



# Implementing Integrated Project Delivery, Lean Construction and BIM through Design Build

Presented to
Lean Construction Institute Congress











October 5, 2011

### About the District



- Second Largest Community College District in California
- Sixth Largest in Nation
- Centralized Maintenance & Operations
- Four Institutions
  - Three colleges (City, Mesa and Miramar Colleges)
  - Six Continuing Education campuses







# About the District (Current State)









### **Current Square Footage**

Buildings = 2,078,008 Gross Square Feet (GSF)
Parking = 377,712 Gross Square Feet (GSF)

### **Current Acres of Landscape = 130.2**

### **Current Utilities Consumption**

Electric = \$3,971,950

Gas = \$480,821

Water = \$774,070

Total = \$5,226,841

# About the District (Future State)



### **Projected Square Footage**

Additional Building GSF = 1,601,443 Total Building GSF = 3,679,451

Additional Parking GSF = 987,289 Total Parking GSF = 1,365,001

**Grand Total GSF = 5,044,452** 



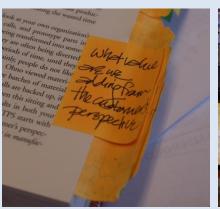




# Practicing the Toyota Way Business Principles

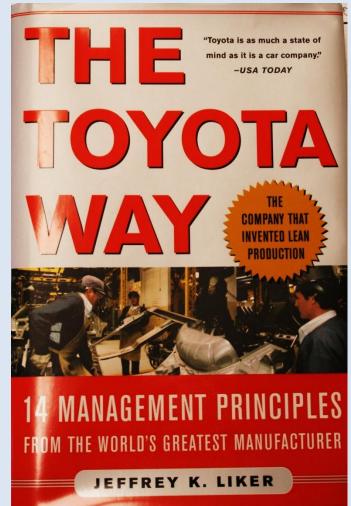






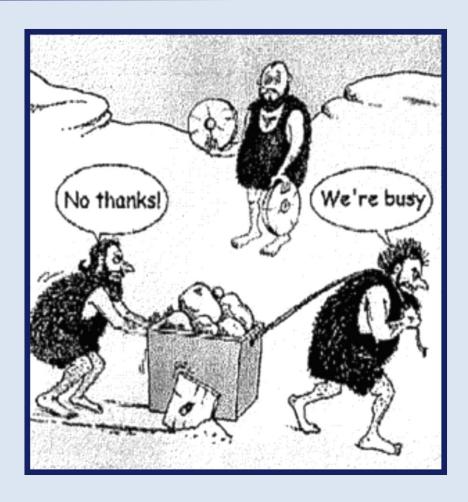






# Early Attitudes Toward Lean



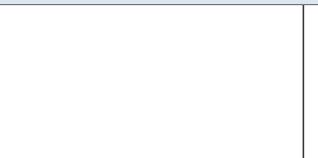


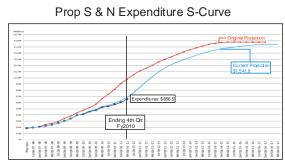
- We've tried that.
- We already do that.
- We don't need it.
- It won't work here.
- We don't build cars.
- We're different.
- •The other guy needs it, not me.
- We're doing well, so why change?

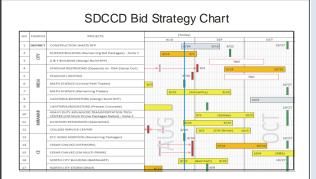
Credit: Lean Construction Institute

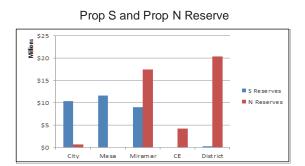
# Program A3 Report

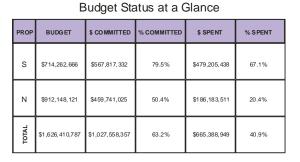


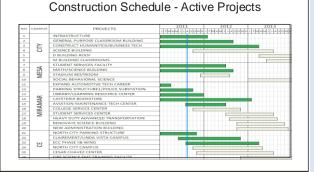


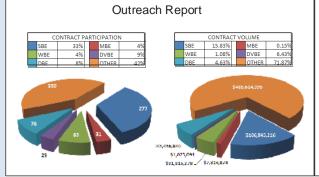


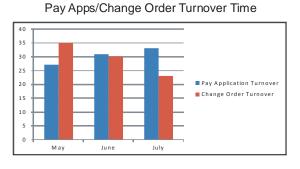














# "Rainbow" Report



4		Prop.	Campus		Contract Manager Project Budget as of 2011_08_12	Contract Manager Commitments to 2011_09_02	Soft Cost	Hard Cost	FFE AV/IT	П	Expenditures as of 2011_06_30	DSA Submit	DSA Approved	Board Approval	Construction Complete	Change Order Rate	Status
		S	CE	ECC - Land Acquisition & Relocation Skills Center (Land \$7.4M)	\$ 31,650,000	\$ 31,681,400	\$ 11,297,890	\$ 10,782,697	\$ 1,560,878	\$ 614,124	\$ 31,737,281	Jan-06	Oct-06	May-07	Aug-09	8.0	100%
	2	S	Œ	West City Campus	\$ 17,409,369	\$ 17,409,369	\$ 2,484,567		\$ 1,073,191		\$ 17,409,495		Nov-06	Jul-07	May-09	10.0	

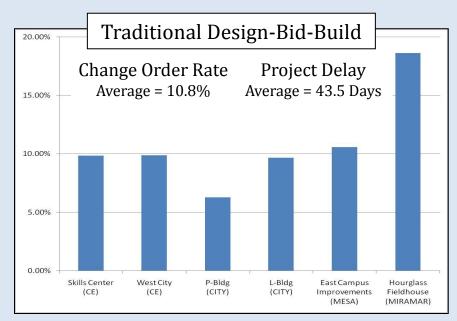
	Miramar	Cafeteria/Bookstore & Student/Campus Center	\$ 34,519,245	\$	31,515,776
	Miramar	Aviation Maintenance Technology Center	\$ 10,251,857	\$	8,475,465
	Miramar	Parking Structure #1 & Police/Emergency Center	\$ 17,848,765	\$	16,608,677
	City	Infrastructure - Central Plant /Sewer & Storm Drain/ Data & IT projects	\$ 19,441,050	\$	17,017,141
	Mesa	Infrastructure - Fire Lane/Central Plant/IT/Stadium Restrooms	\$ 8,127,797	\$	9,637,103
	Miramar	Infrastructure Phase II	\$ 41,564,305	\$	17,108,101
	District	Proposition N Program Management	\$ 41,992,026	\$	17,874,745
	CE	Fire Science / EMT Training Facility	\$ 13,000,000	\$	1,774,354
	City	Science Building	\$ 54,014,278	\$	14,369,196
_				-	The Area





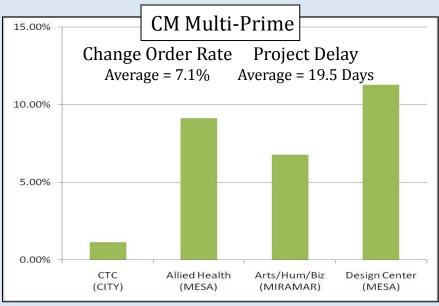
### Schedule Performance











# **Pull Planning**

















# Target Costing – Project Budget Development

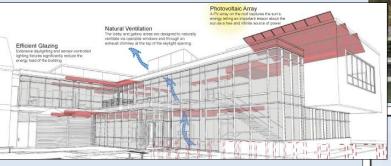
BUILDING

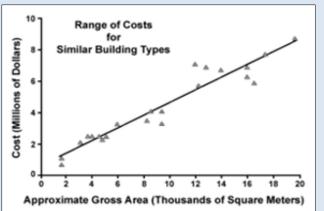


Space Programming

Efficiency

■ Targeted Cost Per Sq. Ft.



