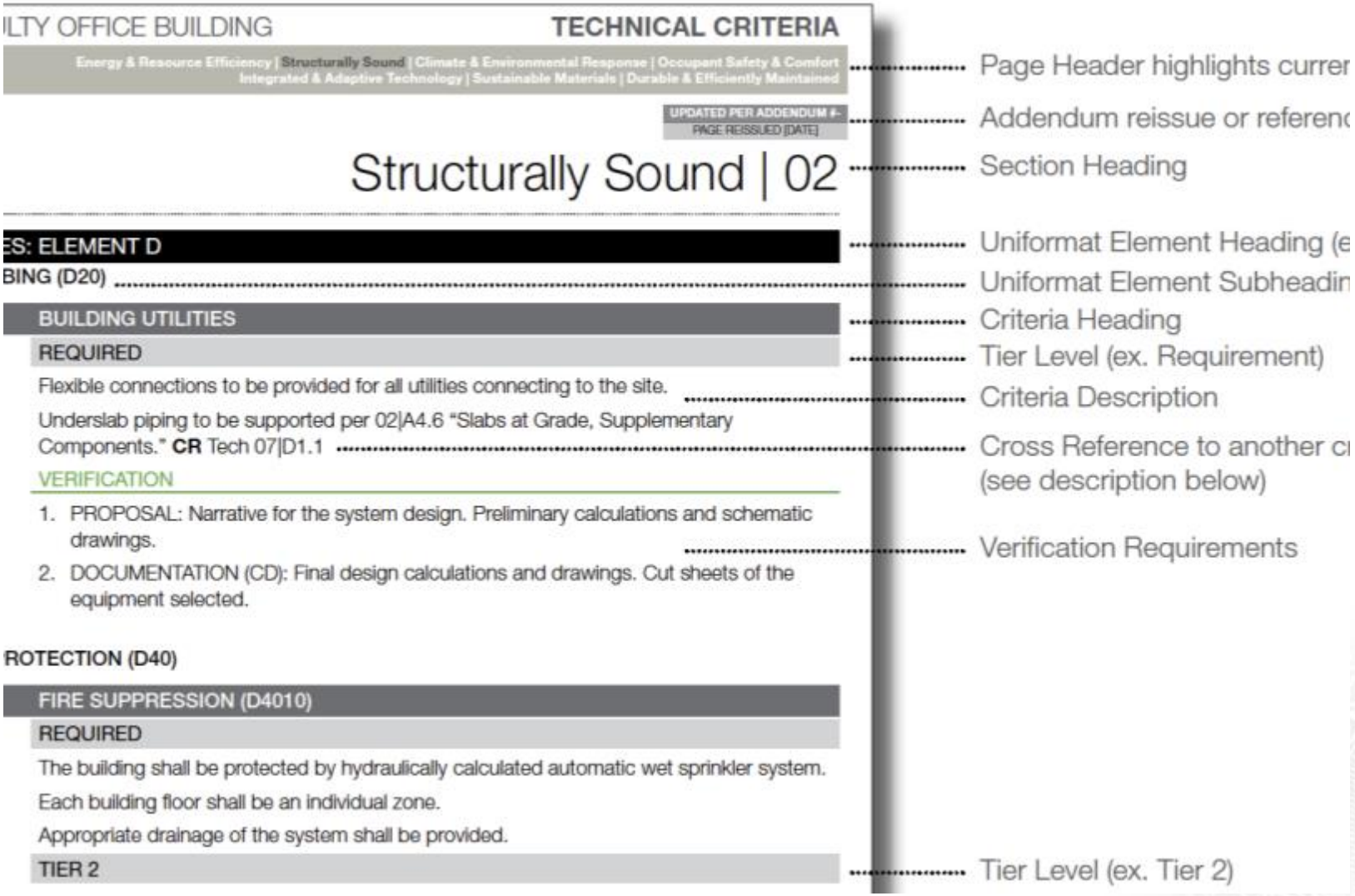
Measuring Value

PROJECT GOALS

A Quality Work & Learning Environment	A Model of Architectural & Urban Design	A High Performing Building	Environmentally Sustainable	Durable & Long-lasting	Efficiently Serviced & Maintained

01 Energy & Resource Efficiency	Design a project that integrates all systems to provide a high-performing building that is appropriately controlled and monitored to minimize energy and resource consumption.
02 Structurally Sound	Develop a code-compliant, safe building that can withstand major seismic events. Provide an efficient structural system that is integrated with the proposed spatial and building systems and that can efficiently adapt to changing office use requirements and infrastructure improvements, while fulfilling or exceeding required performance standards.
03 Climate Responsive	Provide a building that is weather-tight while making maximum use of day-lighting and natural ventilation. Design site utilities, plantings, and site drainage to respond to the specific climactic and soil conditions of the Mission Bay environs.

Measuring Value



Delivery Model Improvement

- Program Information: data-driven design process
- Enforceable Performance Specification
- Proposal process
    - Better targeting of proposal features for selection process
    - Increased compensation to teams
    - Phased proposal process
        - Design
        - Production

Delivery Model Improvement: What Will We Do Differently Next Time?

- PROPOSAL PROCESS
  - Better targeting of proposal features for selection process
  - Increased compensation to teams
  - Phased proposal process
    - Design phase
    - Production planning phase
    - Selection Process

Original Contract Value *versus* Current Contract Value:

- Original Contract value – $93,878,412
- Current contract value – $99,241,510 (note: this is where we are to date – project isn't closed out yet some change orders pending & ongoing owner-requested changes)
- Change orders for the most part were owner-requested changes (due to new AV and IT technology)… However, the Design Builder needed to meet the intent of the performance criteria that UCSF published for this project submission.

