



APPA Institute

Campus Construction in the
New Economy

Capital Construction Strategies for the New Economy




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University of Colorado
Boulder

1 - AIA Continuing Education Credit



AIA
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Provider

Credit(s) earned on completion of this course will be reported to American Institute of Architects (AIA) Continuing Education Session (CES) for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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Course Description

Design Project Management

This class will focus on basic effective fundamental procedures for managing the project design process.

Topics include how to understand and administer the design process, how to interview, select and hire a design consultant, how to get the best from your architect/engineer, how to work and communicate with your campus client, effective communication strategies, what to look for in design reviews, and the importance of program and budget conformance.

Review successful processes for value engineering, effective team management, communication, and basic project manager skills.

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Learning Objectives

1. Learn the basic fundamental procedures for managing project designs.
2. Learn how to understand and administer the design process.
3. Learn how to get the best architect/engineer.
4. Learn how to interview, select and hire a design consultant.


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This concludes The American
Institute of Architects Continuing
Education Systems Course


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Fun in the air



Grandsons






• Licensed Architect

- Colorado
- Georgia
- North Carolina
- Louisiana

• Private Practice -15 years

• Higher Education -29 Years

- **Duke University** -6 Years
 - Director Facilities Design Office
 - Assistant Dean Facilities
- **Emory University** - 6 Years
 - AVP PDC
- **University of Colorado** -17 Years
 - Director PDC
 - Campus Architect
 - AVC Facilities
 - VC Administration - retired in 2015
- **Thweatt Mgt. Consultants**






Agenda


- The Need
- Cost Management Principles
- The New Normal
 - Cost Reduction Strategies
 - Best Price Point
 - Audits
 - Contracts / Standards
- Partnerships
- Communication




	<p><i>APPA Institute</i> Campus Construction in the New Economy</p>	<p>The Need</p>
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Reasons for Increased Cost Control



- Evolving Economic Reality
 - The last big recession was in 2008-09
 - Before that it was 1988-89














	APPA Institute Campus Construction in the New Economy	The New Normal
<p style="text-align: center;">"The new normal is not so new anymore."</p> <div style="text-align: center;">  James Wagner President- Emory University </div> <div style="display: flex; justify-content: space-between; align-items: center;">  University of Colorado Boulder </div>		

	APPA Institute Campus Construction in the New Economy	The Need
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><u>Reasons for Increased Cost Control</u></p> <ul style="list-style-type: none"> • Evolving Quality </div> <div style="width: 45%; text-align: center;">  </div> </div> <div style="position: relative; height: 100px;"> <div style="position: absolute; top: 0; left: 0; transform: rotate(-15deg); border: 2px solid black; padding: 5px; font-weight: bold; font-size: 1.2em;"> Table Talk </div> <p style="text-align: center; font-weight: bold;">In your opinion, when might we experience the next recession?</p> </div> <div style="display: flex; justify-content: space-between; align-items: center;">  University of Colorado Boulder </div>		

	APPA Institute Campus Construction in the New Economy	The Need
<p><u>Create a Culture of Excellence and Integrity</u></p> <ul style="list-style-type: none"> • Instill Trust and Accountability • Arm's Length Relationships • Vendor Accountability • Financial Transparency • Confidence in Budget Performance  		


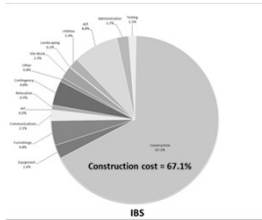


	APPA Institute Campus Construction in the New Economy	The Need
<p>Who Does <u>Not</u> Have Construction Cost Issues on Your Campus?</p>  		




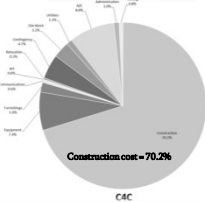

	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="transform: rotate(-15deg); font-size: 2em; font-weight: bold;">Table Talk</p> <p>Are your customer's cost expectations in alignment with yours?</p>  </div> <div style="flex: 0.5;">  </div> </div>		




	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<p style="text-align: center;"><u>Fact or Fiction ?</u></p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;"> <p>Donor</p> <p>Alright; either bring the cost down... or else.</p> </div> <div style="width: 50%;"> <p style="text-align: right;"><i>MULLER</i></p> </div> </div> <p>Are costs too high? Why or why not?</p> <p>You</p> <p><i>I hate this job !</i></p> <p> University of Colorado Boulder</p>		