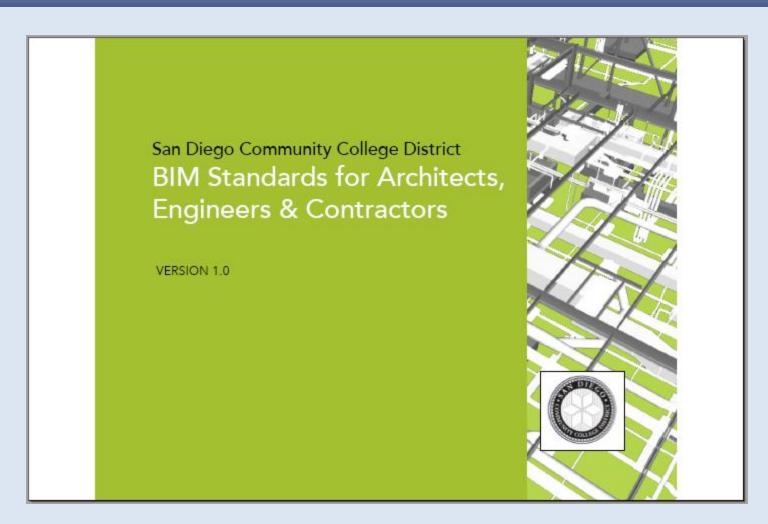




	SPACE DESCRIPTION	2024 ASF	Quantity	Extended 2024 ASF	Extended 2007 ASF	Variance	2007 Room Nos., Comments
	32-Seat Dry Lecture/Lab-Biology	1,600	x 1.0	1,600	836	764	supplements A202
	32-Seat Wet Lab-Biology/Botany	1,728	x 1.0	1,728	1,092	636	supplements A210
w	32-Seat Wet Lab-Biotech/Microbiology	1,728	x 3.0	5,184	2,048	3,136	supplement A204, A231
Sciences	32-Seat Wet Lab-Physiology/Anatomy	1,728	x 3.0	5,184	1,834	3,350	supplement A226, A206
ē	32-Seat Lecture/Dry Lab-Life Science (computer)	1,600	x 1.0	1,600	1,053	547	supplements A207
Sc	Prep/Stg/Lab Tech Rm (1 per 2 wet labs; 7 wet labs total)	800	x 4.0	3,200	1,232	1,968	supplement A203, A205, A226A
Life	Storage	1,200	x 1.0	1,200	0	1,200	supplements A206A, A209, A211
3	Marine Biology/Oceanography Lab	500	x 1.0	500	0	500	Aquarium
	Microbiology Culture/Autoclave Room	200	x 1.0	200	0	200	
	Biology/Anatomy Dissection Room	200	x 1.0	200	0	200	
				20,596	8,095	12,501	
	32-Seat Wet Lab-Chemistry	1,728	x 4.0	6,912	3,018	3,894	M201, M202, M203
-	Chemistry Lab Instrument Room (1 per 2 labs)	250	x 2.0	500	180	320	M220
Sciences	Chem. Prep/Storage/Lab Tech Rm (1 per 2 labs)	800	x 2.0	1,600	1,337	263	M216, M217, M218
e	Hazardous Chemicals Storage Room	175	x 1.0	175	120	55	M219
ō	32-Seat Lecture/Dry Lab-Physics, Physical Science, Geography, Geology	1,600	x 4.0	6,400	2,014	4,386	M204, M205
				2.000	0.	2.000	
sical	40-Seat Lecture/Dry Lab-Geography	2,000	x 1.0				
sical					1.059	541	M214 M215 M215A
sical	40-Seat Lecture/Dry Lab-Geography Physics/Physical Science/Astronomy Prep/Stg/Lab Tech Rm	1,600	x 1.0	1,600	1,059		M214, M215, M215A
Physical S	40-Seat Lecture/Dry Lab-Geography Physics/Physical Science/Astronomy Prep/Stg/Lab		x 1.0 x 2.0		1,059	541 3,200 2,500	

### **BIM Standards**





http://www.sdccdprops-n.com/BUILDING%20STANDARDS/SDCCD\_BIM\_Standards\_Ver01.pdf

### **BIM Clash Detection**

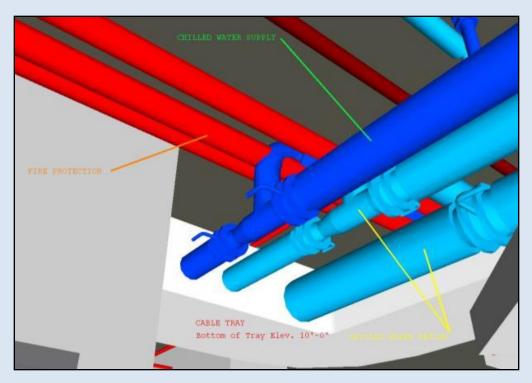


### Building Construction

Mechanical piping hits cable tray and fire protection piping in ceiling space

### Survey Average Results

- ■Man-hour Savings = 61
- ■Delay Savings = 3 Days
- **■**Cost Savings = \$30,349.00

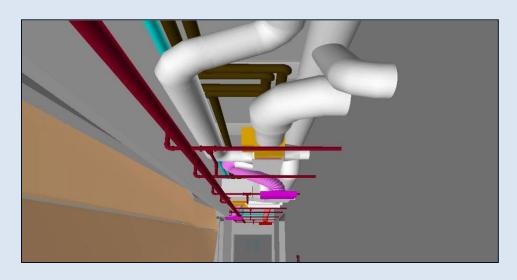


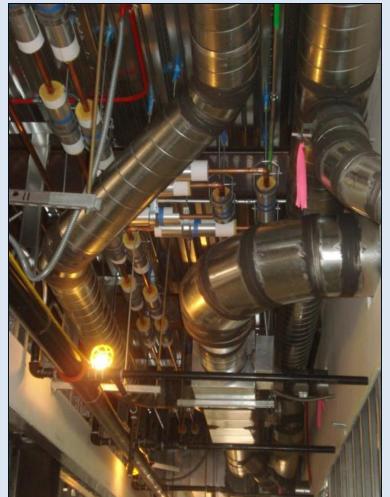
- Number of Clashes Shown in Example = 9
- Savings per Clash Resolved = \$3,372.00

