Educational Seminar Series;

PM/CM Fundamentals - Estimating, Scheduling, and Claims

January 12, 2022

CMAA
NORTHERN CALIFORNIA CHAPTER

UPCOMING CMAA NORCAL EVENTS

January 18, 12:00 PM - 1:00 PM
Owner's Only Quarterly Virtual Owners Roundtable Series
Upcoming Scheduled Dates: April 19, July 19, and October 18

February 9, 11:30 AM – 1:30 PM
Education Seminar Series: Risk, Vulnerability, and Resilience in Water Infrastructure

February 22, 11:00 AM – 2:00 PM
CODE Roundtable Luncheon: SBE/DBE Townhall Success Stories & Challenges
San Francisco Library - Koret Auditorium

February 23, 9:30 AM – 10:30 AM
Joint Program Webinar:
How DGS Serves as Business Manager for the State of California

March 3 - 6
Western Winter Workshop™ Conference 2022
Marriott Renaissance, Indian Wells Resort

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Saylor
Consulting

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VANIR

Solutions for Success

THANK YOU GOLD SPONSOR!

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WEBINAR'S LEARNING OBJECTIVES

1. How early cost and schedule planning drives the process and is outcomes driven?
2. Tools, resources and metrics used for better estimating and schedule planning
3. Owner and Consultant roles in managing cost, change orders and schedule
4. Communications, systems, collaboration and leadership
5. Claims avoidance and management
6. Relationships between cost estimates, scheduling and project success

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GUEST SPEAKERS

Rafael Martin, PE
Director of Technical Services
Vanir Construction Management

Mike Parkyn, MRICS
Regional Director
Saylor Consulting Group

Matt T. Hawk, Esq.
Principal Counsel and LEED Green Associate
University of California Legal, Office of the General Counsel

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PM/CM Fundamentals – Estimating, Scheduling, and Claims

Project Schedule Management

Intro

Rafael Martin, PE
Director of Technical Services

Vanir Construction Management, Inc.
rafael.martin@vanir.com | www.vanir.com

Why is this important

- Construction projects frequently fail to meet desired schedule goals
- Globally 77% of megaprojects are 40% or more behind schedule*
- Large projects typically take 20% longer to finish than scheduled*
- Global Construction budget overruns =

$1.4 trillion annually; 60% due to project delays**

* McKinsey Global Institute

**Investment banking firm FMI

Why is this important

- A study of 1,185 projects; $1.8 trillion
- Over $48.6 billion in disputes
- 593 years of delay
- Top 4 issues:
  - Change in Scope
  - Incorrect Design
  - Incomplete Design
  - Poor Management of subcontractors / suppliers

* HKA's CRUX Insight 2020 report

Schedule Management Phases

Planning / Programming (Pre-design)

Design and Procurement

Construction

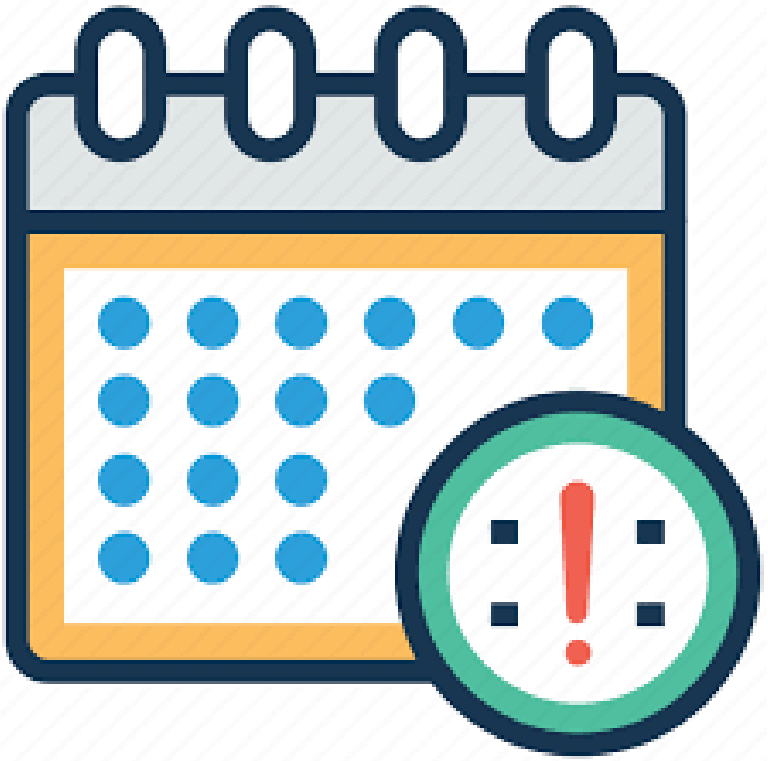
Commissioning / Move management / Closeout

Planning Phase

Project Schedule Management

Planning the Project

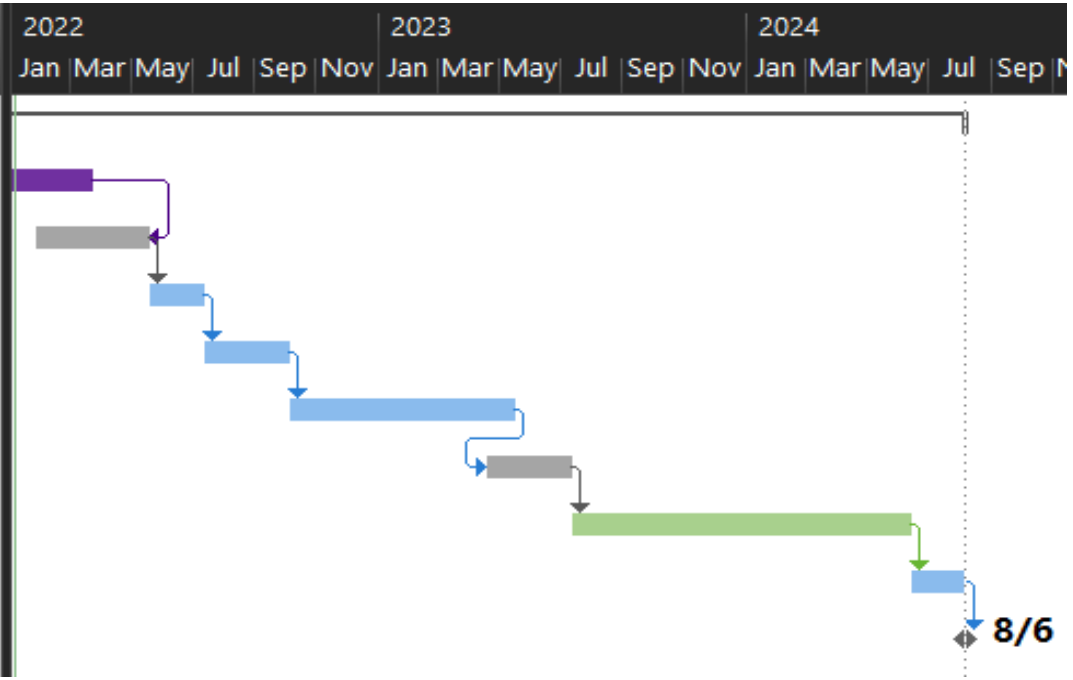
- Realistic Project Duration????
- Project Scope / Budget
- Delivery Method
- Key Milestones
- Hard Opening Date
- Funding Requirements
- Permit / Environmental Requirements
- Deferred Design Reviews (DSA, SFM, etc.)
- Construction Market / Labor, other resources
- Other Factors (Other projects, Weather, COVID?)



Planning the Project

- High Level Schedule
- Durations based on known factors and experience of similar scope projects

Task Name	Duration
Project Name	**700 days**
Site Selection & Acquisition	4 mons
Consultant Procurements	4 mons
Conceptual Design	2 mons
Schematic Design	3 mons
Design Development & Approvals	8 mons
Procurement and Award	3 mons
Construction	12 mons
Closeout / Move-in	2 mons
Project Complete	0 days