Design Schedule

- Project Awarded – August 2012
- Complete design – 9 months
- Design structure & skin – September 2012 – February 2013
- Design tenant improvements – September 2012 thru May 2013

Number	Title	Version	Project	Date Started	Collaborators	Approved by:	Approved date:	Status:
HDS001	High Density Shelving and Design Options	R3	UCSF 25A	11/20/2013	WRNS, R&S, UCSF, PSI	Michael Bade	12/20/2013	✓ Development

Section 1 – Issue

Currently there is a need for shelving/filing system for UCSF. A high density shelving system has been proposed. There are a few issues that need to be selected for short (construction) and long term systems

- Determine what needs to be installed during current construction phase – framing upgrades? Flooring upgrades? All upgrades and shelving system?
- Which rooms get upgraded? All rooms, a portion of rooms?
- Determine room layout – as is plan vs. modified plan (WRNS received direction to go with the modified plan)
- Determine what to install during the current construction phase: access floor, framing/drywall, MEP under floor, etc. revisions/redesign/upgrades. How is flexibility provided?
- Determine what to install for the long term occupancy of the building
- Determine long term shelving system selection

Section 2 – Background

UCSF has indicated there is a need for more storage, filing, etc. space for their current filing system and future needs.

Section 3 – Current Condition

- The current plan indicates some storage space with no high density shelving system.
- Rebar has been upgraded and installed for the possible future installation
- No mechanical, access floor, framing, etc. systems have been upgraded, revised or redesigned – DIRECTION TO PROCEED NEEDS TO BE GIVEN BY 12/20/2013 IN ORDER TO MAINTAIN CURRENT SCHEDULE FOR PROCUREMENT, DELIVERY, INSTALL, ETC. THE MAJOR SYSTEMS THAT REQUIRE THIS DEADLINE ARE ACCESS FLOORING AND MECHANICAL SYSTEMS. PROCUREMENT IS CURRENTLY UNDER WAY FOR BOTH SYSTEMS AND THEREFORE DIRECTION IS NEEDED ASAP, AT THE LATEST 12/20/13.
- A pricing exercise was conducted and is ready for review

Section 4 – Analysis (5 whys?)

- UCSF needs storage space
- UCSF just got consultant for shelving on board
- Need to review options with consultant prior to making a selection
- Create an option for construction phase to not hold up mechanical as well as eliminate future rework and costs
- Prep room for future installation e.g. provide shell space

Section 5 – Target Condition

- PROVIDE SHELVING/FILING SYSTEM AND OR UPGRADES DURING CONSTRUCTION FOR UCSF TO BE FLEXIBLE IN THE FUTURE TO INSTALL SHELVING
- Work on cost to provide shell space for storage rooms
- UCSF has just got their shelving consultant on board
- In order to eliminate rework and additional costs, the group decided to explore a shell space option – revise design, mechanical reroute, full height walls, leave rooms in shell condition, allowance for access floor (current cost) to apply to future build out

Section 6 – Proposed Countermeasures (not solutions)

The following ROMs are based on all rooms getting revised. The design cost (architectural) will also vary depending on which option is selected (REFERENCE COST ESTIMATES FOR BACK UP):

SHELL SPACE OPTION - $93,259.00

- Make design changes/revisions
- Provide full height walls, drywall one side, install backing
- Revise mechanical design and reroute outside of rooms
- Revise access floor – cut at full height walls, one side
- Do not install access flooring in rooms – hold allowance for flooring not installed

OPTION 1 – $72,769.00

- make design changes (architectural)
- upgrade framing/backing only

OPTION 2 – $371,325.00

- make design changes (architectural, lighting and mechanical),
- upgrade framing/backing,
- upgrade access floor system,
- install rail and cap

OPTION 3a – $871,227.00

- All design revisions and upgrades the same as option 2
- install compact shelving system (with open shelves)

OPTION 3b – $1,618,324.00

- All design revisions and upgrades the same as option 2
- install compact shelving system (with mechanical flip up doors)

NOTE – This A3 does not include the review of the fixed shelving option; should the compact shelving not be desirable, a review of systems and costs of the fixed shelving would need to take place.

Section 7 – Implementation Plan

	Action	Who	Due	Outcome - Comments	Status
1	All to meet and review possible options	All	12/11/13	done	Complete
2.	All to give input for A3	All	12/13/13	done	Complete
3.	Send out revision of A3 and have second meeting to discuss	R&S	12/18/13	done	Complete
4.	UCSF to make selection by for AF, Mechanical, framing, shelving etc. revisions.	UCSF	12/20/13		complete

Cost: $93,259 – shell space option was selected at the current time to ensure construction operations are not held up. (PCO 8108)

Cost Benefit/Waste Reduction: construction continues uninterrupted, UCSF can further determine the best shelving solution for their needs, shelving and other systems are not reworked, just installed at a later date.

Test Actual after Implementation: forthcoming

Section 8 – Follow Up & Next Improvement Cycle (Plan Do Check Act)