# Change Order Metrics - BIM vs. No BIM



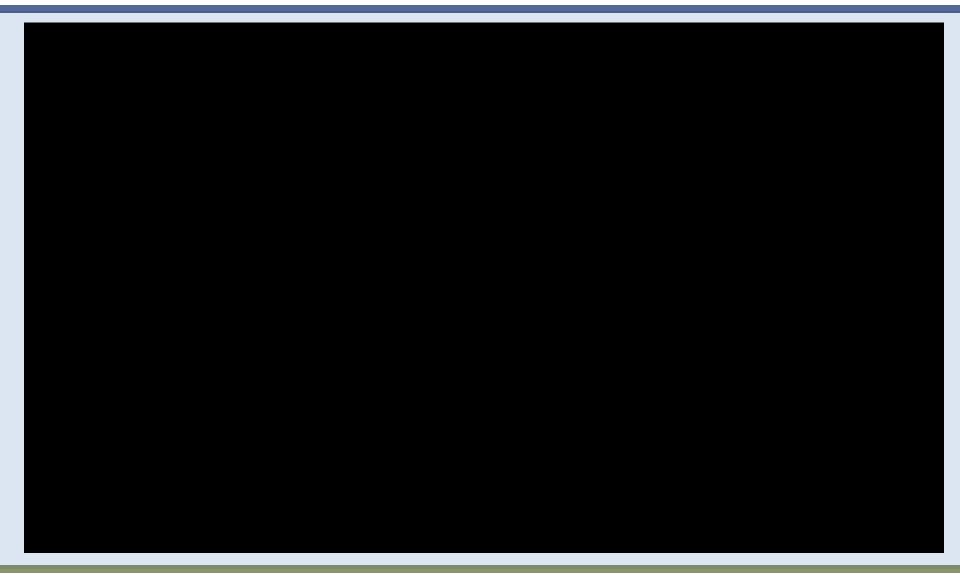
- Projects designed in BIM:
  - Change Order Rate = 2.3%
- Projects not designed in BIM:
  - Change Order Rate = 8.0%





BIM Integration: Mesa College Social & Behavioral Sciences Building





# Design/Build Statute in California for CCS



- As of January 1, 2008, CommunityColleges can use design build under SB614.
  - Must be at least \$2.5M in value
  - Requires project-specific Board resolution
- Need to evaluate the project based on five minimum criteria.
  - Price (10%)
  - Technical Experience (10%)
  - Life cycle cost over 15 years (10%)
  - Skilled Labor Force (10%)
  - Safety Record (10%)





# Design/Build Scoring Criteria and Weight



### SAN DIEGO COMMUNITY COLLEGE DISTRICT SUMMARY SCORING SHEET MIRAMAR COLLEGE SCIENCE BUILDING DESIGN-BUILD PROPOSALS

	MIL	NAMAN CULL	EGE SCIENC	E BUILDING	DESIGN-BUIL	D FNOFUS	4L3			
Firm	Price	Points Based on Price	Technical Expertise	Lifecycle Costs	Skilled Labor Force	Safety Record	Design Excellence	Subcontracting Outreach Plan	Total Points	Rank
Maximum Point Value		200	250	100	100	100	150	100	1,000	
DPR										
Marlene Imirzian & Associates	\$2,517,590	139	230	77	100	100	130	100	876	1
Sundt										
NTD	\$2,518,968	139	232	88	100	90	128	95	872	2
Swinerton										
gkkworks	\$1,919,331	183	207	60	100	90	125	90	855	3
Rudolph and Sletten										
Delawie Wilkes Rodriques and Barker	\$2,147,919	163	217	80	100	80	125	75	840	4
Prowest Constructors										
Harley Ellis Devereaux	\$2,921,500	120	245	90	100	70	150	60	835	5
Legacy Building Services Inc.										
RNT	\$1,807,904	194	217	55	100	50	128	78	822	6
CW Driver										
Mosher Drew Watson Ferguson	\$2,094,313	167	231	66	100	80	120	48	812	7
Barnhart										
Joseph Wong Design Associates	\$2,329,883	150	228	83	90	60	112	65	788	8
Highland										_
Hanna Gabriel Wells	\$2,535,000	138	213	80	100	50	107	70	758	9
Hensel Phelps Construction Co.										
Tucker Sadler Gilbane	\$3,860,014	91	220	77	90	90	115	75	758	10
Gensler		405	007		400	400	400	30	700	
Pankow	\$2,587,000	135	207	45	100	100	103	30	720	11
IBI	62 004 240	90	193	85	90	70	133	45	706	40
PCL Construction	\$3,891,348	90	193	00	90	70	133	45	706	12
Ferguson, Pape, and Baldwin	\$2,931,455	120	190	70	90	90	108	30	698	13
Harper Construction	\$2,551,455	120	150	70	50	50	100	30	030	13
DLR Group WWCOT	\$1.845.614	190	175	47	90	80	58	45	685	14
Roel Construction Company	\$1,045,014	150	173		50	- 00	30	40	005	14
JCJ Architecture	\$1,892,891	185	153	82	90	80	73	0	663	15
Whiting Turner	\$1,002,001	100	100	- 02			,,,	Ť	000	10
SGPA Architecture and Planning	\$2,760,860	127	163	60	100	70	68	55	643	16
Ledcor Construction	\$2,700,000	121	100		100		- 55		0.10	
DGA Planning/Architecture	\$2,223,519	158	155	57	90	80	60	35	635	17
BN Builders	53,225,510									• • • • • • • • • • • • • • • • • • • •
Carrier Johnson	\$1,751,705	200	190	38	0	50	78	0	556	18

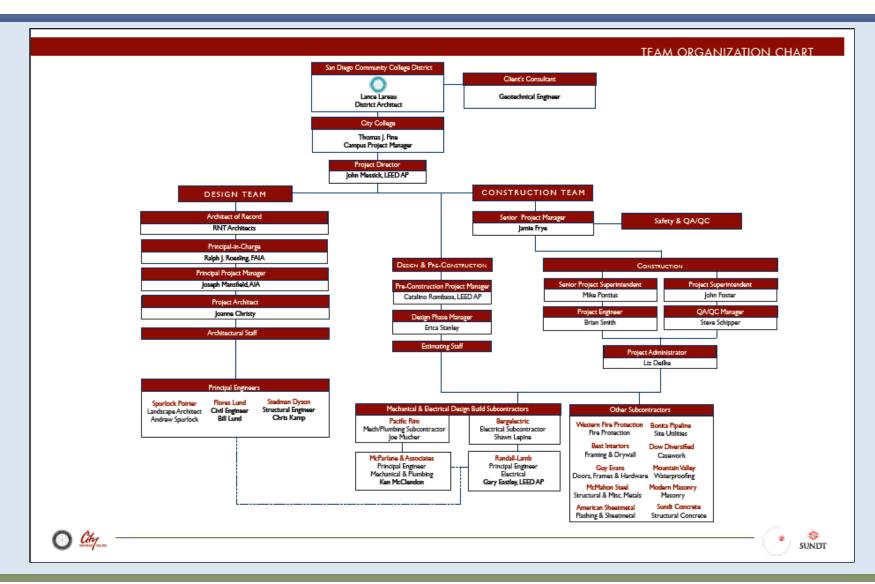
# Integrated Project Delivery Charter





# Sample Proposal Organizational Chart





### San Diego Community College District (SDCCD)

# A3 Problem Solving - Risk/Benefit Analysis



THEME: Mesa College Student Services Center Building Risk-Benefit Analysis
Start of Construction: ASI-062 (Academic Skills Center) and ASI-065 (Student Health Services)