Design Phase

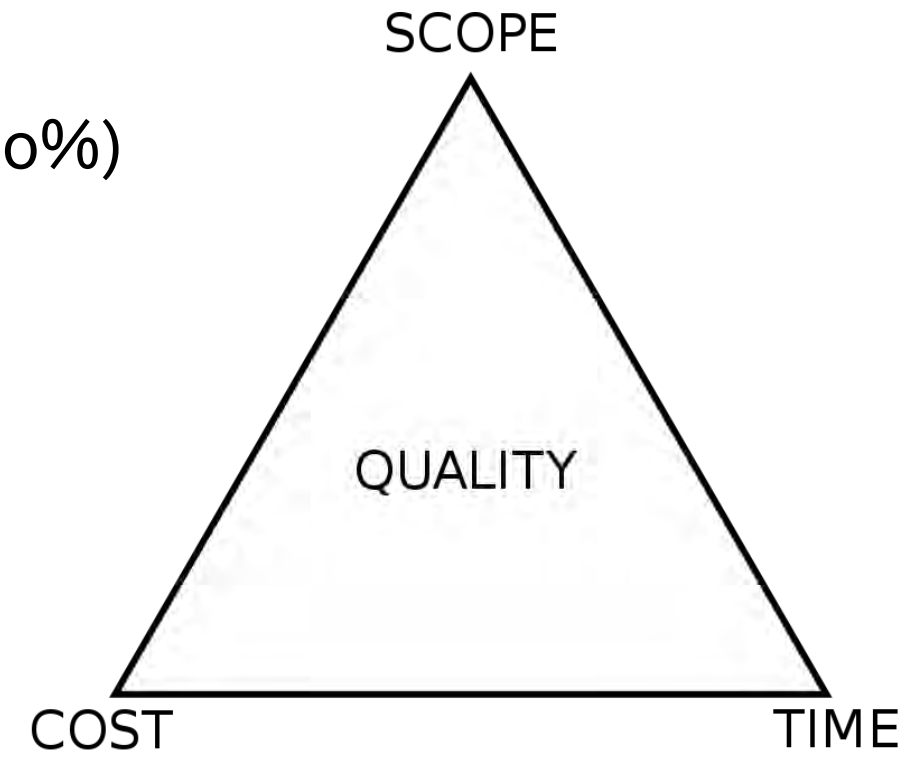
Project Schedule Management

Design Schedule Management

- Start with a high-level Plan
- Develop a Design Schedule
  - Design submittals, reviews, procurement…
  - Don't rush the design! (HKA CRUX report)
- Mitigate potential issues:
  - Adequate design resources and timelines
  - Plan appropriate time for design reviews
  - Make sure the design is ready for bid
  - Constructability Reviews

Design Schedule Management

- Update the project schedule during design
- Design Development Submittals
  - Continue Schedule Development (15% - 30%)
  - Cost & Schedule Reconciliations
  - Cost & Schedule Contingencies
  - Constructability Reviews w/ Schedule
  - 4D Schedule Model



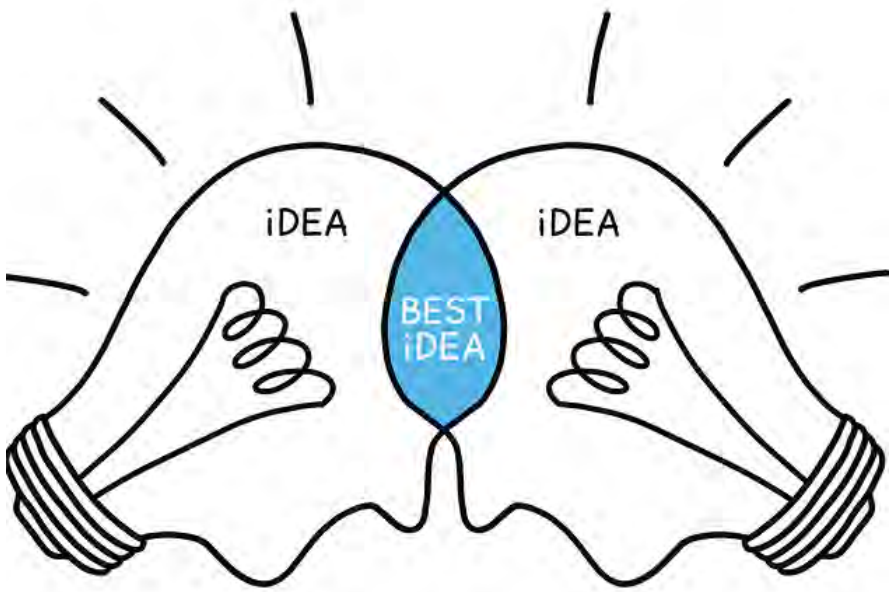
Design Schedule Management

Construction Phase

Project Schedule Management

Baseline Construction Schedule

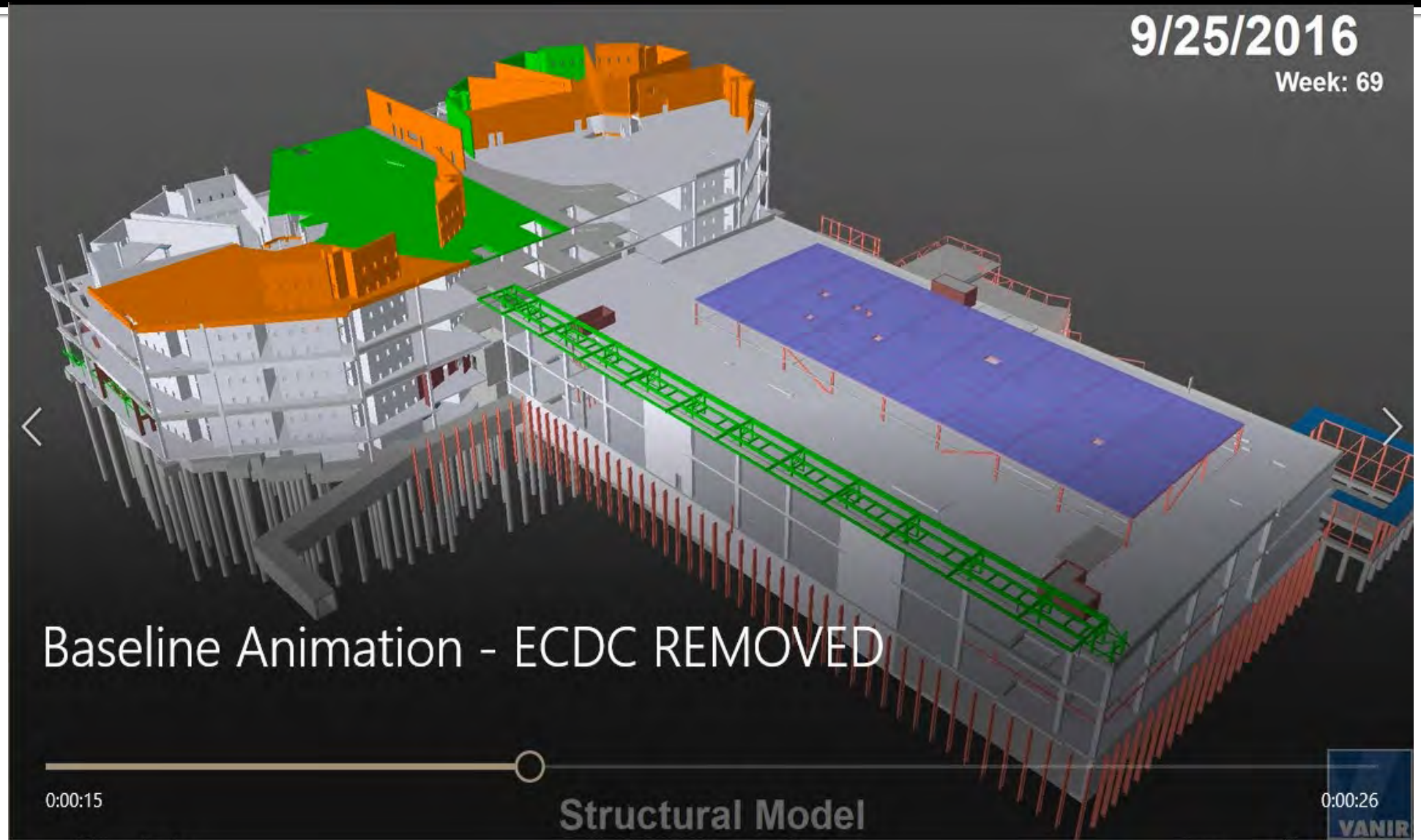
- Prep for the Baseline Submittal
- Develop Project Insights
- Meet with Stakeholders
- Review the Planning Schedule
- Study the Plans and Specs
- Develop a Review Checklist
- Meet with the Contractor
- Share information and keep open communication & a collaborative process



Baseline Review

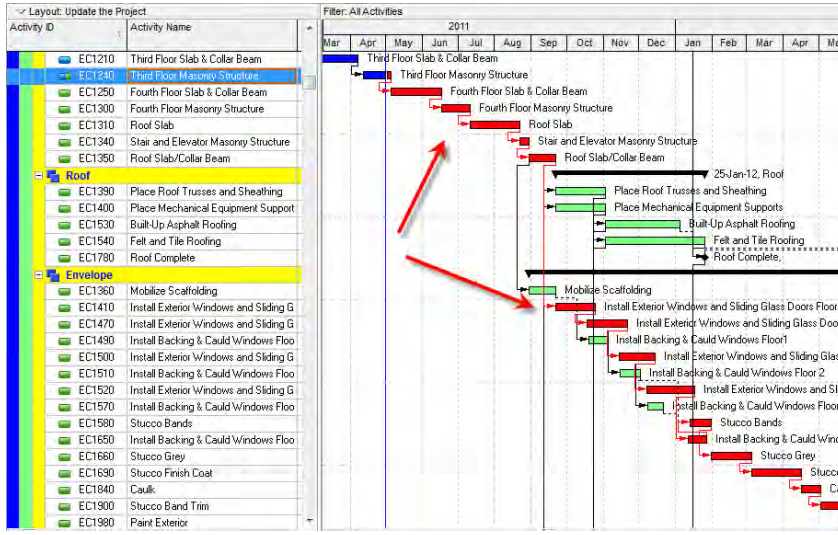
- Use the Checklist
- Verify Contract Compliance
- Milestones compared to contract dates
- Is there a definable Critical Path and does it make sense?
- Constraints
- Review resource flow
- Should be buildable (Constructability – 4D)
- Provide comments and meet again…

Baseline Review



Update Review

- Look for Changes (*use clues – Float and Finish Variance*)
- Verify Changes in Contract Requirements
  - New planned completion or milestone dates
  - Revised project or phase duration
  - Added activities for Change Order work
- Look for other changes
  - Added/deleted activities, logic, added constraints…
- When something doesn't make sense, ask "why?"