FORTHCOMING

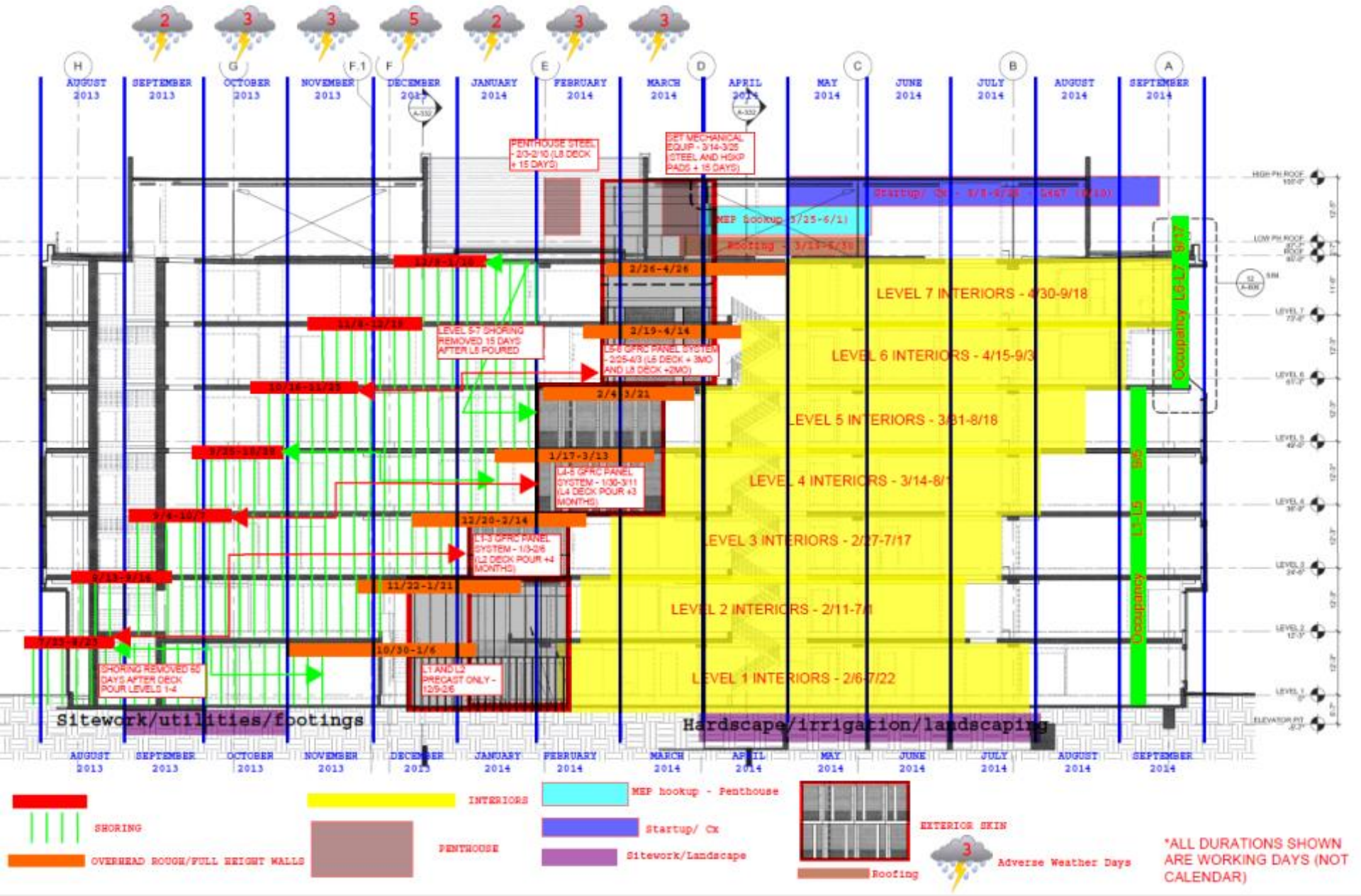
Construction Schedule

- Make ready work/move trailer – September 2012 thru February 2013
- Main building and landscaping – March 2013 – September 2014 – 18 months
- Remove trailer/complete parking lot – October 2014 thru November 2014
- **NO CLAIMS SUBMITTED**!
- Building turned over on time – big wins for the project!
- Temporary Certificate of Occupancy & Substantial Completion occurred- 9/5/2014
- o classes start tomorrow.

Phases and Projected Schedule

Phase	Projected Date
Piles	Completed
Foundations	May / June 2013
Top-Out Structure*	January 2014
Interior Construction	January – August 2014
Exterior Cladding	January – June 2014
Landscape	May – July 2014
Final Completion	September 2014
Occupancy – Academic Groups	*September – November 2014*
Occupancy – Clinical Groups	*November 2014 – February 2015*

UCSF BLOCK 25A - SCHEDULE SEQUENCING MAP - 8/14/2013



What LEAN Processes Worked on this Project?

- Prefabrication – as we designed the building we focused on designed systems that would encourage prefabrication
- Exterior skin/envelop (big design win to improve quality control and improve construction timeframe to install the exterior skin of the building)
- Duct-sox (in lieu of hard ductwork under floor)
- Sign of Success: classes start tomorrow.

UCSF Block 25A
Choosing By Advantages - Access Flooring Anchorage System

Date	Number	Revision	Title	Facilitator	Collaborators	Approved By:	Approved Date:	Status
11/15/2013	AF 001	4	Access Flooring Anchorage Review	R&S - Matt Jackson	UCSF, R&S, WRNS, R&C, PSI, Tate, Brandow & Johnson, MaryAnn P, Chuck T	Michael Bade - UCSF		FINAL

SECTION 1 - OBJECTIVE

Utilize Set Based Design and Choosing by Advantages to develop and select best option for the UCSF 25a access flooring anchorage method. We will select the best and most cost effective access flooring anchorage method based on the projects current design (MEP Systems, pedestals, etc.), UCSF criteria and schedule milestones/durations.

SECTION 2 - SCHEDULE

The project schedule indicates the access floor systems will start installation in early February 2014. The procurement time for the level one access flooring system/tiles (nurazzo and cork finishes) is 12 weeks. In order to ensure there is no impact to the project construction schedule, the material must be ordered by November 15, 2014. Therefore a selection of the access flooring anchorage method must be selected and notice to proceed be given by the end of the first week of November, 2014. Note a deferred approval package must also be completed and submitted /reviewed by mid November 2014.