#### BACKGROUND:

- At request of Mesa College District representatives, changes have been made to design of 2nd and 4th floors of Student Services Center to include Academic Skills Center and Student Health Services Departments:
  - ASI-062: Academic Skills Center (ASC)
    - New design includes reconfiguration of approx. 5000sf of conference room space in NE section of Level 2, modifications to adjacent catering room and meeting room.
    - Submitted to DSA on 6/7/11. Resubmitted to DSA on 8/1/11. DSA approval expected 8/31/11 or earlier.
  - o ASI-065: Student Health Services (SHS)
    - New design converts two classrooms in SE section of Level 2 into SHS and includes: reception area, offices, exam
      rooms, lab, pharmacy, and storage spaces. Level 2 Staff Lounge converted into classroom, adjacent meeting
      room designated as new location of Staff Lounge. Modifications made to layout of classroom on Level 4 to allow
      increased seating.
    - ASI-065 submitted to DSA on 7/14/11. DSA review/approval expected to take 2-3 months (estimated approval between 9/15/11 and 10/15/11).

#### CURRENT CONDITIONS:

- Current status of construction:
  - Interior work on Levels 1, 3, and 4 continues uninterrupted.
- All work on affected areas of Level 2 currently on hold bare steel structure and concrete floor in place. No MEP work, framing, or fireproofing has been put in.

#### Schedule

- Baseline start date of original Level 2 interior work intended to be 5/18/11. Work currently stopped in all areas
  affected by ASI's.
- Estimated completion date of areas before changes made: 1/4/12. Per PCL (July 2011 schedule update): areas can be completed 4/6/12 if work begins 8/15/11.
- Estimated substantial completion date of building before changes made: 3/30/12. Per PCL (July 2011 schedule update): building can be completed by 5/24/12 if work begins on 8/15/11. Equates to 2 month delay to project, which is best case scenario.<sup>12</sup>

#### Preconstruction Activities:

- Pre-DSA approval versions of both ASI's distributed to all trades.
- o BIM: Majority of modifications to BIM made necessary by issuance of ASI's already complete.
- Shop Drawings/Submittals: Majority of new or modified shop drawings/submittals made necessary by issuance of ASI's already complete.
- · Pricing and Approvals:
  - Pricing for ASI-062/065 received from several trades. Project Management team intends to submit COR's for work
    in multiple phases according to sequence of work. First phase to be submitted on 8/10/11. Anticipate approvals on
    8/15/11. Trades included in first phase: Fire Sprinkler, Structural Steel, HVAC/Plumbing, Electrical,
    Fireproofing/Framing/Drvwall. See attached cost/time impact analysis<sup>3</sup>.

#### ROOT CAUSE ANALYSIS:

Design change requests made too late in construction process to avoid impact to schedule. Authorization to proceed
with design of ASC issued 4/13/11. Authorization to proceed with design of SHS issued 5/11/11. Since authorizations
issued, SSC team has worked as efficiently as possible to minimize subsequent time impacts.

#### TARGET CONDITION:

- . Minimize duration of work stoppage on Level 2 by restarting work by 8/15/11.
- Reach Substantial Completion of Student Services Center Building no later than 5/24/12.
- . Occupy Student Services Center before start of 2012 Fall Semester.

#### IMPLEMENTATION PLAN:

- Proceed with long lead purchases/material orders and preliminary construction activities required of "Group 1" trades on 8/15/11. Process COR's for "Group 1" and "Group 2" trades. Issue "Group 2" authorizations on 9/1/11.
  - Group 1: Trades include Simplex (Fire Sprinklers), McMahon (Steel), Interstate (HVAC/Plumbing)\*, Steiny (Electrical), Best (Fireproofing, Framing, Drywall).
  - Obtain District Approval of COR's by 8/15/11
  - Value: \$270,000 ROM
  - o Group 2: Team C (Concrete), Johnson Finch McClure (Doors/Frames/Hardware), ISEC (Casework)
    - Obtain District Approval of COR's by 9/1/11
    - Value: \$110,000 ROM
  - o Material Orders to be authorized:
  - Simplex: Piping/sprinkler head, McMahon: Fabrication of steel for exam light support, Interstate\*: Mechanical
    equipment/materials- VAV, FSD, Duct etc., Steiny: Lighting/floor box order, Best: Metal framing order,
    Johnson/Finch McClure: All door materials, ISEC: Release fabrication of casework
  - o Construction Activities to be authorized:
  - MEP, Fire Sprinkler Hangers, L2 floor plumbing cores and L1 plumbing, Structural steel for exam light, Electrical Floor boxes, Fireproofing, Wall framing, MEP & Fire Rough-in, Install HM Frames
  - Group 3 and 4 (All remaining trades): PCL expects to authorize these trades to proceed with their scope in early 2012. We hope to have DSA approval of ASI-062 and ASI-065 before this time
- Delay Impacts associated with this implementation plan: Plan designed to minimize total delay impact incurred by work stoppage and design changes.
  - Cost: PCL estimates the following subs may be entitled to compensation for a delay claim based on current schedule: Interstate, Steiny, Simplex, and Best. PCL calculates total delay cost to be approx. \$150,000/mo. between all trades and CM.
  - Contractual Limits: Most trade contracts involved in scope of work are not at risk of exceeding 10% CO limit. Trade Contracts with potential to exceed limit, due to work combined with other changes on job, include: Interstate, Steiny, JFM, and Clear Sign.
  - o Post Subst. Compl., FF&E activities estimated to run 2 mo. before building ready for occupancy.
- · Under these assumptions, delay exposure is:
  - Proceed 8/15/11 (Per Implementation Plan): \$300,000 ROM (2 mo.delay), Subst. Compl.: 5/24/11. Move in: 7/24/11.
  - Proceed on 10/15/11: 5600,000 ROM (4 mo. delay). Subst. Compl.: 7/24/11. Move in: 9/24/11. Late move-in
    requires mid-semester occupancy impacts subsequent relocation of faculty/staff into Modular Village
    [demolition associated with Social and Behavioral Sciences Building] causing delay to start of construction.
- Potential Risks: HGW is confident there will not be any DSA comments that would significantly affect layout/systems of ASI-062 or ASI-065
  - ASI-062: DSA comments received/responded. No comments affect wall placement, ceilings, electrical, HVAC or plumbing systems. Main changes related to removal of fire rated glass windows/doors, and addition of pair of solid core 90-min. doors (corrections requested by SSC team, not DSA).
  - ASI-065: HGW believes most significant comments could come from Fire/Life Safety Dept. Comments could affect
    fire sprinkler layout, electrical related to fire alarms and exiting, and HVAC related to smoke fire dampers. HGW is
    confident that design is very complete, and expects comments to be minimal, not resulting in significant changes or
    additions.
  - o Best guess at potential risk exposure: \$35,000.00 for rework of FLS related items.