Evaluating Time Impact Analysis (TIAs)

- Be Proactive
  - Don't wait to be notified
  - Not a schedule update
  - Don't let issues pile up
- Evaluate one issue at a time
  - Keep it simple
- Documentation
  - Track the events, start/end dates, affected activities and resources
  - Did it impact the critical path work and completion date?

Evaluating Time Impact Analysis (TIAs)

- Check for concurrency
- Other events/impacts at the same time
- Can the delay be mitigated?
- Come to a reasonable conclusion / resolution
  - Get it into a CCO to adjust the project schedule

Schedule Management Summary

Planning / Programming (Pre-design)

Design and Procurement

Construction

Commissioning / Move management / Closeout

- Realistic Project Duration
- Balance Facts with Desires

- Don’t Rush the Design
- Develop Design and Construction Schedule

- Prep for the Baseline
- Open Collaborative
- Be Proactive

Outcomes-driven Pre-Construction Cost Management

A Framework for Success

Mike Parkyn MRICS
Regional Director
Saylor Consulting Group
mparkyn@saylorconsulting.com

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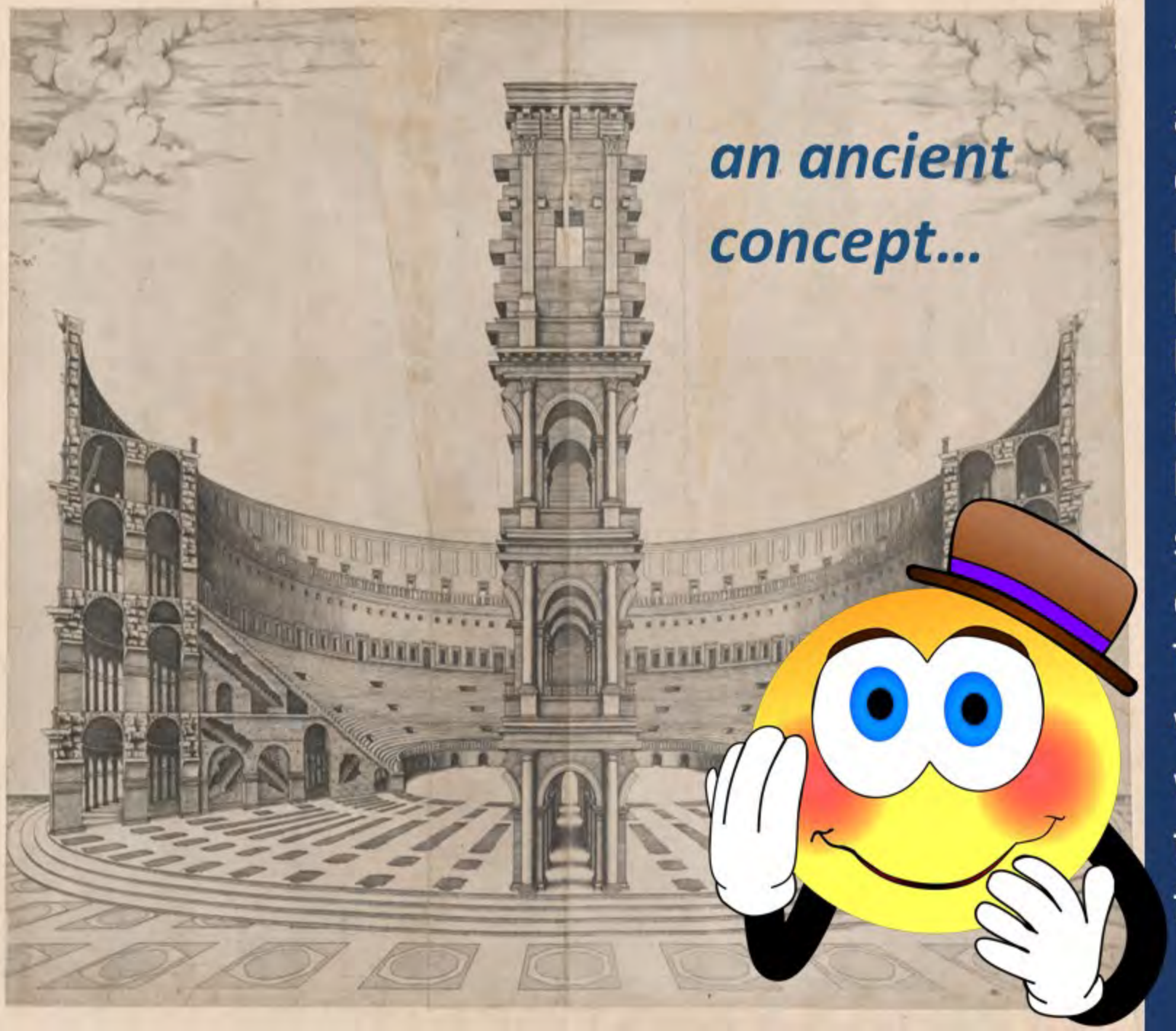
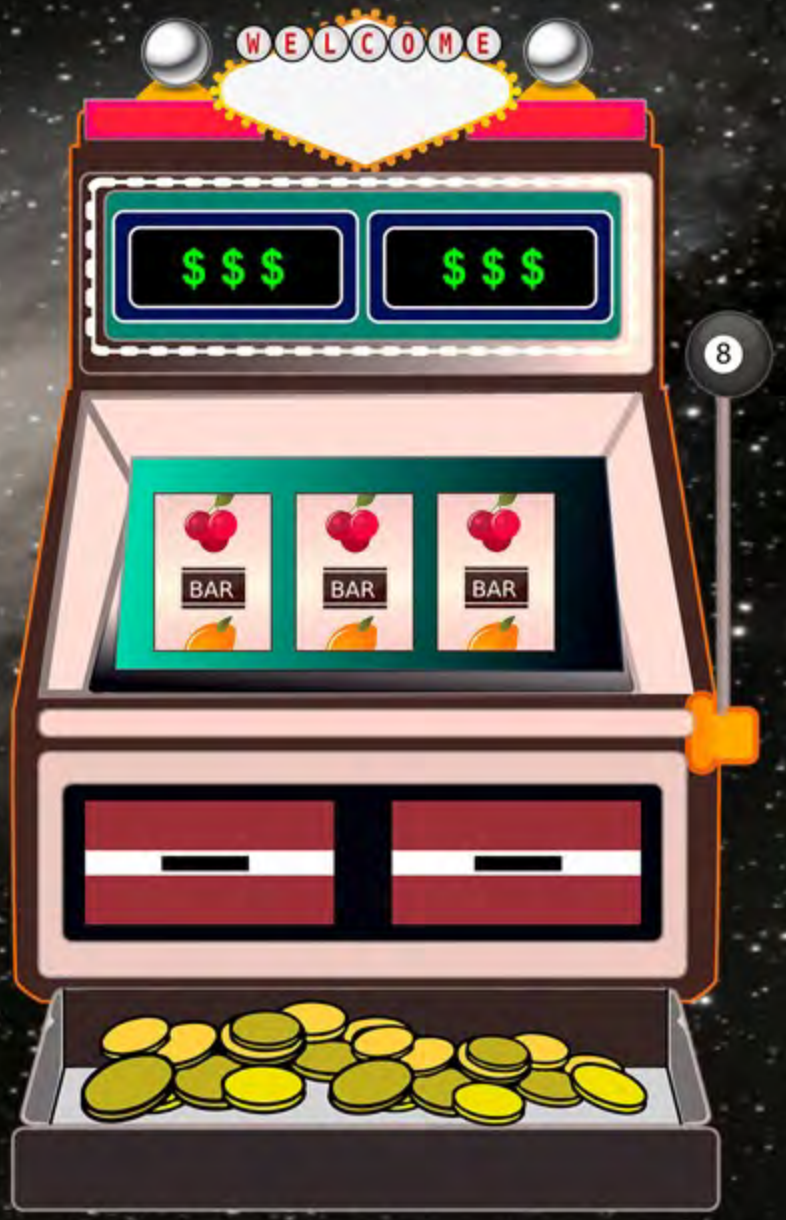


"If one of you wanted to build a large building, you would sit down first and think of how much money it would take to build it. You would see if you had enough money to finish it, or when the base of the building is finished, you might see that you do not have enough money to finish it. Then all who would see it would make fun of you. They would say, 'This man began to build and was not able to finish.'"