SECTION 3 - ANCHORAGE DESIGN OPTIONS & ISSUES

OPTION A: Cantilevered Pedestals with Adhesive (Basis of Design)

Description
utilize seal bond 95 adhesive for structural anchorage
adhesive anchorage utilized on all levels
reference pedestal cut sheets for details

Pros:
Basis of design, no additional design changes
Schedule Impacts are minimal (approx. 10 days)
coordinated with rebar and MEP under floor systems
Long term flexibility for future under floor system tenant improvements
0 Mechanical anchorage points, Approx. 78,000 adhesive anchorage points (pedestals), Basis of design

Cons:
added cost of QC and testing
QC/testing program to be developed and accepted
Quantity of pedestals to be tested per CSP-T method
mitigation of QC/installation errors
schedule impacts (approx. 10 days)
Confidence of long term structural performance

OPTION B: Cantilevered Pedestals with Expansion Anchors (all floors)

Description
hilti TZ anchors (3/8" x 2"); 2 anchors per pedestal (all)
hilti TZ anchorage utilized on all levels
reference pedestal cut sheets for details

Pros:
timely QC and testing during construction
meets longevity requirements
minimal coordination with MEP under floor systems
Long term flexibility for future under floor system tenant improvements

Cons:
Added cost of system
added cost of QC and testing
extensive rebar coordination and mitigation of rebar hits
Potential impact of MEP system redesign
Impacts to schedule (approx. 20 days)
Approx. 156,000 mechanical anchorage points (2 anchors per pedestal)

OPTION C: Cantilevered Pedestals with Expansion Anchors L1, L2; Braced pedestals with expansion anchors L2-L7

Description
L1 - L2 - Hilti TZ anchors (3/8" x 2") 2 per pedestal
L2 - L7 - 4 way bracing w/ Hilti TZ anchors (3/8" x 2")
reference pedestal cut sheets for details

Pros:
timely QC during construction
meets longevity requirements

Cons:
Added cost of system
added cost of QC and testing
Impacts to schedule (approx. 30 days)
extensive rebar coordination and mitigation of rebar hits
Potential impact of MEP system redesign
Added 45 degree kickers that extend in 4 directions per pedestal (on 90), approx. 16" in access flooring bays
Approx. 47,840 anchorage points (4 anchors per brace)

OPTION D: Adhesive and Mechanical Anchors Hybrid (add mechanical anchors at limited number of pedestals as back up system)

Description
utilize seal bond 95 adhesive for structural anchorage
adhesive anchorage utilized on all levels(seismic assumed resisted); anchor 1/3 of pedestals on each floor
reference pedestal cut sheets for details

Pros:
Long term flexibility for future under floor system tenant improvements
coordinated with MEP under floor systems
No QC program required
minimal coordination with MEP under floor systems
Minimal cost of testing

Cons:
mitigation of QC errors
Impacts to schedule (approx. 15 days)
Approx. 52,000 Mechanical anchorage points, Approx. 78,000 adhesive anchorage points (pedestals)

SECTION 4 - COST ANALYSIS

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	PSI QC/Testing ROM	TOTAL ADD TO D/B TEAM	CELQC/Testing ROM	TOTAL ADD TO UCSF	Qty of Test (pedestals or anchors)	Notes
A: Adhesive	$0	$0	$0	$0	$0	$0	$0	$104,000	**$104,000**	$11,064	**$115,064**	3,124	PSI - 2 ppl/week for 13 weeks; CEL - 85/hr, 12 tests/hr, 3124 tests per CSP-T test; based on 5 failures per floor
B: Mechanical	$136,706	$82,921	$114,355	$114,355	$114,203	$114,203	$58,686	$19,623	**$755,052**	$55,250	**$810,302**	15,600	10% of anchors tested per floor (torque test); assume 2.5 mins per test; CEL 85/hr
C: Hybrid Braced and Anchored	$136,706	$112,808	$120,053	$120,053	$120,053	$187,992	$94,735	$19,623	**$912,023**	$16,943	**$928,966**	4,784	10% of anchors tested per floor (torque test); assume 2.5 mins per test; CEL 85/hr
D: Adhesive with Backup	$45,569	$27,640	$38,118	$38,118	$38,118	$38,118	$19,562	$0	**$245,244**	$18,417	**$263,660**	5,200	anchor 1/3 of floor;10% of anchors tested per floor (torque test); assume 2.5 mins per test; CEL 85/hr; PSI QC time built into cost per floor

SECTION 5 - CHOOSING BY ADVANTAGES

Scoring System
5 - Very Good
4 - Good
3 - Fair
2 - Poor
1 - Very Poor

	Cost - **all agreed**	Schedule Impacts (testing and install impacts) - **all agreed**	Impacts with other Systems (field) - **all agreed**	QC / Testing Required - **all agreed**	Confidence of Structural Design - **all agreed**	Confidence of Structural Performance (long term) - **all agreed**	Future Flexibility (under floor systems) -**all agreed**	**Overall Total - all agreed**	Notes
A: Adhesive	4	3	5	2	4	2.5	5	**25.5**	
B: Mechanical	1	1	3	3	4	5	5	**22**	
C: Hybrid Braced and Anchored	1	1	1	4	4	5	2	**18**	
D: Adhesive with Backup	3	4	4	4	4	4	5	**28**	

SECTION 6 - SELECTION AND CONCLUSION

Selection: Option D - reference email from UCSF
R&S will work with PSI on tapcon option if possible.

Justification Option A and D were selected via highest scores in the CBA scoring above
Cost of Options A and D are better than B and C
Options B and C costs are to high per Michael Bade

SECTION 7 - IMPLEMENTATION PLAN

What	Who	Promise Date	Outcome - Comments	Status
Template out to team	R&S	10/30/2013		complete
Team to respond	All	10/31/2013		complete
Revise A3 template with feedback	R&S	11/1/2013		complete
All review input, respond to items with comments	All	11/4/2013		complete
Update A3 with all comments and send to team for decision making	R&S	11/4/2013		complete
Meet to discuss A3 @ 11am	UCSF	11/5/2013	UCSF to review A3 and make final selection	complete

SECTION 8 - FOLLOW UP (PLAN - DO - CHECK - ACT)

Outcome: UCSF Selected option D.