#### FOLLOW UP:

· Group 1 and 2 CO submittal and approval.

#### Footnotes/Attachments

- 1. PCL Construction Schedule Update 7/15/11
- 2. Gafcon ASI-062/065 Design/Permitting Schedule
- Gafcon ASI-062/065 Impact Analysis
- On 8/9/11, Interstate Plumbing & Air Conditioning suspended work on project. An alternate contractor will need to be retained to complete Interstate's contract work. Process may impact start of work contemplated in this document.

### San Diego Community College District (SDCCD)

# A3 Reporting System Design - Mechanical



A3 No Title	Theme						Cham	pion	Collabor	rator	Additional	Collaborators	Sponsor	Customer Group	Sign-off		
	AC System				r AHU,		David D	opudja	Don Harri	sberger	Jim	Horan					
	kage DX A	C Units a		P's	Date Ope	ened Path Forward Date Category					A3 Status						
	hanical		VAC Syst	ems	12/7/20		12/13/		N/A		Idea Development	Sponsor Identified	A3 Development	Customer Accepts	Integration		
Section 1 - Background Comparison of HVAC sy							e cost and	provides	greatest ben	efit to	Section 3 - Analysis Option			Advantages			
the facility. Responding LEED Silver. A facility distribution piping and 4- on package direct expans - For the CHW system, I distribution piping. - Heating for the package	to the chall of this size pipe (CHW ion (DX) ro leating hot e DX system	enge to in is typically V/HW) air ooftop air water (HV m is provie	uprove effi y served b handling to conditioni V) is suppl ded by gas	iciency, in by a chilled units. Thing units a lied by bo s furnaces	icrease rel d water (C is analysis nd ground ilers and p within the	liability, r CHW) sys s will com d source h pumps in e rooftop	educe mai tem with o pare the C leat pumps the central package u	ntenance central pla CHW syste (GSHP). I plant via nits.	and help ach nt, undergro em to system undergroun	ieve und is based d	Chilled Water (Base Option)	Better temperature con     Much better zoning op	nt life ficient and existing CUP ntrol and ability to use 100% OSA ptions (ability for CO2 zoning) bance (chiller and condenser nois		ive areas or communities)		
- In the GSHP system, h system of plastic pipe but through the pipes. This c condenser/evaporator hea	ied in the g losed loop t exchange dition	ground (gr system tra ers in each	ound coup insitions to GSHP uni	oled) to all o metal pi it.	low heat to pe within	ransfer be the buildi	etween the ing(s) whe	earth and re it is con	fluid flowin nnected to th	e e		More available     Much less UG distribu	ution piping required (none)				
Two 15,000 SF facilities rate, a 2% escalation rate Section 3 - Analysis SHOULD CRITERIA											Ground Source Heat Pumps (Alternate 2)	More efficient (water s     More innovative (LEE	(no gas required for heating) source vs. air source)	CHW			
Mechanical System Option	Schedule	First Cost	Life Cycle Cost	Efficency	Sustainability	reativity/Innovation	Flexibility	Community	Maintenace			• • • • • • • • • • • • • • • • • • • •	roblems or constraints that still		antages.		
	-					0											
HVAC System										-	Section 5 - Recomme	ndauons					
1 Split System	+	+	0	0	0	0	+	0	0	3	Based on the current in	nformation at hand the opt	tion of chilled and hot water air h	andlers served by centr	al plant is recommended.		
2 Package System	+	+	0	0	0	0	+	0	0	3	Section 6 - Path Forw	vard/Follow-up					
3 HHW &CHW/ AHU, FCU	0	0	+	+	+	+	0	+	+	6	1 Provide existing Ci	III conscition Owner					
4 Ground Source Heat Pump	0	0	+	+	+	+	0	0		5	2. Analyze existing C	UP capacities- Owner UP capacities - Don Harri:					
5 Water Source Heat Pump	0	0	0	+1	+	0	0	0	0	2	4. Confirm CHW (or	final HVAC choice) meets		er			
	ts "Should s Not Mee			1							5. Proceed with /impl	ement CHW (or final HVA	AC choice) - Don Harrisberger				

### San Diego Community College District (SDCCD)

# A3 Reporting System Design - Structural



3 No	Theme / Title					(	hampion	Coll	aborator	Additional	Collaborators	Sponsor	Customer Group	Sign-off
S-001	Structural Sy	stem Selec	tion Comp	arison		A	ldrin Orue	Jorg	e Rivera	Patrio	k Meek			
5-001	Discipline	Elen	nent	Dat	e Opened	Path	Forward Date	Ca	tegory			A3 Status		
	Structural		Framing		2/7/2010	1	2/13/2010		N/A	Idea Development	Sponsor Identified	A3 Development	Customer accepts	Integration
ction 1 - Backgr	round - Relevar	ice to Proje	ect							Section 3 - Analysis				
										Option			Advantages	
omparison of stru eeting project go	als of cost, sche			ch option is	the most ap	opropriate a	and efficient fo	or the facilit	y while		Lower Cost    More Flexible (modificate    Faster Erection Time	ions and attachments)		
ction 2 - Currer		1: 0 P					0.374 0.07				4. Lighter System			
vo-story 15,000 s pically constructe										Steel	Much More Accommoda     More Durable Material	ting in Architectural Design		
mparison analysi										Steel	7. Better Sound and Floor V	ibration Qualities		
erlooked and pro											8. Easier Construction			
ection 2 - Currer	nt Condition - I	)esign												
							0.0	- <del>-</del>						
		A = 1					0 4							
		$A \equiv$	1				⊚	-   1			Shorter Lead Time Requi     Much More Durable Mat	red to Erect Superstructure		
_		A / A	1			_	<u></u>				Much More Durable Mat     Much More Thermal Mas			
			_					四月	1		Much More Sustainable (			
		1	Station of the	3 to 2 to 202	A SERVER CO. SC.		o— <b>i</b> =	1.79	1	Concrete /	5. Much Better Sound and F			
	Hillimm	No. of the last of		1		17	o° ≡	+		Masonry		~		
-	-11477				- 1	7	0	4-11-1						
1	_ : 41/11		l N	-		1 1								
-			_				0	-	1 1					
1	7 7 7	(9		_	-		·		+-1					
						ř	°		1 1		1. Much Easier Construction			
		115	TN.			11		7.	1 -		Shorter Lead Time     Much Lighter System			
	No.	<u> </u>	<u> </u>			· ·		-17			5. Much Lighter System			
		3D 9	Section				Θ	6	1					
							Level 11	loor Plan		Wood				
ection 3 - Analys														
HOULD CRIT	ERIA													
		c				2:	T							
		fule	T I	ycle)	tt	apili	ation	tion .	, I					
Structural Syst	tem Options	Construction	Flexibility	Durability (Life Cycle)	Cost	tain	Sound	Vibration	lota	Section 4 - Unresolved Is	: sues - Identify any problem	s or constraints that still exist		
		3 ~	ш.	0 3		Sus	4	>						
Structural Syst	tem									Need structural analysis to	determine preliminary steel	member sizes to confirm steel op	tion.	
1 Steel System					14	7		12	7	Section 5 - Recommenda	tions			
								-		Based on the current infor	mation at hand the option of	steel structural system is recom	mended.	
2 Concrete Syste	em	0	0	+	0	+	+	+	4	Section 6 - Path Forward	l/Follow-up			
3 Masonry Syste	em	0	0	+	+	+	0	0	3		etermine preliminary steel me	mber sizes- Aldrin Orne		
4 Wood			0	0	+	0	0	0	2	<ol><li>Confirm structural steel</li></ol>	member sizes with budget - !	Dustin Smith		
	+ Meets "Shou	ld" Criteri	a									and approve A3- Aldrin Orue		
	0 Does Not Me									+. incorporate/proceed wit	th structural steel design- Ald	nn Orue		
													·	