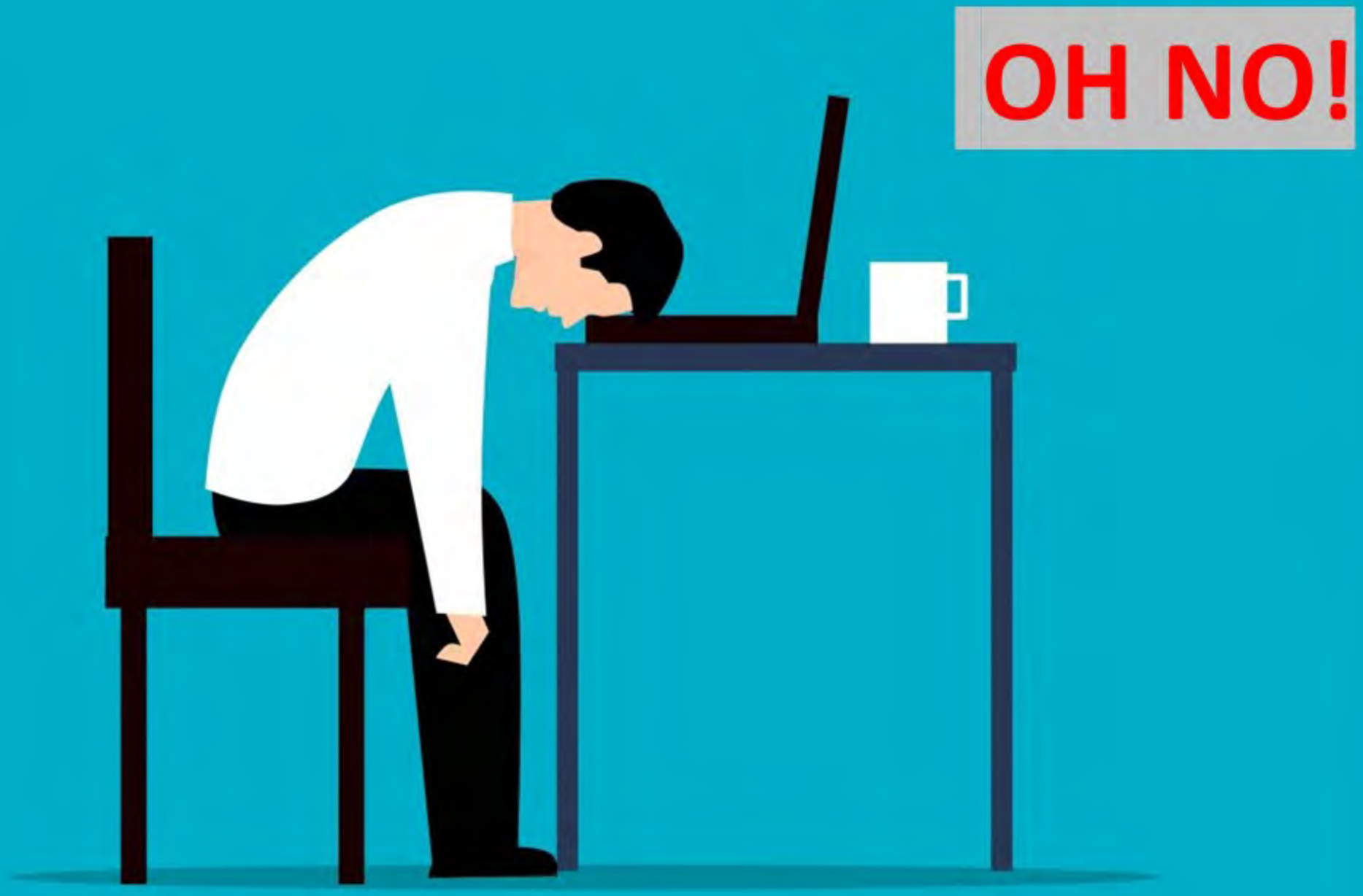
the Bible

Milestone Estimates

SD, DD, CD

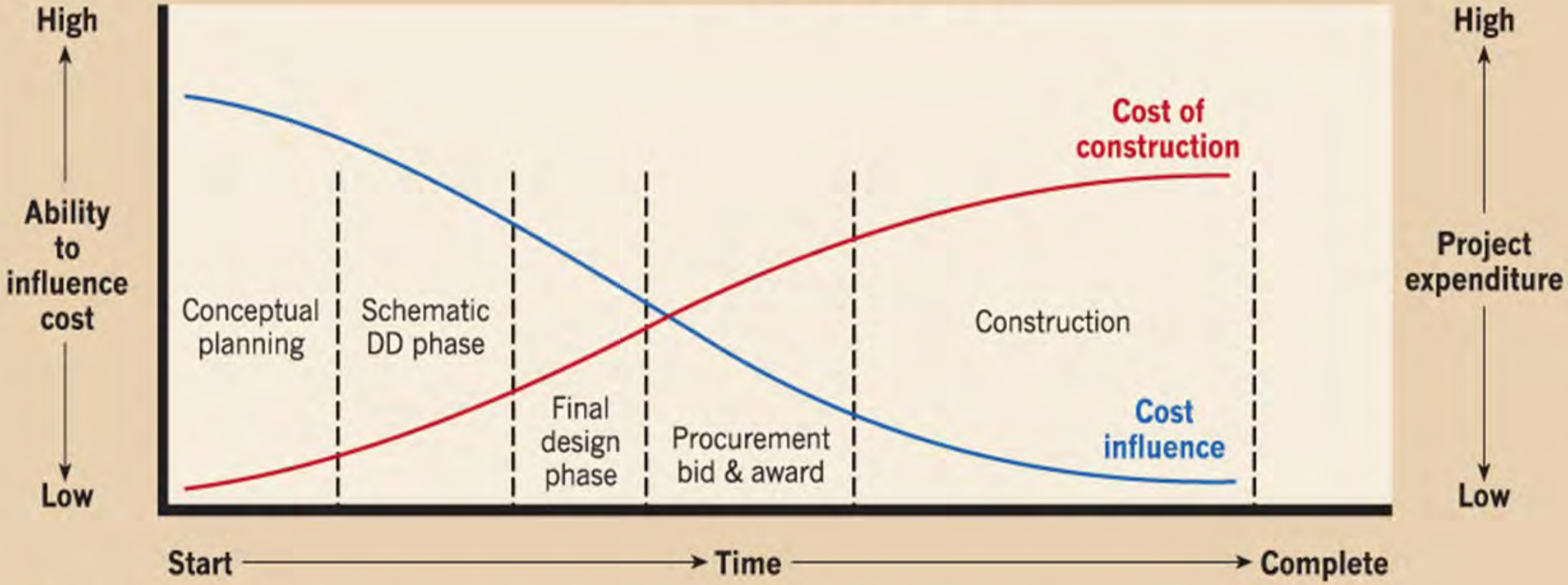


"time to check in on cost…
hopefully we're on budget"


OH NO!

Cause: estimating "after the event" rather than an *outcomes-driven* Cost Management *framework*

Cost Influence Curve



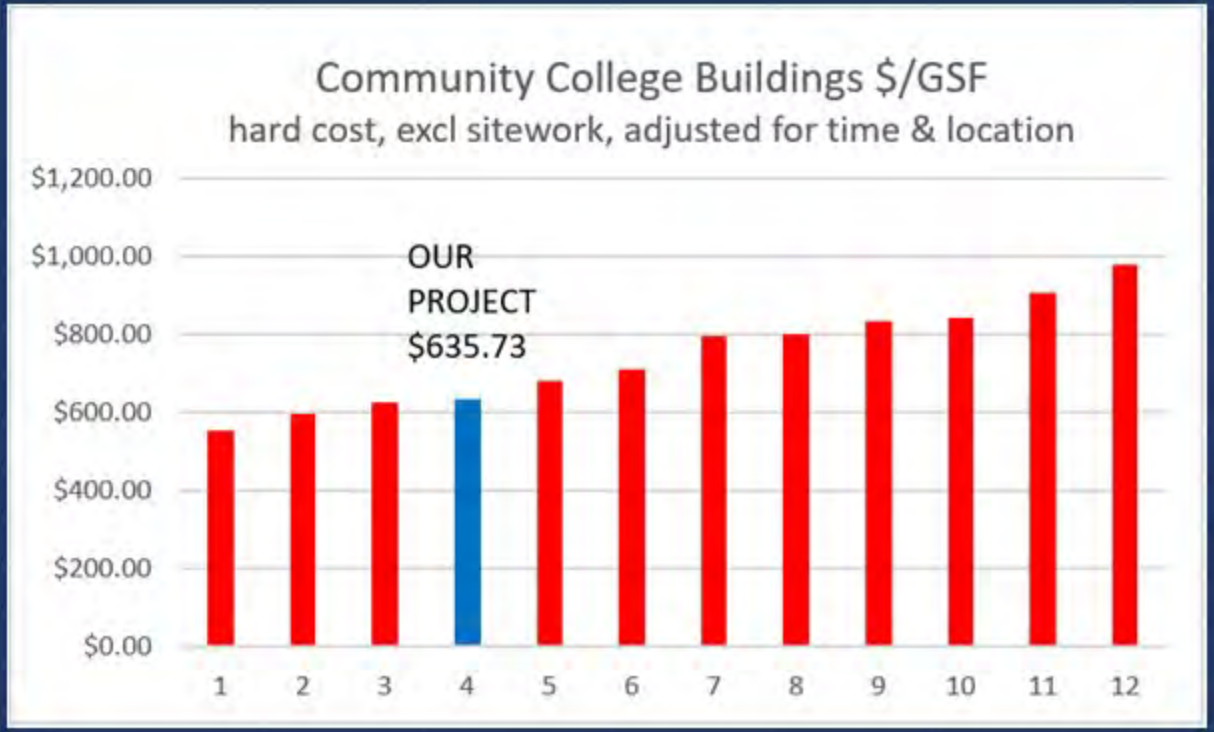
Value engineering	Conceptual	30%-60%	90%		Informal analysis
Estimating	Class I	Class II & III	Class IV	Bid analysis	Evaluate change orders