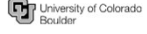
	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<p>Compare to Commercial / Apples to Oranges Compare to Other Peer Universities / Apples to Apples Compare to Published University Costs</p> <p style="text-align: center;"><u>What Are We Comparing ?</u></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p><u>Construction Costs Only</u></p> <p>GSF vs. ASF – 40% - 50% swing Apples to Apples Location Index Inflation</p> <p><u>Excluded:</u></p> <p>Soft Costs (A/E fees, testing, moving) FF&E Internal Costs / Management</p> </div> <div style="width: 50%; text-align: center;"> </div> </div> <p> University of Colorado Boulder</p>		



	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<div style="display: flex; align-items: center;"> <div style="margin-left: 20px;"> <p>JILA Addition</p> </div> </div> <p> University of Colorado Boulder</p>		



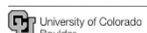
	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<div>  <p>Construction cost = 67.1%</p> <p>IBS</p> </div> <div> Institute for Behavioral Sciences </div> <div>  </div> <div>  University of Colorado Boulder </div>		




	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<div>  </div> <div>  </div> <div>  <p>Construction cost = 70.2%</p> <p>CAC</p> </div> <div> Center for Community </div> <div>  University of Colorado Boulder </div>		


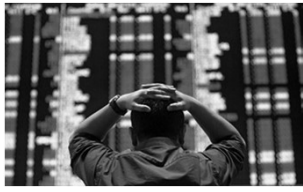

	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<div> <u>Are Costs in Fact High?</u> </div> <div> <ul style="list-style-type: none"> • Why? • What can we do? <ul style="list-style-type: none"> • Frame of Reference </div> <div>  </div> <div>  University of Colorado Boulder </div>		




	APPA Institute Campus Construction in the New Economy	Cost Management Principles
 <p>Housing Cost Study</p> 		




	APPA Institute Campus Construction in the New Economy	Cost Management Principles			
School	Project Name	Construction Cost / SF	# Beds	Construction Cost / Bed	Total Proj Cost/Bed
Princeton University	Butler Dormitory Complex	\$572.51	288	\$238,163	\$305,237
Princeton University	Ellipse Dorm	\$385.07	222	\$139,659	\$161,035
Stanford University	Green Dormitory	\$365.96	47	\$214,286	n/a
Duke University	Bell Tower Residence Hall	\$294.88	138	\$94,068	\$110,769
Rice University	Wess College	\$292.70	230	\$94,120	\$116,840
Dartmouth College	NOM Central Residence Hall	\$271.46	299	\$94,809	\$109,778
Emory	Tuman	\$270.00	133	\$89,504	\$112,566
Emory	Few & Evans	\$265.00	296	\$99,518	\$122,311
Dartmouth College	NOM East Residence Hall	\$256.94	299	\$94,809	\$113,500
Rice University	Martell College	\$251.32	230	\$92,455	\$117,470
Johns Hopkins University	Charles Commons	\$241.94	618	\$107,807	\$134,453
Northwestern University	Benjamin W. Silva Residential College	\$237.14	141	\$76,418	\$93,440
Washington University in St. Louis	Housing Phase III	\$236.91	172	\$63,395	\$73,503
Emory	Freshman 4	\$235.00	355	\$82,208	\$107,665
Emory	East Village - Oxford Campus	\$210.00	350	\$64,949	\$81,429
Average		\$292.43		\$109,751	\$125,750
					




	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<p><u>Are Costs High?</u></p> <ul style="list-style-type: none"> • Frame of Reference • Educate Our Clients/Customers <ul style="list-style-type: none"> • High Expectations • High Quality Standards • Complex Programs • Extensive Infrastructure • Commitment to Sustainability  		




	APPA Institute Campus Construction in the New Economy	Cost Management Principles
<p><u>Are Costs High?</u></p> <ul style="list-style-type: none"> • Frame of Reference • Educate Our Clients/Customers <ul style="list-style-type: none"> • High Expectations • High Quality Standards • Complex Programs • Extensive Infrastructure • Commitment to Sustainability • Continuous Operations • Energy Efficient Designs <div>  </div> <div>  University of Colorado Boulder </div>		