# San Diego Community College District Set-Based Design and Life Cycle Cost Analysis

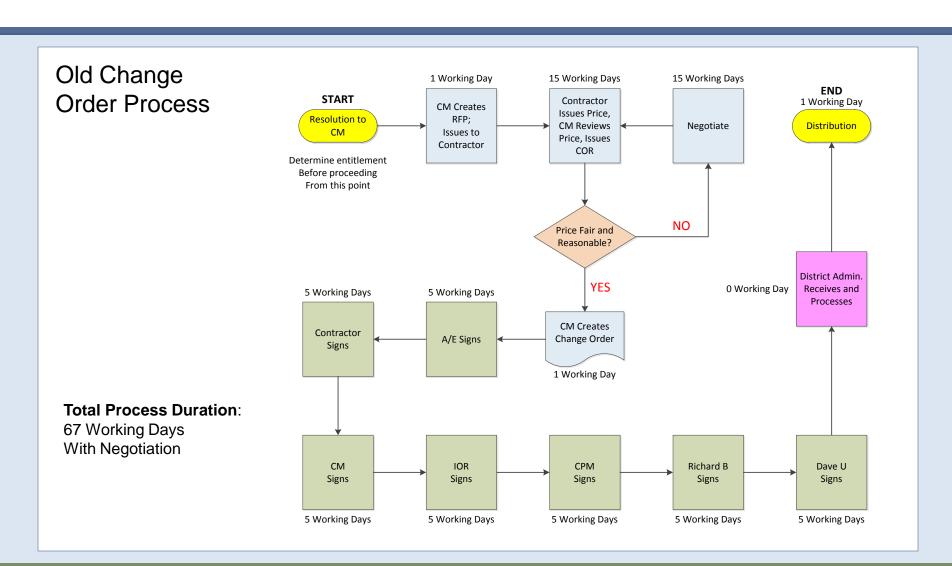


		Miramar (	College Cafeter	ia and Booksto	ore		
Options	OPTIONS	ANNUAL SYSTEM ENERGY COST (\$)	ANNUAL SYSTEM MAINTENANCE COST (\$)	ANNUAL WATER USAGE COST	TOTAL ANNUAL OPERATING COST	SYSTEM INSTALLATION COST (\$)	SIMPLE PAYBACK (Years)
1	VAV WITH REHEAT	126,488	15,400	1,735	143,623	3,462,000	0
2	GROUND SOURCE HEAT PUMP	135,285	19,100	0	154,385	4,196,000	- 68.2*
3	CONBINATION VAV WITH REHEAT (49.1%) / CHILLED BEAM (50.9%)	119,865	12,700	1,664	134,229	3,767,147	33
4	COMBINATION VAV WITH REHEAT (42.1%) / CHILLED BEAM (40.9%) / DISPLACEMENT VENTILATION (17.0%)	124,759	13,300	1,643	139,702	3,794,725	85
5	COMBINATION VAV WITH REHEAT (84.3%) / DISPLACEMENT VENTILATION (15.7%)	129,601	15,600	1,675	146,876	3,536,348	- 22.9*

Note: A Negative (-) Payback indicates that this option will not pay for itself.

# Value Stream Mapping - Change Order Process



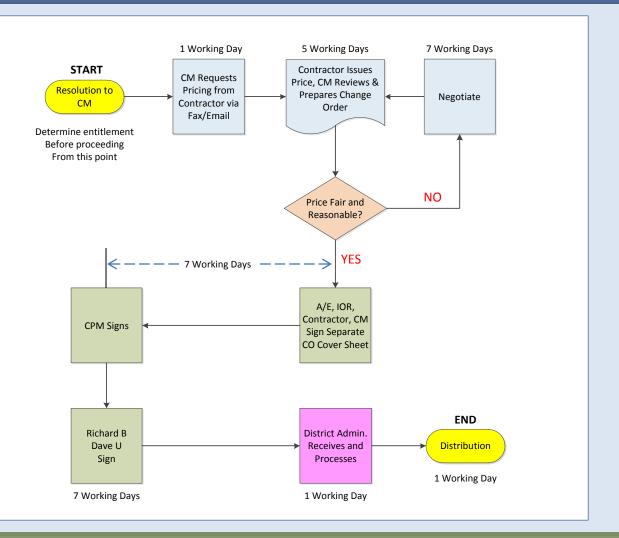


# Value Stream Mapping – Change Order Process



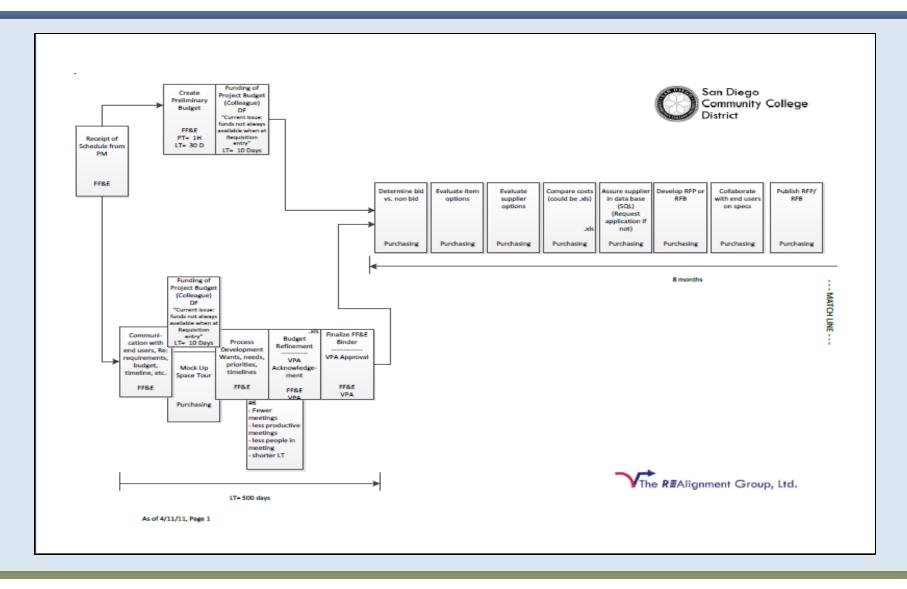
New Change Order Process Effective January 2011

**Total Process Duration**: 28 Working Days With Negotiation



# Value Stream Mapping - Purchasing





# San Diego Community College District Safety – Root Cause Analysis of Repeated Incidents



- Required fall protection
- Enhanced training for spotters
- Zero-tolerance safety culture