Project Visibility
Budget Validation
Project Cost Plan (Control Quantities)
Milestone Estimates

Project Visibility
Project Cost Plan (Control Quantities)
Milestone Estimates
Budget Validation

First step for Project Visibility is Budget Validation

Benchmark comparables



Project & Location	GSF
Environmental Science, San Mateo CCD	23,050
Student Services Center, Long Beach City College	31,954
Math, Science & Technology, San Mateo CCD	48,380
SAILS Student Center, LACCD Harbor College	55,381
Health Science Building, Santa Ana, Rancho Santiago CCD	55,781
Building 2100, Las Positas College	77,752
Library Building, Chabot College	81,396
Career Education Building, San Jose City College	83,435
***OUR PROJECT ***	87,300
Wellness & Kinesiology Complex, San Mateo CCD	98,124
Media and Performing Arts Center, LACCD Valley College	118,099
Social Sciences & Creative Arts, San Mateo CCD	120,780

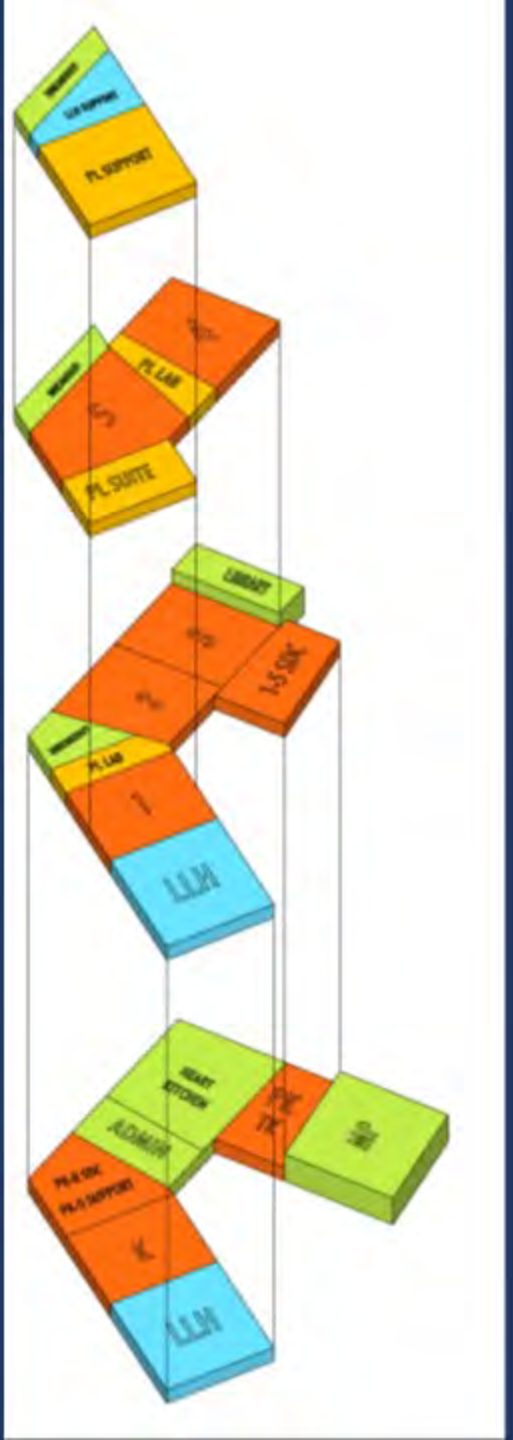
California Community College New Buildings
Budget Construction costs, escalated for comparison

BUILDING NUMBER	REMODEL/NEW BUILD	INTENDED GSF	ADJUSTED CONSTRUCTION BUDGET $	CONSTRUCTION BUDGET REQUIRED FOR INTENDED GSF	STATUS on $	STATUS ON GSF
CAMPUS 1						
Building 1	Demo and new build	85,498	$56,000,000	$63,657,685	REVIEW	REVIEW
New	New build	40,000	$32,414,988	$32,204,988	OK	OK
Building 5	Remodel	46,299	$3,500,000	$2,830,658	OK	OK
Building 7	Remodel	31,473	$5,100,000	$7,309,430	REVIEW	REVIEW
Building 10	Remodel	42,514	$2,151,400	$1,972,344	OK	OK
TOTALS: CONSTRUCTION COSTS ONLY		271,090	$99,166,388	$107,975,105		
CAMPUS 2						
Building 1	Remodel	24,930	$3,500,000	$3,521,448	OK	OK
Building 3	Remodel	28,027	$7,000,000	$6,802,474	OK	OK
Building 4	Remodel	15,245	$3,049,000	$3,006,849	OK	OK
Building 6	Demo and Rebuild	69,000	$28,000,000	$57,246,062	REVIEW	REVIEW
Building 10	Remodel	49,402	$7,000,000	$6,835,370	OK	OK
Building 17	Remodel	7,425	$2,100,000	$2,000,811	OK	OK
Building 18	Demo and Rebuild	53,232	$34,600,800	$39,542,471	REVIEW	REVIEW
Building 21	Demo	21,779	$2,177,900	[illegible]	OK	OK
Building 23	Remodel	10,800	$700,000	$6[illegible]0,297	OK	OK
TOTALS: CONSTRUCTION COSTS ONLY		348,716	$88,127,700	$12[illegible]		
CAMPUS 3						
Building 1	Demo and Rebuild	110,[illegible]00	$80,5[illegible],000	$100,474,092	REVIEW	REVIEW
New	New build	18,00[illegible]	$12,700,000	$12,683,049	OK	OK
New	New build	7,000	$2,625,000	$2,821,431	IN RANGE	IN RANGE
Building 4	Remodel	46,872	$1,750,000	$10,367,393	REVIEW	REVIEW
Building 5	Remodel	51,906	$3,500,000	$6,030,428	REVIEW	REVIEW
Building 8	Remodel	9,797	$1,050,000	$1,400,351	REVIEW	REVIEW
Building 9	Demo	38,842	$2,100,000	$2,064,760	OK	OK
TOTALS: CONSTRUCTION COSTS ONLY		282,417	$104,225,000	$135,841,503		
ALL THREE CAMPUSES, CONSTRUCTION COSTS		902,223	$291,519,088	$364,072,209		

Project Cost Model				
Campus	3			
Project ID:	1		N	
Project Name:	New Tech Ed building			
Project Description:	New 3-4 story building. Marquee building, no heavy trades, atrium, café, auditorium, classrooms, and specialty lab spaces (enhanced MEP). Exterior terraces and high glazing ratio. Includes approx. 90,000 SF of sitework to include hardscape yard for trades' curricula and greenspace. (Approx 50:50)			
GSF:	110,000			
Construction Start	06/01/23			
Construction End	12/31/24			
New Build (Y/N)	Y			
TI Level:	H			
Upgrades/Repurpose/Renovations (Y/N)	N			
Upgrades/Repurpose/Renovations Level				
Demolitions:				
		GSF	16.00	0
Core/Shell	110000	GSF	301.00	33,110,000
TI Allowance L	110000	GSF	0.00	0
TI Allowance M	110000	GSF	0.00	0
TI Allowance H	110000	GSF	272.00	29,920,000
Upgrade/Repurpose/Renovations: L	0	GSF	0.00	0
Upgrade/Repurpose/Renovations: M	0	GSF	0.00	0
Upgrade/Repurpose/Renovations: H	0	GSF	0.00	0
Adjustments:				
Marquee Image premium, allow	1	LS	2,500,000.00	2,500,000
Auditorium premium, allow	1	LS	500,000.00	500,000
Site Allowance:	60000	SF		
Green Landscape	60.00%		22.00	792,000
Pavers	40.00%		30.00	720,000
Patio furniture	1	LS	150,000.00	150,000
Total (today)				67,692,000
Prorates			34.38%	23,269,125
Total (today)				90,961,125
MPOC:		03/16/24		
Base date		12/30/21		
Escalation Days		808		
Escalation Years		2.21		
Escalation Annual %		0.045		
Escalation %			0.10	9,303,410
Construction Costs:				100,474,092
Construction Contingency:			5.00%	5,023,705
Soft Cost additions:			37.00%	37,175,414
Total Project Costs				142,673,211