	APPA Institute Campus Construction in the New Economy	The New Normal
<p><i>"Strategies for the next recession"</i></p> <div>  </div> <div>  University of Colorado Boulder </div>		

	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Cost Reduction Strategies</u></p> <ul style="list-style-type: none"> • Renegotiate Agreements <div>  </div> <p><i>Mom always said that it's important to share...</i></p> <div>  University of Colorado Boulder </div>		




	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> Renegotiated Agreements – Saves \$\$ <ul style="list-style-type: none"> Means and Longstreet Res. Hall (\$39.2 million) <ul style="list-style-type: none"> 2.3% • \$495K Saved in Mechanical • \$419K Saved in Miscellaneous Oxford Road Building (\$37.5 Million) <ul style="list-style-type: none"> 2.0% • \$378K Saved in Architectural • \$240K Saved in Mechanical • \$157K Saved in Electrical RSPH (\$82.9 million) <ul style="list-style-type: none"> 3.6% • \$3 million Saved <div>  </div> <div>  University of Colorado Boulder </div>		



	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> Renegotiate Agreements Leverage Relationships <ul style="list-style-type: none"> Change Orders Cost Transparency <div>  </div> <div>  University of Colorado Boulder </div>		




	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> Renegotiate Agreements Leverage Relationships Examine Procurement Alternatives <div>  </div> <div>  University of Colorado Boulder </div>		



	APPA Institute Campus Construction in the New Economy	Procurement Alternatives
<p><u>Project Delivery Options</u></p> <ul style="list-style-type: none"> • CM @ Risk – Traditionally Preferred • Hard Bid • Negotiated • Design / Build • JOC • <u>IPD</u> 		
 University of Colorado Boulder		




	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> • Renegotiate Agreements • Leverage Relationships • Examine Procurement Alternatives • Direct Purchasing 		
 University of Colorado Boulder		




	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Direct Purchasing Program</u></p> <ul style="list-style-type: none"> • Strategic Procurement <ul style="list-style-type: none"> • Concrete • Steel • Roofing • 5%-8% Savings 		
 University of Colorado Boulder		


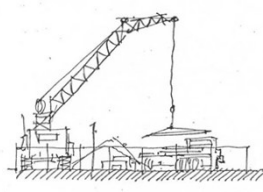

	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> • Renegotiate Agreements • Leverage Relationships • Examine Procurement Alternatives • Direct Purchasing • Pre-establish Design Fees • Owner Controlled Insurance Program • Value Management vs. VE <p>  University of Colorado Boulder </p>		




	APPA Institute Campus Construction in the New Economy	Value Management
<p><u>Value Management</u></p> <ul style="list-style-type: none"> • Means and Longstreet <ul style="list-style-type: none"> • \$593,403 • Oxford Road <ul style="list-style-type: none"> • \$624,000 • RSPH <ul style="list-style-type: none"> • \$349,224 <p>Total = \$1.5M</p> <div>  </div> <p>  University of Colorado Boulder </p>		

	APPA Institute Campus Construction in the New Economy	It's a New Day
<p><u>Aggressive Pursuit of Best Price Point</u></p> <ul style="list-style-type: none"> • Independent Cost Consultants • Expand Vendor Lists <p>  University of Colorado Boulder </p>		

	APPA Institute Campus Construction in the New Economy	Scope Control
<p><u>Control Scope "Creep"</u></p> <ul style="list-style-type: none"> • Projects Represent a Need <ul style="list-style-type: none"> • Not a Wish List • Maintain Focus on Intentions • Challenge Scope Changes 		
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	APPA Institute Campus Construction in the New Economy	Audits
		
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	APPA Institute Campus Construction in the New Economy	Audits
<p>How Many Use CM@Risk?</p>  <p>Audits Are Particularly Important for CM@Risk</p>		
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	APPA Institute Campus Construction in the New Economy	Audits
<p><u>Construction Audits</u></p> <ul style="list-style-type: none"> • Audit Contractors Books / Change orders • Multiple Profit Centers • Use of Contingency • Ambiguous Costs • Inappropriate Charges <ul style="list-style-type: none"> • No gen. requirements • GMP on GC's 		
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What are General Conditions (GC's)?