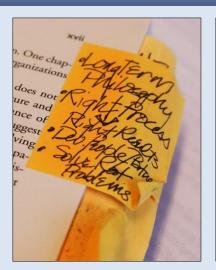


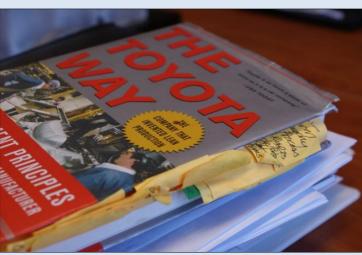


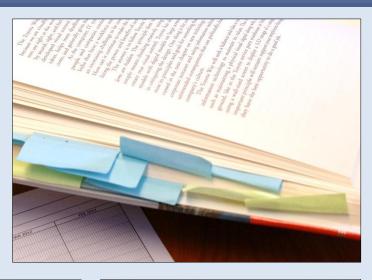


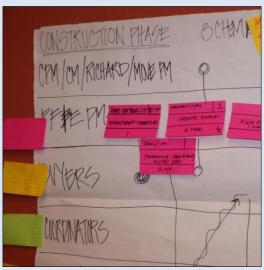
# Kanban Tools in Process - The Sticky Note

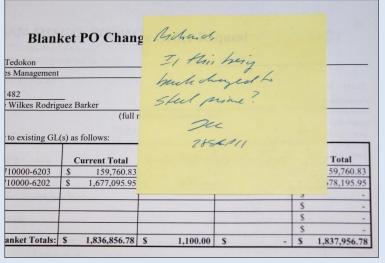


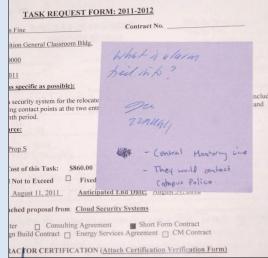












# Genchi Genbutsu









### Hourensou

CONSTRUCTION STATUS:

### SAN DIEGO COMMUNITY COLLEGE DISTRICT Proposition S Project

### FACILITIES MANAGEMENT WEEKLY REPORT

Guy Meades/Tom Fine CM/CPM: Joe Gorak September 22, 2011

A-E/Contractor: RNT Architects/Sundt Construction Project Description: The Math & Social Sciences building will consist of approximately 84,000 square feet of new building construction for the addition of new general number of sections of new general number of roject Description: The Math & Social Sciences building will consist of approximately 84,000 square feet of new building construction for the addition of new general purpose classrooms, a Family Health Center, Corporate Education Center, Math, Chicano Studies, Black building History and Political Science Rehavioral Science and Military Education programs. In addition, the project will consist of an incomplete History and Political Science Rehavioral Sciences. or the addition or new general purpose classrooms, a ramily Health Center, Corporate Education Center, Main, Chicano Studies, Black indices, History and Political Science, Behavioral Sciences, and Military Education programs. In addition, the project will consist of an additional parking structure that will provide approximately 400 page parking spaces.

structure that will provide approximately 400 new parking spaces.

Approved COs: \$76,403	0.15% 38.93%	Contract Number  Contract Start Date: November 12, 2010  % Complete: 45  Contract Duration: 627 days  Original Completion: July 31, 2012  Estimated Completion: August 21, 2012
------------------------	-----------------	---

#### CORs by Contractor: PROJECT STATUS/Comments:



possible.





Summary: Crews are working to install concrete walls and columns on level five of the west side of the classroom building. The deck Summary: Crews are working to install concrete waits and columns on level rive of the west side of the classroom building. The deck in the classroom building on the third land. The talletion of parimeter quarked protection is also consoling at the third land. We named formwork below level rive is being removed, and resnoting is being placed subsequency. Exactlor curb is being installed on the west studied by the classroom building on the third level. Installation of perimeter guardrail protection is also ongoing at the third level. We poured the classroom building on the third level. Installation of perimeter guardrail protection is also ongoing at the third level. We poured the classroom building on the third level. Installation of perimeter guardrail protection is also ongoing at the third level. We poured the classroom building on the third level. Installation of perimeter guardrail protection is also ongoing at the third level. We poured the classroom building on the third level. Installation of perimeter guardrail protection is also ongoing at the third level. of the classroom outling on the third level. Installation of perimeter guardran projection is also ongoing at the third level. We perimeter 2, west side, of the parking structure on Wednesday, and preparations are being made to stress the post tensioning cables this

tier 2, west side, or the parking structure on wednesday, and preparations are being made to stress the post tensioning causes that Saturday. Framing subcontractor has mobilized and has begun laying out metal stud walls. Plumbers have installed the grease. Danutuay. Framing succontractor has mobilized and has begun laying out metal stud wails. Frumbers have installed the grease therefore along 16th street, and our utility subcontractor is back onsite tying into that system. Throughout the classroom building, we have concerns wishers filling in the bales from the formulation. Job Look-ahead: Next week, level 5, west side will continue with walls and columns installation. On the east side of the classroom

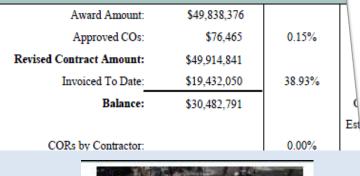
JOD LOOK-anead: Next week, level 2, west side will commine with walls and commis installation. On the east side of the classroom hadding, level four, walls and columns will be ongoing, with preparations being made for installation of the roof deck shoring. In the particular garage, we will be removing formwork from the previously poured deck and moving it over for the tier 3, each side deck ounting, level four, wans and commiss will be ongoing, with preparations being made for installation of the foot deck shoring. It parking garage, we will be removing formwork from the previously poured deck and moving it over for the tier 3, east side deck. Paiking garage, we will be removing formwork from the previously poured deck and moving it over for the tier of, east side deck.

Electricians and plumbers will continue with hanger installation, and sleeve installation in conjunction with the reinforcement steel.

installation. Layout of walls will be ongoing at level 2.

All pending change orders have been responded to by the District at this time. The question regarding markup calculation has been anywared. We will provide an additional expendence of calculations to sumplement Exhibit R Change Orders: Last change order received was Change Order #15

Schedule. The current contract completion date is 7/31/2012. We are approximately one week behind schedule on the classroom answered. We will provide an additional spreadsheet of calculations to supplement Exhibit B. Schedule: The current contract completion date is #31/2012. We are approximately one week behind on the classification of the parking structure. Sundt will continue to work selected overtime to make up as much time as





Parking garage concrete pour

Summary: Crews are working to install concrete walls and colum formwork below level five is being removed, and reshoring is being of the classroom building on the third level. Installation of perime tier 2, west side, of the parking structure on Wednesday, and prepa Saturday. Framing subcontractor has mobilized and has begun lay interceptor along 16th street, and our utility subcontractor is back of have concrete pitchers filling in tie holes from the formwork.