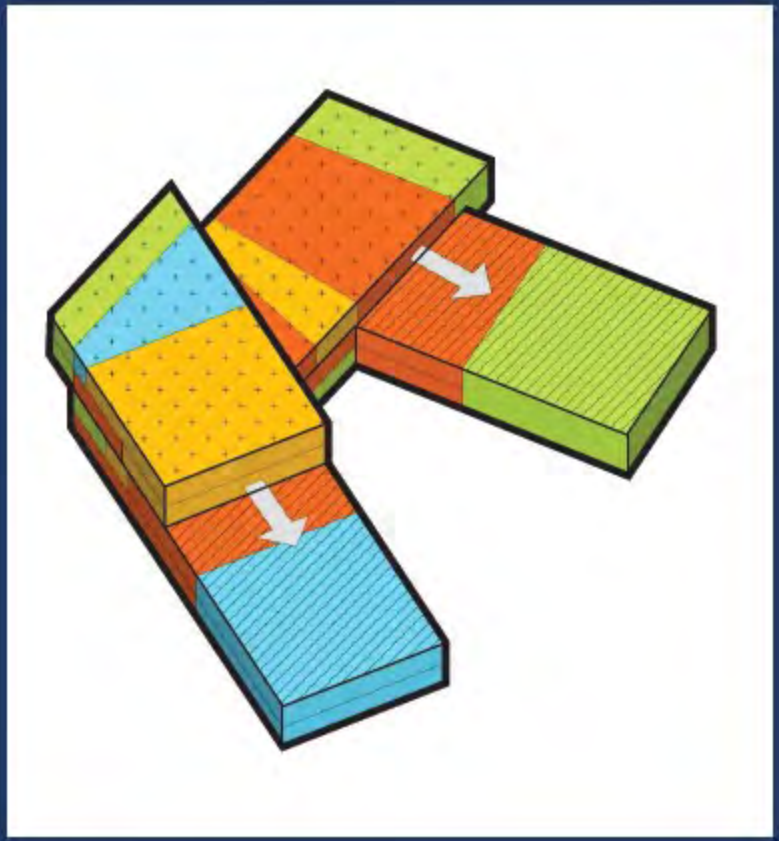
Fictitious project list

Project Visibility
Budget Validation
Milestone Estimates
Project Cost Plan (Control Quantities)



Control Quantities

Defining building parameters and major cost elements



- Program SF
- Efficiency Factor
- Gross SF
- No of stories/heights
- Footprint
- Perimeter
- Exterior Wall to floor ratio
- Glazing %
- Partition density
- Door Count
- Elevator Count
- Plumbing Fixture Count
- HVAC CFM
- Elec Loads
- Add Site: SF, Blend, Utilities

Number of Stories above grade 6

Gross Areas:	Enclosed	Covered (50%)	Total	Story Heights	Perimeter
Basement Parking Pit	18,960	0	18,960	7.25	966
Basement B01	101,944	0	101,944	10	1,520
L1	111,601	0	111,601	16.167	1,735
L2	93,940	0	93,940	12.25	1,918
L3	71,341	3839	73,261	12.33	3,282
L4	75,180	0	75,180	11	3,282
L5	71,725	0	71,725	11	3,200
L6	59,038	0	59,038	10.33	3,100
Total Building	482,825	3,839	484,745	90.327	
Total Basement	120,904		120,904		
Footprint Area: Parking	120,904				
Footprint Area: Building	111,601				
Parapet				4.17	
Gross Wall Area: Basement	22,204				
Concrete Frame Support Area	286,185				
Residential Suspended Floor	277,284				
Gross Façade Area: L1-L6	195,337				
Gross Façade Area: L1	28,050	6,796	31.98%		
Windows or Glazing Area: %	60.00%				
Windows or Glazing Area: SF	117,202				
Parapet	2,637				
Roof Equipment Screen	1,676				
Roof Area - Total:	75,098				
Waterproofed Terraces:	38,741				
L1 Over Parking Waterproof	9,303				
Interior Partition Ratio	2.00				
Interior Partition SF	969,489				

Page 2

location **date** (index tracking, e.g. CCCI/ENR)

CONCEPT ESTIMATE					
ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
A	SUBSTRUCTURE				
A10	FOUNDATIONS			28.31	1,370,000
A20	BASEMENT CONSTRUCTION			1.55	75,000
		SUBSTRUCTURE TOTAL		29.86	1,445,000
B	SHELL				
B10	SUPERSTRUCTURE			73.03	3,534,581
B20	EXTERIOR ENCLOSURE			68.00	3,291,370
B30	ROOFING			21.00	1,016,250
		SHELL TOTAL		162.03	7,842,201
C	INTERIORS				
C10	INTERIOR CONSTRUCTION			28.36	1,372,548
C20	STAIRWAYS			5.18	250,500
C30	INTERIOR FINISHES			69.84	3,380,464
		INTERIORS TOTAL		103.38	5,003,512
D	SERVICES				
D10	CONVEYING SYSTEMS			9.50	460,000
D20	PLUMBING SYSTEMS			3.41	165,000
D30	HVAC SYSTEMS			65.00	3,146,000
D40	FIRE PROTECTION SYSTEMS			7.50	363,000
D50	ELECTRICAL SYSTEMS			81.92	3,964,800
		SERVICES TOTAL		167.33	8,098,800
E	EQUIPMENT AND FURNISHINGS				
E10	GROUP I EQUIPMENT			3.10	150,000
E20	FURNISHINGS (GROUP I CASEWORK)			10.20	493,520
		EQUIPMENT AND FURNISHINGS TOTAL		13.30	643,520
F	SPECIAL CONSTRUCTION/DEMOLITION				
F10	SPECIAL CONSTRUCTION				NONE
F20	SELECTIVE DEMOLITION				NONE
		SPECIAL CONSTRUCTION/DEMOLITION TOTAL		-	-
G	SITEWORK - SEE SEPARATE SITEWORK ESTIMATE				
	TOTAL BUILDING		GSF	475.89	23,033,034

CONCEPT ESTIMATE					
ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
	PRORATES				
	General Conditions	10.00%			2,303,303
	Design Contingency	15.00%			3,454,955
	Escalation to Midpoint	13.00%			2,994,294
	SUBTOTAL		GSF	656.73	31,785,586
	Bonds / Insurance	2.50%			794,640
	Contractors Fee	6.00%			1,907,135
	TOTAL CONSTRUCTION COSTS		GSF	712.55	34,487,361

- Standard Work Breakdown Structure (Uniformat)
- Standardize for Data Value
- Sitework Separate (12%, 18%, 26%, 32%)
- Prorates stated
- Switch to CSI Masterformat later

Project Visibility
Budget Validation
Project Cost Plan (Control Quantities)
Milestone Estimates

get the right tools together

Project Visibility

Budget Validation → Project Cost Plan (Control Quantities) → Milestone Estimates

Proven Tools

Design Options $ROM → Issues Log → Value Engineering → Costed Risk Matrix → Estimate Reconciliation

Project Visibility

Budget Validation

Project Cost Plan (Control Quantities)