Plus Delta: good team work, good A3 review process, all got to review all options/issues, several sessions held to continue to update A3/CBA Score and discuss systems, collaborative process, decision making was more efficient than sending everything via letter and or email, issues were worked out on the spot in lieu of drawn out process

Lessons Learned: A3 process worked well, team work and working sessions helped decision making process, CBA and Set Based Design keep selections focused and on track

	Updated Plan:	Status
1	R&S to follow up with CEL on inspection costs, rates, inspection type etc.	complete
2	include 10% testing in cost	complete
3	PSI, R&C and B&J to follow up on design item D, B&J to follow up with R&C	complete
4	10% testing, what happens is one fails? address in QC plan (add anchors, use CSP-T, i=44)	complete
5	R&S to provide final A3 by Friday	complete
6	use CSP-T testing on option D? R&C and R&S review - in lieu of testing 10%; got option from R&C	complete
7	UCSF to make selection by 11/11/2013	complete
8	Conference call with WRNS, R&C, R&S, Mary Ann to discuss AF submittals (product, review, turn around time, etc. need to order first floor by 11/15.	ongoing

- Walters and Wolf design build skin subcontractor
  - Brought on very early in proposal phase
- 361 panels
  - Precast
  - GFRC
  - GFRC window box (up to 12x36’)
- Corrugated metal panel penthouse skin
- Plaster soffits and parapets
- Torch down roof

361 Skin Panels

Offsite Fabrication

- GFRC Panels
- Glazing
- Metal Panels
- Caulking
- Curtainwall insulation
- Aggressive lean practices in shop allowed for onsite schedule acceleration

Field of Panels

Access Floor System Overview

- Subcontractor - Partition Specialties Inc.
- 66,500 Floor Tiles (9,500/floor)
- 78,000 pedestals (12,000/floor)
- Panel Finishes
  - Carpet
  - Nurazzo
  - Cork
  - High Pressure Laminate

The “BIG ROOM”

- There is no way we could have designed and constructed this building in the time frame we committed to without the BIG ROOM and the commitment from the key team members to be committed to occupying the big room (as it was required)
- Dialog was continuous in the BIG ROOM through:
  - · On the fly discussions and sidebars
  - Loose “on the go” meetings
  - Structured weekly check ins

Big Room: Weekly Work Plan/Sequencing


Percent Plan Complete
Weekly Work Plan
3/2014

ADVANCED TECHNOLOGY

- Using technology available to share information on the fly
- Box.com to house all of the master drawings (no more having to each keep their own drawing sets)
- BIMAnywhere to bring the model to the field and manage daily quality items
- Bluebeam used to keep all the visual management tools up to date (even superintendents are updating these documents….no long limited to the office staff to keep documents up to date)
- Most of the punchlists kept in a visual format

PULL Scheduling

- Pull scheduling was very successful for the project
- We committed with UCSF to delivery this building (design & construction this building under a very aggressive schedule – 24 months). We had a good master schedule (summary schedule) which was submitted to before we completed the design. So now that the design was complete, pull scheduling was used to validate the schedule with the subcontractors and get firm commitments from the subs to meet this aggressive schedule. The pull scheduling sessions also helped to identify/highlight schedule efficiencies & challenges.

PULL Scheduling (con't)

- We found pull scheduling to be one of the more successful LEAN tools we used on this project. The prep work that went into scheduling pull sessions was also just as valuable. These prep sessions were to have the early dialog with small groups of people to discuss sequence, constructability, etc. This was the dialog necessary to be prepared to go into a pull scheduling session and be successful.
- Our pull scheduling sessions were highly effective, because of the preplanning, prep sessions, training we have the team members, and making sure all involved with the pull scheduling session was coming in prepared.

PULL Scheduling (con't)

We completed pull scheduling sessions for the following areas of work:

- Underground/excavation/footings/SOG
- Building structure – going vertical -Bonus – completed Takt time analysis to form and pour a concrete floor plate – to meet a 5 day pour sequence – 15 days to complete a floor
- Interiors, 1st floor - A typical floor ended of being a set of 3 phased working sessions because the first pull scheduling session confirmed we needed to rework construction sequences to improve our construction schedule durations.
- MEP startup and commissioning

Mission Bay Block 25A

Typical Cycle With Crane Durations

Friday, February 08, 2013

MCCLONE CONSTRUCTION COMPANY

Legend: Form, MEP, Reinforcing, Pour, R&S / Inspections

Crane Usage per Day														Crane Usage per Week
	Form	7	3	4	4	4	22	Form						
	MEP	0	1	0	1	0	2	MEP						
	Rebar	3	7	4	4	6	24	Rebar						

Week ->	1					2						3						4						5						6						7						8						9		
Day of the Week ->	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S	M	T	W	TH	F	S
Required Crane Time per Day (Insert # in Cell)	3	1	2	5	6	0	6	9	6	9	6	0	8	11	8	9	10	0	10	11	8	9	10	0	10	11	8	9	10	0	10	11	8	9	10	0	7	10	6	4	4	0	4	2	2	0	4	0	2	0	0	0	0	0

Level 3 Pour #1

Form Deck	3	1	1	0																																														
Install Handrail & Clean Deck			1	1																																															
MCC Lay Out / Control			0	0																																															
Install Edgeforms / CJ's / Embeds				1	0																																													
MEP Layout				0																																															
MEP Insert / Sleeves				1																																															
Rebar Layout				0	0																																														
Install Horizontal Rebar (Bottom Matt)					3		1	2																																										
MEP In Deck Piping							0	1																																										
Install Horizontal Rebar (Top Matt)								2	2	0																																								
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Install Vertical Rebar (Round Columns)				2	1																																												
Install Vertical Rebar (Walls Including Boundary Columns)					2		2	3	2	2			0																																					
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Strip Vertical Formwork																	4																																	

Level 3 Pour #2

Form Deck							3	1	1	0																																										
Install Handrail & Clean Deck									1	1																																									
MCC Lay Out / Control									0	0																																									
Install Edgeforms / CJ's / Embeds										1	0																																								
MEP Layout										0																																									
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Strip Vertical Formwork																																															

Level 3 Pour #3

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MCC Lay Out / Control															0	0																																			
Install Edgeforms / CJ's / Embeds																1	0																																		
MEP Layout																0																																		
MEP Insert / Sleeves																1																																		
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Level 4 Pour #1