How do you measure them?

Audit GC's		Psychology and Interdisciplinary Studies		Rollins School of Public Health		Health Science Research Bldg	
	App / Mls.	Total Construction		App / Mls.	Total Construction	App / Mls.	Total Construction
1. Staff / Personnel							
Total	212,621	212,621	15	212,621	212,621	15	212,621
Travel	1,000	1,000	0	1,000	1,000	0	1,000
Commutation Allowance	100,000	100,000	0	100,000	100,000	0	100,000
Telephone	100,000	100,000	0	100,000	100,000	0	100,000
Supplies	100,000	100,000	0	100,000	100,000	0	100,000
2. Data, Printing, Post Office	100,000	100,000	0	100,000	100,000	0	100,000
3. Insurance	100,000	100,000	0	100,000	100,000	0	100,000
4. Staffing	100,000	100,000	0	100,000	100,000	0	100,000
5. Office Public Rental	100,000	100,000	0	100,000	100,000	0	100,000
6. Employee Vehicle	100,000	100,000	0	100,000	100,000	0	100,000
Transportation	100,000	100,000	0	100,000	100,000	0	100,000
Number of Vehicles	100,000	100,000	0	100,000	100,000	0	100,000
7. Vehicle Working	100,000	100,000	0	100,000	100,000	0	100,000
8. Transportation Working	100,000	100,000	0	100,000	100,000	0	100,000
9. Computer Rental / Purchase	100,000	100,000	0	100,000	100,000	0	100,000
10. Insurance and Bonds	100,000	100,000	0	100,000	100,000	0	100,000
Professional	100,000	100,000	0	100,000	100,000	0	100,000
Professional and General	100,000	100,000	0	100,000	100,000	0	100,000
General Liability	100,000	100,000	0	100,000	100,000	0	100,000
11. Other General Costs	100,000	100,000	0	100,000	100,000	0	100,000
Total Project Budget	1,000,000	1,000,000	0	1,000,000	1,000,000	0	1,000,000
Total	1,000,000	1,000,000	0	1,000,000	1,000,000	0	1,000,000
Construction Cost		\$30 Million		\$65 Million		\$88 Million	





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Audits

Construction Audits


- Audit Contractors Books / Change orders
- Multiple Profit Centers
- Use of Contingency
- Ambiguous Costs
- Inappropriate Charges
 - No gen. requirements
 - GMP on GC's
 - Return unused allowances
 - No savings split
 - Agree on billing rates ahead
 - Agree on truck costs, etc.






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Emory Construction Audit Status report					
Project	Year Project Completed	Construction Amount	Gross Savings	Audit Costs	Net Savings
School of Medicine	2007	\$43,685,965	\$90,000	\$35,000	\$55,000
Golzueta Business School Addition	2005	\$21,232,134	\$88,399	\$59,000	\$29,399
Psychology	2009	\$29,426,025	\$0	\$26,400	-\$26,400
Emory Conference Center Hotel Exp.	2009	\$21,530,000	\$0	\$9,293	-\$9,293
WASHCAB Renovation	2009	\$7,673,268	\$27,638	\$15,525	\$12,113
Yerkes Field Station	2009	\$8,270,610	\$32,731	\$18,750	\$13,981
Atwood AHU & Piping	2009	\$6,400,000	\$21,000	\$0	\$21,000
Oxford Road Building	2010	\$29,800,000	\$125,570	\$54,000	\$71,570
Rollins School of Public Health Exp.	2010	\$65,700,688	\$307,063	\$37,000	\$270,063
Total Savings		\$233,718,690	\$692,401	\$254,968	\$437,434







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Contracts

Construction Contracts

- Owner "Friendly"
- Identify and Close Loopholes
- Clearly Identify Responsibilities
- Articulate Costs for GC's