Milestone Estimates

Proven Tools

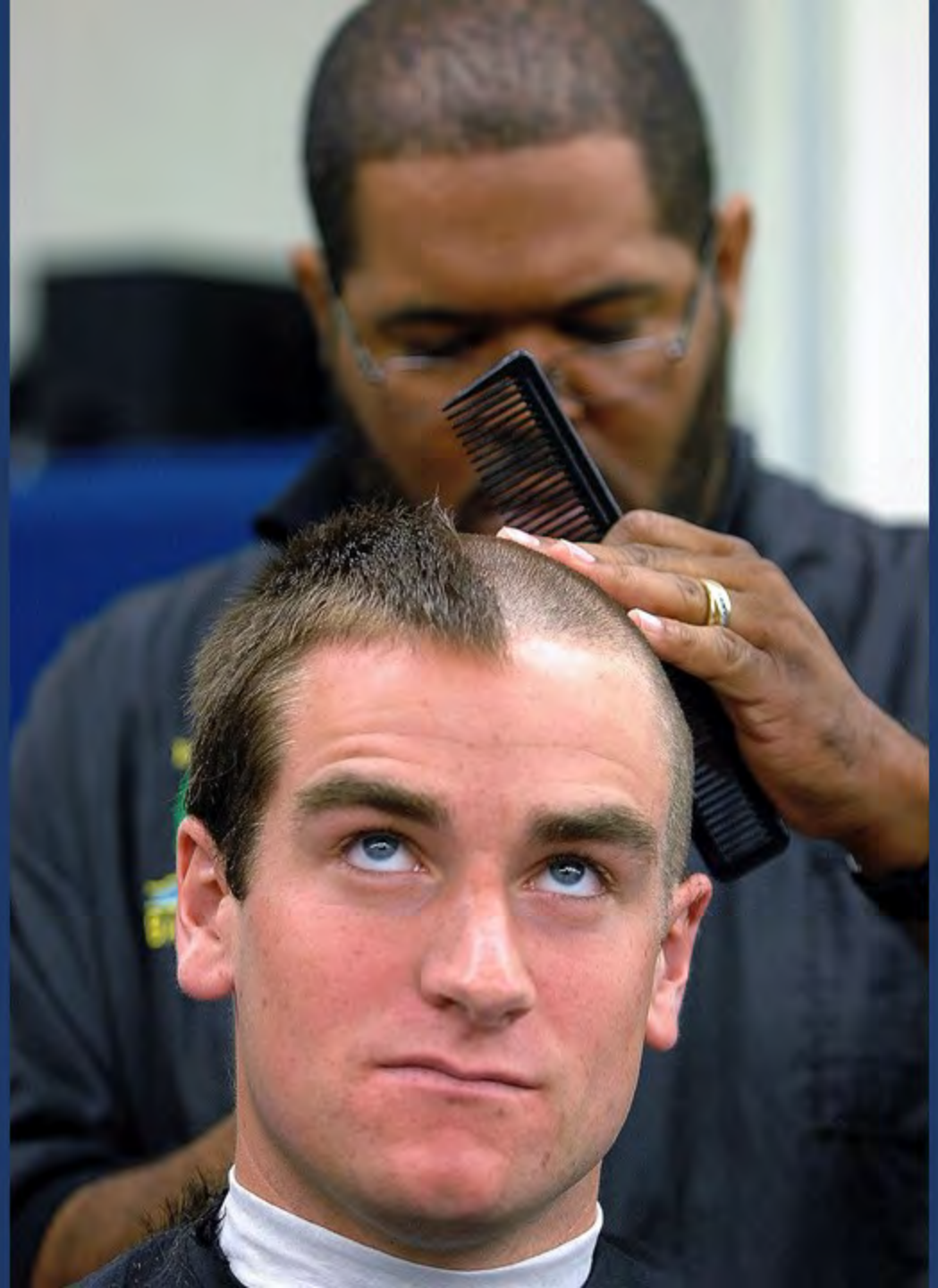
Design Options $ROM

Issues Log

Costed Risk Matrix

Estimate Reconciliation

Value Engineering



It’s ok, we’re getting back on budget…

Four phases of Value Engineering

INFORMATION

OBJECTIVE
Provide an information base
Select areas for detailed study

QUESTIONS
What is it?
What must it do?
What does it cost?
What is it worth?

TECHNIQUES
Functional Analysis
Cost Worth Concept
Graphics
Cost Modeling

"What do we have right now?"

SPECULATIVE

OBJECTIVE
Generate alternatives
For meeting requirements

QUESTIONS
What else will perform
The required function

TECHNIQUES
Creative thinking
Processes (i.e., Brainstorming)

"What else might work?"

ANALYTICAL

OBJECTIVE
Evaluation and selection of best cost saving alternatives

QUESTIONS
What will the alternatives Cost?
Will the alternatives meet
The required function?
What proposals have the
Greatest cost savings?

TECHNIQUES
Life Cycle Costing
Weighted Constraints
Evaluation Idea Rating

"find best option"

PROPOSAL

OBJECTIVE
Presentation of best
Alternatives to
decision maker

QUESTION
How best to
Present proposals?

TECHNIQUES
Narrative Report
Schematic Overlays
Graphics

"deliver results"

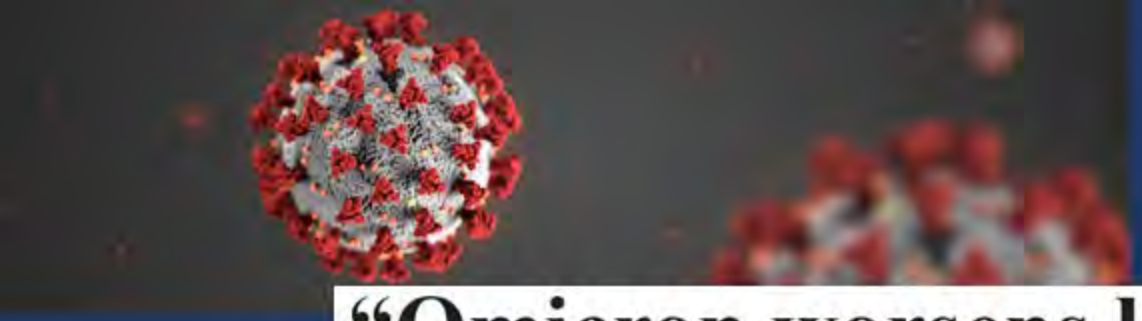
Project Visibility

Budget Validation → Project Cost Plan (Control Quantities) → Milestone Estimates

Proven Tools

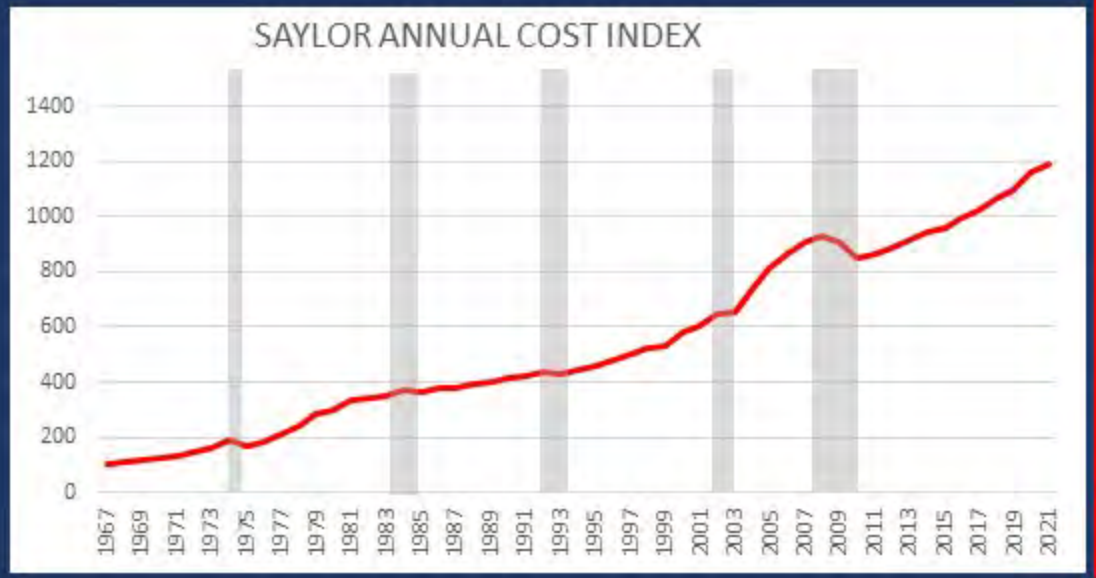
Design Options $ROM → Issues Log → Value Engineering → Costed Risk Matrix → Estimate Reconciliation

Market Alignments



Covid-19 recovery and ongoing market uncertainty

"Omicron worsens labor shortage, slows economy — and could boost inflation" *Market Watch, January 11, 2022*



What is the shape of the pricing surge?

2021Q4 Data Shocks:

Materials sample (23 items) + 9.3%

SubContract Index (21 trades) + 5.7%

- monitor markets
- cost risk mitigation strategies

Project Visibility

- Budget Validation
- Project Cost Plan (Control Quantities)
- Milestone Estimates

Proven Tools

- Design Options $ROM
- Issues Log
- Value Engineering
- Costed Risk Matrix
- Estimate Reconciliation

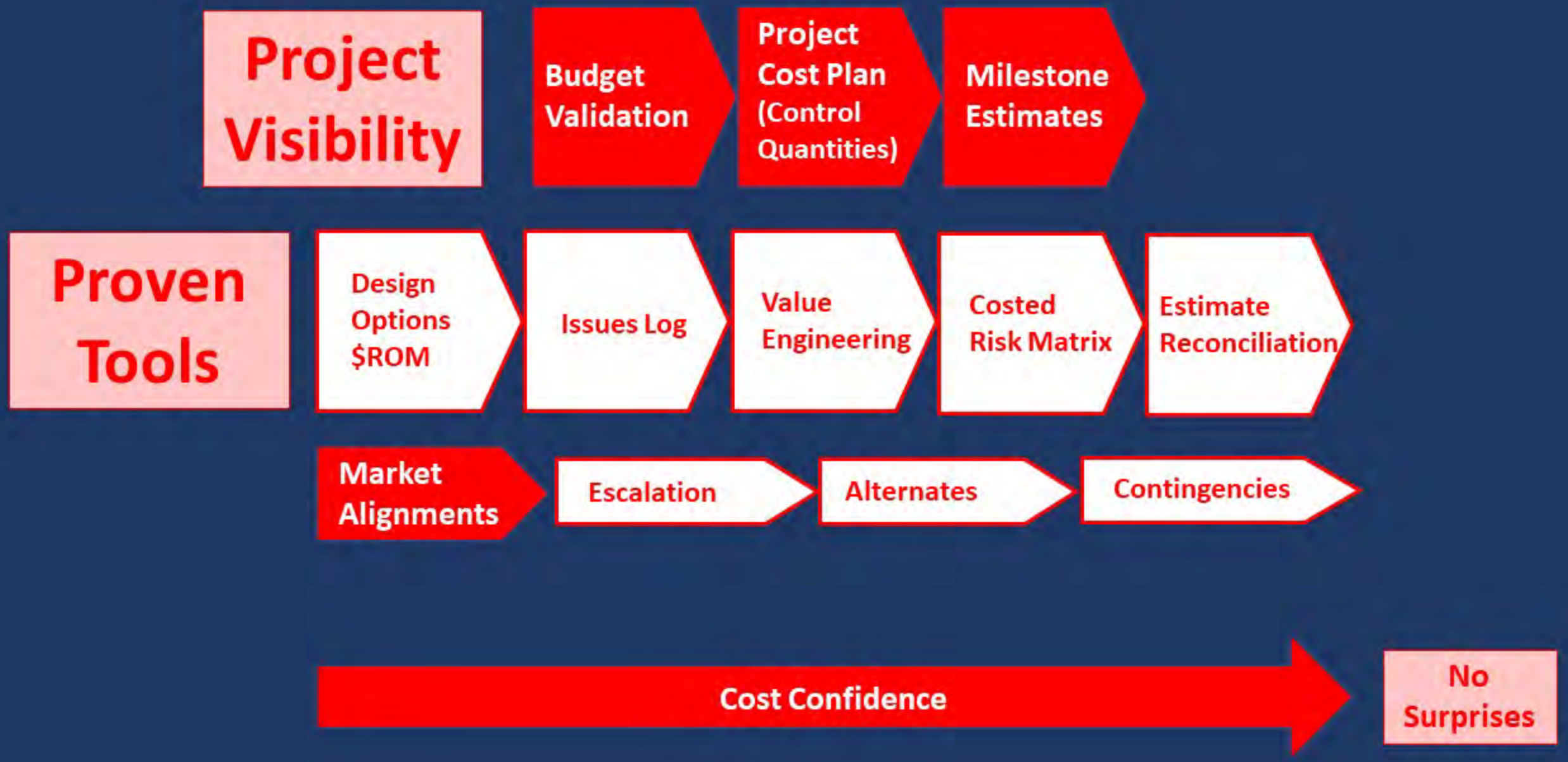
- Market Alignments
- Escalation
- Alternates
- Contingencies