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Install Edgeforms / CJ's / Embeds																				1	0																														
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MEP In Deck Piping																								0	1																							
Install Horizontal Rebar (Top Matt)																									2	2	0																			
Clean Deck																											1																			
Horizontal Inspections																									0	0	0	0																	
Pour Deck																												0																	
Install Vertical Rebar (Round Columns)																													2	1															
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Level 4 Pour #2

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Form Vertical Walls																																						2	2	2				
Pour Vertical																																							0				
Strip Vertical Formwork																																							4		2			

Level 4 Pour #3

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Install Handrail & Clean Deck																															1	1															
MCC Lay Out / Control																															0	0															
Install Edgeforms / CJ's / Embeds																																1	0													
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MEP Insert / Sleeves																																1													
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Form Vertical Walls																																											0	0	0	
Pour Vertical																																											4		2	
Strip Vertical Formwork																																													

VISUAL MANAGEMENT

- ANOTHER VERY KEY LEAN TOOL USED DAILY OUT HERE
- Used in all aspects of the construction process
- Examples included:
- DAILY JOB HAZARD AND ACTIVITIES BOARD – located at the building entrance and updated daily/weekly.
- VISUAL OVERVEW OF THE PROJECT MASTER SCHEDULE – best tool to visually represent how the sign limited how fast we could construct the building

VISUAL MANAGEMENT

- BEST TOOL TO COMMUNICATE THE SCHEDULE CHALLENGES TO UCSF that were buried in the 2,000 line schedule ATTACHED AS UCSF MASTER SCHEDULE S
- WEEKLY SITE MANAGEMENT & SNAPSHOT OF SCHEDULE/AREAS IMPACTED - Used to communicate weekly to the sub contractors of activity on the site and visually communicate the schedule (subs were using this document more than they were looking at the 6 week rolling schedule, also published weekly) (THIS WAS USED IN LIEU OF THE 5S PROGRAM – ANOTHER LEAN TOOL)
- TRACKED SIGN OFF BY FLOOR AS WORK WAS COMPLETED

EXAMPLE OF 5S

QUALITY MANAGEMENT

- We had a high success with our inspections & avoided rework because we closely monitored construction progress and daily checked subs work
- Inspection success rate was 98% – mostly in part of the LEAN processes we had in place
- Visual management (comprehensive tracking and drilling down to what really needed to be tracked) – we may have looked at the project holistically but we didn't do "deep dives" for everything to track quality.

QUALITY MANAGEMENT

- The focus was
  - Concrete deck inserts and rebar placement
  - Wall framing/close walls
  - Ceiling framing/close ceilings
  - Under floor plenum integrity
- Use of BIMAnywhere to track field deficiencies using the BIM model – real time tracking of deficiencies

Quality Program Overview

- Floors broken into 3 sectors to create small sections for inspections
  - One piece flow
- Pre-inspection and quality check lists
  - Development
  - Management
  - Evolution
- Daily quality walks and QC map distribution
- Quality maps housed and tracked in BIMAnywhere software
- Model/Quality review, issue tracking and resolution via BIMAnywhere
- Quality maps reviewed in sub meetings

Quality

UCSF Block 25A
QUALITY CHECKLIST
Date: 11/7/2013
FOR REFERENCE ONLY

RUDOLPH AND SLETTEN

Subcontractor	Pour Date	Time	Estimated Yds	Design Strength	PSI	Other
Cupertino, Southland, Superior	11/8/2013	AM	N/A	N/A	N/A	None
Scheduled Placement Location:	**Floor (Level&col Lines)**		**Columns (col lines)**		**Walls (col lines)**	
L7 Area A - Deck	L7 Area A - Deck		N/A		N/A	
Inspection Notification:	**Agency/Eng called**	**Date**	**Time**	**Confirmed with**		
L7 Area A - Deck	UCSF FM & IOR	11/8/2013	2:30pm	Jeff Monkman & Mike Watkins		
Concrete Mix Number & Type Aggregate:	**Mix**		**PSI**	**Aggregate Size**	**Slump**	
Slab Concrete	N/A		N/A	N/A	N/A	
Weather:	**Forecast:** Cloudy					
Pre-pour meeting with Testing Agency	Date held	N/A	Comments			
Pre-pour meeting with subcontractor held	Date held	10/18/2013	Comments	Spoke with Dave P., James B. and Dave A.; indicated work is complete and ready for inspection		

Scope/Logistics:	Yes	No	Action Needed	Comments
deck formed, hand rails installed, controls set	X			
Rebar staging and sequence established	X			
MEPF work complete, ready for inspection	X			
Rebar delivered and installed, coordinated with MEPF	X			
inspection request submitted 48 hrs prior to inspection	X			
layout and install mechanical inserts	X			
layout and install plumbing inserts	X			
layout and install plumbing cans	X			
layout and install fire sprinkler inserts	X			
layout and install fire sprinkler sleeves	X			
layout and install electrical WAPs, Boxes, etc.	X			
layout and install electrical cans / stub ups-downs	X			
layout and install electrical in slab conduit			X	Electrical to fix conduit and stub down, informed Dave A. via S-C-W email. Dave to fix 11/8 am

CONTRACTOR SIGN OFF					
Cupertino:	**Signed Off By:**		Dave Amaral	**Date**	11/7/2013
layout and install electrical inserts	X				
layout and install electrical cans / stub ups-downs	X				
layout and install electrical in slab conduit			X		
Southland:	**Signed Off By:**		James Braga	**Date**	11/7/2013
layout and install mechanical inserts	X				
layout and install plumbing inserts	X				
layout and install plumbing cans	X				
Superior:	**Signed Off By:**		Dave Petersen	**Date**	11/7/2013
layout and install fire sprinkler inserts	X				
layout and install fire sprinkler sleeves	X				
Rudolph & Sletten:	**Prepared by**		Matthew Jackson	**Date**	11/7/2013