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Interior Design & Construction Standards 2009 Edition - Room Requirements			
	Room Name	Requirement	Notes
Sustainability Requirements Basic Program Requirements	Changing Rooms (USGBC LEED Credit 4.2)	0.5% of FTE	Single occupancy ADA compliant shower and changing room.
	Bicycle Storage Rooms (USGBC LEED Credit 4.2)	0.5% of FTE	Every project must contain either bicycle storage. Storage is consistently locating these spaces throughout the campus and a new project may or not be required to have this space depending on
	Recycling Room (Section 01.78.29)	One recycling room per floor is required for residential projects.	10'x10' ft. close to loading dock.
	Lactation Rooms	Single occupancy ADA compliant room	Except for residential projects. Typically located near a women's restroom.
Universal Design Basic Program	Single Occupancy Family Restroom	Unisex ADA compliant restroom	Except for residential projects, can be used as a child changing room.
Building Services, Custodial & Building Maintenance	Laboratory Rooms	80 sq. ft. per floor	Min. 8 ft x 10 ft.
	Custodial Support Room	Up to 50,000 sq. ft. = 10' x 10' Between 50,000 & 100,000 sq. ft. = 15' x 15' Between 100,000 & 200,000 sq. ft. = 20' x 20' Over 200,000 sq. ft. = 25' x 25'	Convenient access to the loading dock. Lockable double doors are preferred.
	Custodial Staff Support Room	Up to 50,000 sq. ft. = 10' x 10' Between 50,000 & 100,000 sq. ft. = 15' x 15' Between 100,000 & 200,000 sq. ft. = 20' x 20' Over 200,000 sq. ft. = 25' x 25'	
	Building Maintenance Shop	Up to 50,000 sq. ft. = 10' x 10' Between 50,000 & 100,000 sq. ft. = 15' x 15' Between 100,000 & 200,000 sq. ft. = 20' x 20' Over 200,000 sq. ft. = 25' x 25'	
	Building Maintenance Office	Up to 50,000 sq. ft. = 10' x 10' Between 50,000 & 100,000 sq. ft. = 15' x 15' Between 100,000 & 200,000 sq. ft. = 20' x 20' Over 200,000 sq. ft. = 25' x 25'	

A random calculation to estimate the cost of these spaces might look like this when applied to a new 200,000 square foot building:
Total area required = 4,815 SF @ \$200 / SF = \$963,000

A calculation of the cost of these spaces when applied to a new 200,000 SF building:

Changing Room (Bicycle riders)	50 SF
Bicycle Storage	100 SF
Recycling	100 SF
Lactation Room	30 SF
Unisex Restroom	30 SF
Custodial Closet	450 SF (80 per floor X 5 floors)
Custodial Support	225 SF
Custodial Staff	200 SF
Building Maintenance Shop	625 SF
Building Maintenance Office	625 SF
Attic Stock Storage	100 SF
Communications Room (Netcom)	2200 SF (110 SF per 10,000 SF floor area)
Building Security Room (access services)	80 SF
	4,815 SF

Total area required = 4,815 SF @ \$200 / SF = **\$963,000**





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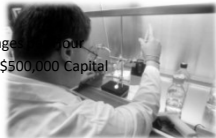

Construction Standards




Review Standards


- Architectural
 - Support Spaces
 - Products Testing and Attic Stock
 - Fume Hoods




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	APPA Institute Campus Construction in the New Economy	Construction Standards
<div>Fume Hoods</div> <ul style="list-style-type: none"> • Recommend Low Flow • From 100 FPM Face Velocity to 80 FPM • Estimated Savings = \$9,500/yr. Chemistry <div>Air Changes</div> <ul style="list-style-type: none"> • Reduce From 10-12 Changes Per Hour • To 8 Changes Per Hour = \$500,000 Capital Construction Savings <div>  </div> <div>  University of Colorado Boulder </div>		

	APPA Institute Campus Construction in the New Economy	Construction Standards
<div><u>Review Standards</u></div> <ul style="list-style-type: none"> • Architectural <ul style="list-style-type: none"> • Support Spaces • Products Testing and New Stock • Fume Hoods • Systems <ul style="list-style-type: none"> • Expand Vendor Lists • Environmental Controls • Occupancy Sensors <div>  </div> <div>  University of Colorado Boulder </div>		

	APPA Institute Campus Construction in the New Economy	Awareness Campaign
<div><u>Strategies</u></div> <ul style="list-style-type: none"> • Communication <ul style="list-style-type: none"> • Presentations • Feature Stories • Building Proctors • Building Occupants • Policy Decisions • Emails • Departmental Town Hall Meetings • Construction Website <div>  </div> <div>  University of Colorado Boulder </div>		