# Future Improvements Focus Areas



### Invoice Processing Kaizen

Goal: Payment to contractors within 30 days at least 95 percent of the time

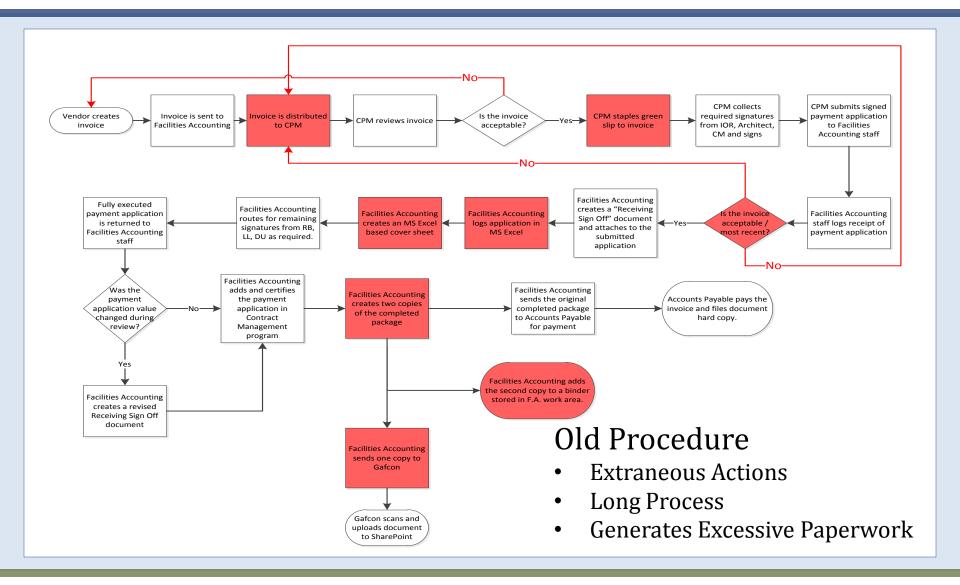
### Email Communication Kaizen

Goal: Reduce unnecessary email traffic and focus email content for brevity and clarity; reducing email management time to less than 1 hour per day.

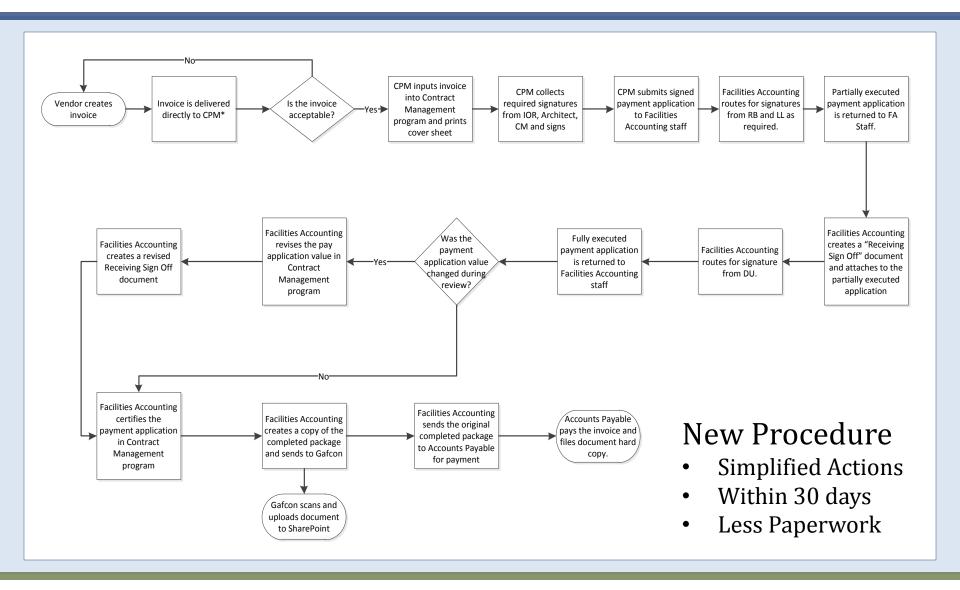
### BIM to FM

Goal: Leverage Building Information model into CMMP to improve productivity of maintenance workers in the field.

# San Diego Community College District Invoice Processing Kaizen



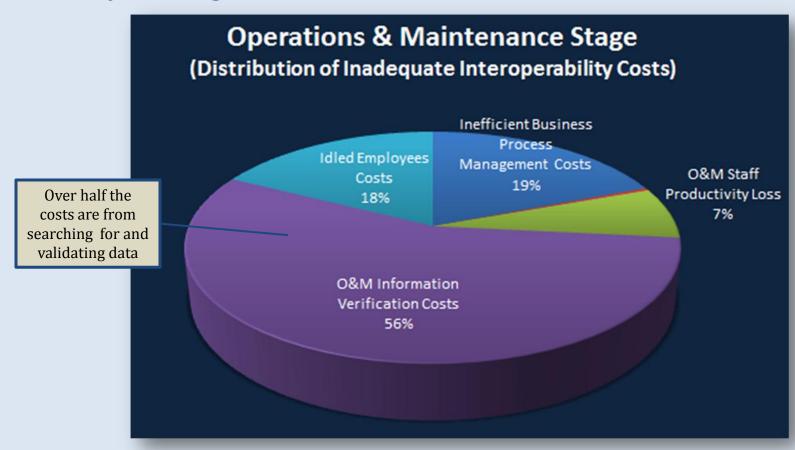
# San Diego Community College District Invoice Processing Kaizen



# Facilities Services Lean Enterprise Efforts



### **Industry Findings**: Cost of O&M Inefficiencies



<sup>\*</sup> **Source**: NIST Study – August 2004

# Facilities Services Lean Enterprise Efforts



### **Building the Solution**: BIM to FM

Inexpensive access to BIM model

Any time, anywhere access to facilities docs

Consistent, scalable, unified database

Collaboration and communication productivity platform

Integration with and extension of existing Program Portal



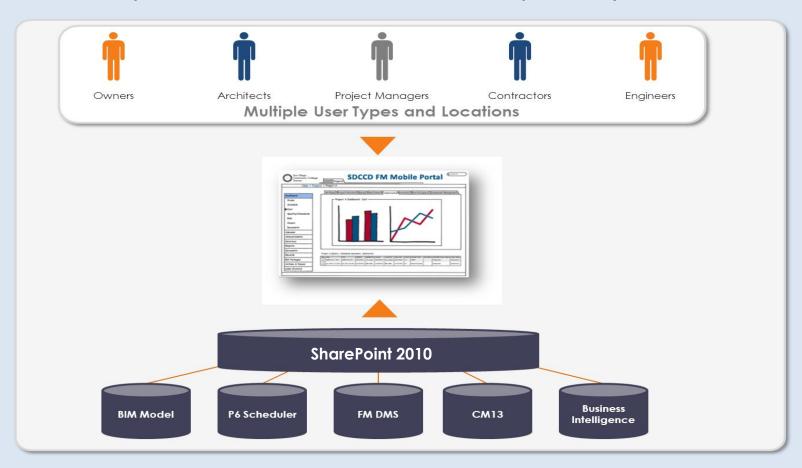


### Lean Processes





### **Approach**: Improve Collaboration and Transparency



### SAN DIEGO COMMUNITY COLLEGE DISTRICT



### Questions?

David Umstot, PE
Vice Chancellor, Facilities Management
San Diego Community College District

dumstot@sdccd.edu

(619) 388-6456