Number of bids drives pricing:

1:	+25 to 100%
2-3:	+10 to 25%
4-5:	0 to +10%
6-7:	0 to -10%
8+:	-10 to -20%

Risk a major cost driver?

Creative risk sharing strategies?


Project Visibility
Budget Validation
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Issues Log
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Market Alignments
Escalation
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Contingencies
Cost Confidence
No Surprises

Communication, Values Based Leadership

Project Visibility
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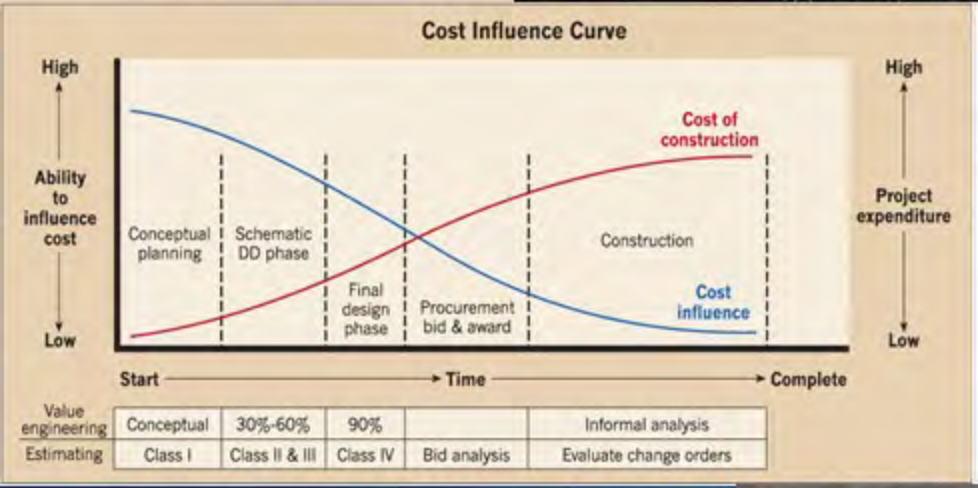
Cost Confidence
No Surprises
Communication, Values Based Leadership

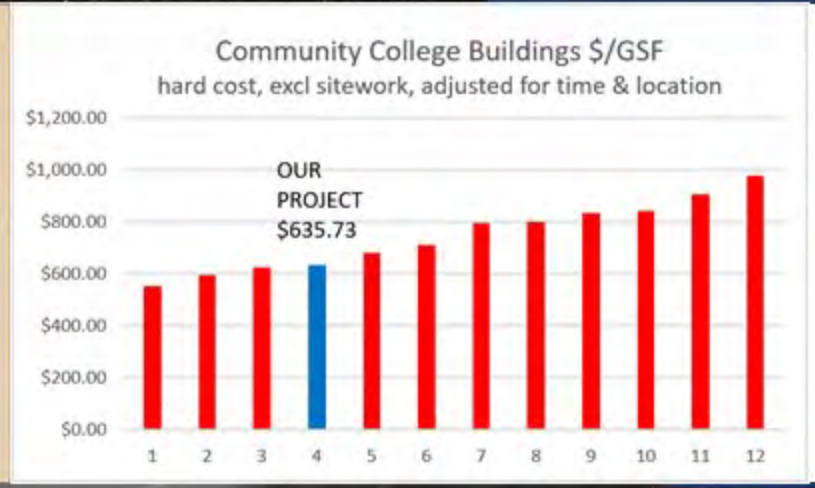
*“**Success is not an accident**, success is actually a choice”.*

Stephen Curry

$$$
$$$

FEMA / STATE
DISASTER
RECOVERY
CENTER


Cost Influence Curve
High
Ability to influence cost
Low
Cost of construction
Conceptual planning
Schematic DD phase
Final design phase
Procurement bid & award
Construction
Cost influence
High
Project expenditure
Low
Start
Time
Complete
Value engineering
Conceptual
30%-60%
90%
Informal analysis
Estimating
Class I
Class II & III
Class IV
Bid analysis
Evaluate change orders


Community College Buildings $/GSF
hard cost, excl sitework, adjusted for time & location
$1,200.00
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
OUR
PROJECT
$635.73
1
2
3
4
5
6
7
8
9
10
11
12

TEAMWORK

30
WARRIORS

thanks!

Outcomes-driven Pre-Construction Cost Management

A Framework for Success

Mike Parkyn MRICS
Regional Director
Saylor Consulting Group
mparkyn@saylorconsulting.com

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NORTHERN CALIFORNIA CHAPTER

Construction Management: An Owner’s Perspective

Speaker: Matthew Hawk, Esq., Principal Counsel, Construction
University of California Office of the President

January 2022

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Not just a university

Who We Are

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Background

Top Public University System in the World

- Largest developer in California
- Cutting edge research facilities
- Increasing enrollment demands
- Providing world-class facilities to both students and faculty
- Commitment to sustainability

What are the Challenges?

- Competitive bidding requirements
- Scrutinized and limited budgets
- Extreme time constraints
- Limitations on staff employees

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Background

What Are Our Priorities?

- Minimizing risk to the University
- Completing projects within budget
- Completing projects on time
- Receiving high quality product

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Minimizing Risk

Starts with Budgeting

- Utilize outside cost estimators or CM firms
- Escalate to the midpoint of construction
- Realistic and conservative estimate
- Cost escalation not a basis for Change Order in UC contracts

- Need strong sources of industry info re: labor, materials, expected contingencies
- Budgets are living documents- treat them as such

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Minimizing Risk

Choosing the Delivery Method

- UC has gravitated away from traditional design/bid/build on larger projects
- Design Build (DB), Progressive Design Build (PDB), CM at Risk (CMAR) are more common
- Centralize and allocate risk appropriately
- Utilize University Controlled Insurance Program (UCIP) for projects over $25 million

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Minimizing Risk

Exploring Newer Delivery Methods

- Integrated Form of Agreement (IFOA)
  - Major parties are all signatories to a single agreement (designers, contractors, major subs, even major suppliers)
  - Parties agree to certain percentages of overall profit
  - Costs go up, profit reduces for all
  - Incentive for parties to work together and avoid costly changes (both time and money)
  - All parties participate from the start (pre-design)
  - Currently being used a pilot program on UCSF's Parnassus hospital expansion project (expected opening 2030, anticipated budget of $2 billion)

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Minimizing Risk

Contract, Contract, Contract!!

- Contract terms are non-negotiated
- Expectation that all team members know the relevant contract terms/requirements before bid
- Project Managers are encouraged to have kick off meetings to review contract so everyone is on the same page
- Know what you bid!
- Keep the key team members constant

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Minimizing Risk

Proactive Owner Steps

- Hire third party scheduling consultants to review submittals and advise of potential issues
- Encourage early communication re: schedule slippage
- Remind contractor of contractual requirements and demand adherence
- Encourage Change Orders get drafted early if needed
- Foster team mentality
- Collaborate, cooperate, and succeed
- Communicate, communicate, communicate

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Minimizing Risk

Change Orders- A Necessary Evil

- Follow the contract
- Provide relevant back up
- Don’t use Change Orders as a way to make up for busts elsewhere in the project

- Be realistic and encourage subs to do the same

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Minimizing Risk

Avoiding Claims

- Follow the contract and things usually work out
- Communicate early and often about problems (actual or possible)
- Be honest and forthcoming
- Be proactive- not reactive
- Do what you say you're going to do
- Show initiative/ingenuity/creativity

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Minimizing Risk

Key Takeaways

- Know your contracts
- Know your team and their capabilities
- Communication is key
- Encourage team mentality- be a good team member
- Be honest, be upfront, be prepared
- Use your experience to your advantage

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Thank You!

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Questions?

Rafael Martin, PE
Rafael.Martin@vanir.com

Mike Parkyn
mparkyn@saylorconsulting.com

Matt Hawk, Esq.
matthew.hawk@ucop.edu

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Educational Seminar Series;

PM/CM Fundamentals - Estimating, Scheduling, and Claims

January 12, 2022

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