Quality: Built-in Quality

UCSF 25A

Inspection Tracking Metrics

Updated - 7/28/2014

Thru confirmed, return inspection number 813 (some inspections still open in this range); inspections overall up to 966

Summary (overall totals)

Total Inspections: 734 Passed Inspections: 720 Failed Inspections: 14

Pass Rate:

98.09%

Breakout (major phases)

Quality: Built-in Quality

Structural Total Inspections: 211 Passed Inspections: 203 Failed Inspections: 8

Pass Rate: **96.21%**

Exterior Skin

Total Inspections: 42 Passed Inspections: 40 Failed Inspections: 2

Pass Rate: **95.24%**

MEP / Fire Sprinkler

Total Inspections: 243 Passed Inspections: 236 Failed Inspections: 7

Pass Rate: **97.12%**

Site

Total Inspections: 10 Passed Inspections: 10 Failed Inspections: 0

Pass Rate: **100.00%**

LAST PLANNER SYSTEM ™

LAST PLANNER

THE VALUE WE SAW WITH LAST PLANNER ON THIS PROJECT WAS TRUE TO THE LAST PLANNER MODEL

- foremen & superintendents committing to what “actually “ can be committed to within that week.

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LAST PLANNER SYSTEM ™

LAST PLANNERS BEING "FORCED" TO LOOK AHEAD – "I HIGHLIGHT 'FORCED' BECAUSE THIS PROCESS STILL DIDN'T COME COMPLETELY ORGANICALLY – SUBS WOULD TEND TO WANT TO "BLOW OFF" KEEPING UP WITH SETTING COMMITMENTS AND LOOKING OUT IN FRONT OF THEIR WORK. THE SUBCONTRACTORS LIKE THE IDEA OF THE COMMITMENTS. BUT ONCE WE GOT SUBS TO SEE IT VALUE AND SEE THAT THESE COMMITMENTS (USING THE POST-IT PROCESS FOR TRACKING), IT BECAME A SOURCE FOR DIALOG AND NEGOTIATIONS TO GET WORK DONE WITHIN THAT MILESTONE PERIOD." *PM FOR THE DESIGN BUILDER*

PERFORMANCE INCENTIVES

- ACCORDING TO THE DESIGN BUILDER, INCENTIVES DO PLAY A PART –BUT OVERALL A SMALL PART . MOST OF THE LAST PLANNERS DIDN'T EVEN KNOW THAT THERE WAS MONEY ON THE LINE….THE DESIGN BUILDER TRIED HARD TO MAKE THE LAST PLANNER PROCESS TO REALLY BE ALL ABOUT HOW IT CAN IMPROVE THE COMMITMENTS ON THE PROJECT AND BE MORE EVOLVED AND MORE SELF AWARE HOW ONE TRADES WORK IMPACTS OTHERS.

- BUT TRACKING COMMITMENTS DOES IMPROVE THE SUCCESS TO THE OVERALL PROJECT. BUT IT IS ALSO AN EDUCATION – TO MAKE SURE FOLKS AREN'T OVER COMMITTING. THAT IS OUR BIGGEST "VARIANCE" TRACKED.

AS IT RELATES TO THE MILESTONES PART OF THE INCENTIVE PLAN:

"I FEEL THAT THIS PART OF THE INCENTIVE PLAN IS MORE SUCCESSFUL BECAUSE SO TANGIBLE TO THE SUBS – EVERYONE CAN RELATE TO A COMMITTED MILESTONE ." *PM FOR THE DESIGN BUILDER*

Overall guidance, tips, lessons learned to implementing LEAN processes and principles on the project

- Training and education will give you your biggest early successes
- Training folks over time to understanding the fundamentals and big picture expectations to make sure we are successful
- Formal training of last planner & pull scheduling
- Need to continually check the temperature to confirm subs are actively updating commitment

Overall guidance, tips, lessons learned to implementing LEAN processes and principles on the project

"DON'T LET THINGS GET ON AUTOPILOT – FOR EXAMPLE WITH LAST PLANNER – DON'T TAKE ANYTHING AT FACE VALUE, ALWAYS CONFIRM THAT THEY CAN MET THAT COMMITMENT (DON'T JUST ASSUME JUST BECAUSE IN BACK LOG THAT IT WILL BE DONE)....SO MAKE SURE AND REVIEW BACKLOG ALSO."

LEAN Lessons and Successes on the Project

- Communication and continuous dialog is key to the successful project
- Having a way to track successes helps to build trackable measurements to give the team a chance to reflect on what we need to improve on
- Lesson - Just because you used tools on a previous project doesn't mean they will work the same on the next project… always reevaluate how you are going to approach a project. Successes on one project, likely won't be the same successes on the next project.

LEAN Lessons and Successes on the Project

For example, we started this project tracking LAST planner with the same tool as a previous project. And it just didn't work, the design phase really lent it to taking a different approach to track commitments. After revamping how we looked at Last planner and broke up the project into "teams", we could approach each team into different ways to be successful

- Design/BIM
- Construction
- OAC team (the overview/big decisions, etc.)
- Start up/commissioning

LEAN Lessons and Successes on the Project

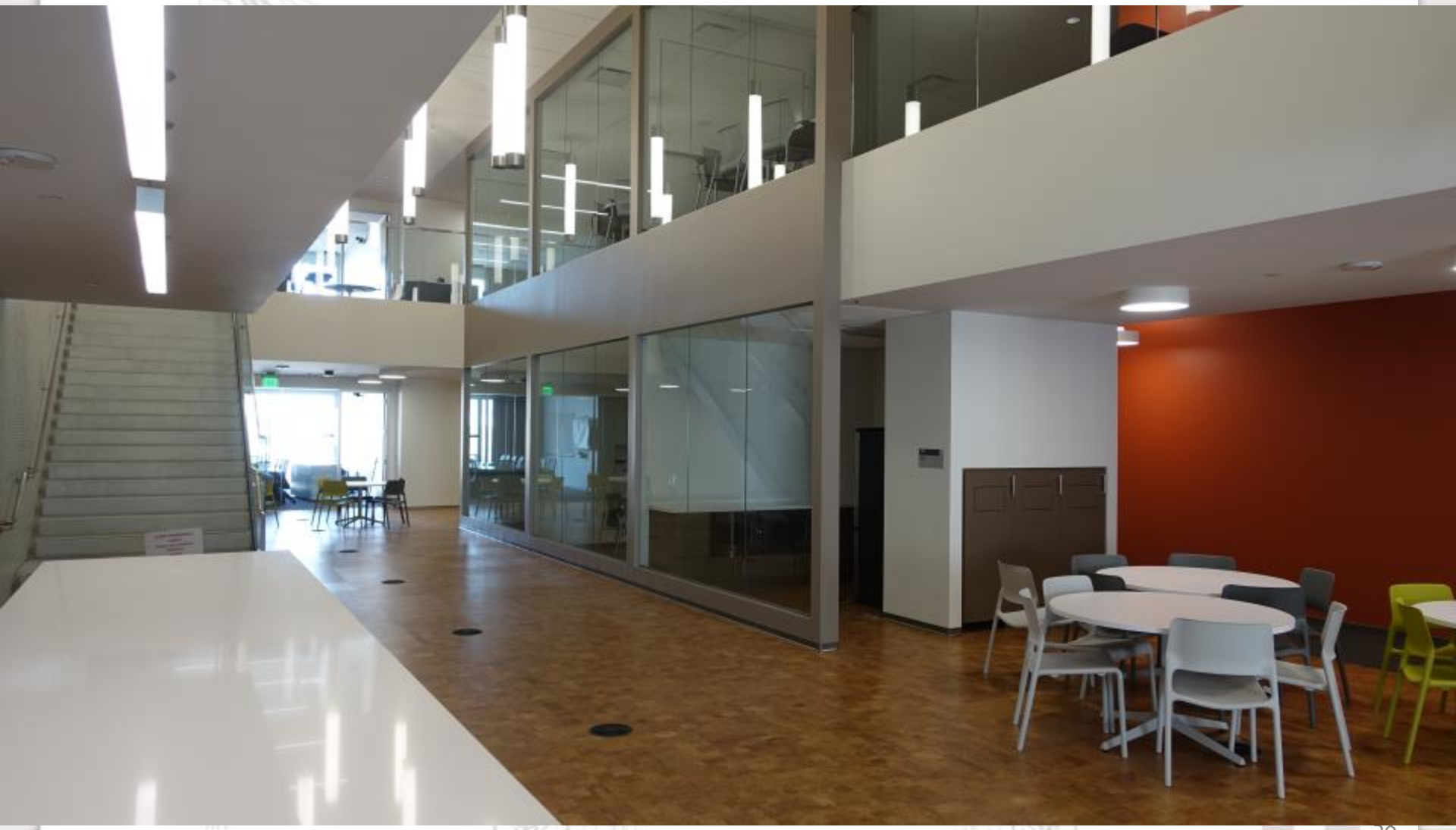
We kept track of the BIG WINS

- Met or beat all milestones committed to
- Maintained over an 80% PPC tracking between phase 2 & 5
- Found a way to build the structure per the submitted construction schedule – topped out 12/28/13

LEAN Results Reflected in the Project

LEAN Results Reflected in the Project

LEAN Results Reflected in the Project



LEAN Results Reflected in the Project

Departmental Lean Process Improvements

Spring/Summer 2014 Progress Report

UCSF Capital Programs

UCSF Capital Programs Lean Process Improvement

- Unhappy customers – projects "too expensive, too time-consuming"
- Stressed-out staff – "too much to do, surly customers, too much red tape"
- Rising workload
- Complex projects – even small projects are complex
- Environment of change in the institution
- **Decided to eat our own cooking**

First Steps

- Engaged Lean Management consultants (Hayley & Aldrich)
- Began formal process improvement effort
- Installing new Business System – vehicle for process improvement of basic business processes (will include e-commerce relationships with contractors, subs, consultants, and suppliers)
- Reached out to customers
- Reached out to staff
- Have seen positive results

THINGS WORKING WELL

Customers

- Excellent architects & designers. Several strong PMs and analysts.
- Many great projects provide the desired outcomes
- Timely, transparent communications
- Construction is well managed

Staff & Directors

- Strong knowledge on team, always someone who can help
- Able to conceptualize and complete complex projects.
- Everyone chips in – staff get along well
- Highly skilled analysts provide good PM support

THINGS WE NEED TO IMPROVE

Customers

- Inconsistent quality by PMs
- Close out 2± yrs. & hold funds
- Too much waiting
- Too costly, unrealistic budgets
- CP is understaffed

Staff & Directors

- Lack consistency in PM methodologies
- Many processes “get in the way” e.g. closeout
- Approval bottlenecks
- Complex processes used for both small & large projects adds cost
- Staff absorb hours to get job done

LEAN APPROACH GAVE US A PLAN:

Improve Each Element For Higher Performance

1. **Strategy:** continual PDCA of customer needs, transparency, new business system, define department roles
2. **Work & Management Processes:** systematically streamline, improve delivery models, support with business system
3. **People:** Hire to fill the gaps in capabilities & drives, improve capacity with process change
4. **Structure:** Reshape reporting relationships

Initial Results

- Response to customer work order went from 4 weeks to 1 week
- PMs taking over project assignments with guidance from Dept. leadership
- Effectively cut steps from key processes such as project startup

A Few Lessons Learned

Start with a shared understanding of the goals, current situation and problems; If you don't **focus on what is most important** you might improve the wrong things

Get the **right people** involved – include policy and decision makers, staff, customers, suppliers - **challenge** all of them and help them improve. Select an implementation leader.

Trust people doing the work to understand WAH (What Actually Happens) and to develop solutions; look for waste AND for positive deviants

Match structure to processes to resources to customer needs to strategy

Engage people to understand **the big picture;** they will develop ownership for long term success

Questions?