



مدیریت پروژه‌های صنعت ساخت (ساختمانی، زیرساختی و صنعتی)

فصل ششم: مدیریت قرارداد
مدیریت اجرای قرارداد
مدیریت اسناد و مدارک
مدیریت ادعاء و اختلافات
مدیریت اختتام پروژه

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

دانشگاه Illinois Tech آمریکا



What we will learn?

- ☐ Administration
- ☐ Documentation
- ☐ Claims and disputes
- ☐ Close-out
- ☐ CM roadmap related to this section

Prepared by Dr. Alavipour
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ADMINISTRATION



Contract administration

- ❑ **Contract administration** is all about managing the business details and relationships.
- ❑ When you consider all of the general conditions, supplemental conditions, and specifications associated with the contract,
you can understand **what a challenge this is**.
- ❑ Every statement and every clause in the contract **sets forth rules, regulations, and procedures** for every aspect of the **construction process**.
- ❑ **Nothing goes forward without** some paperwork leading the way:
written requests for information, change orders, submittal logs, shop drawings, pay requests, lien waivers, progress reports, and on and on.

Staying on top of it all is a huge task and a critical one.

Contract administration

- ☐ It is **virtually impossible** for **one person** to **accomplish** the job; support from the main office and the job site is required.
- ☐ Although **one person** may be the contract administrator,
it takes the efforts of the **entire project team** to accomplish the task.
- ☐ **Without proper attention** to the contract details,
the **whole job** could end up in one big lawsuit.
- ☐ **No matter** how **good** your concrete finishers or carpenters might be,
you can't really fulfill the requirements of the project without strong contract administration.

Contract administration

NOTE

Keeping up with all of the paperwork and red tape of the contract is a real challenge, and it cannot be taken lightly. Poor contract administration procedures are one of the main reasons that projects get into trouble. And if the project should go to court, the party with the most organized managerial procedures will win the majority of the time. The contractor must train all of his management personnel in good administrative practices.



Contract administration

One of the things that new field engineers get nervous about when they first go to work on the job site is their inexperience in construction. All of a sudden they go from working summers cleaning up construction debris for their father's home-building business to being smack dab in the middle of a multimillion-dollar high-rise project somewhere. And on top of that, now they are actually accountable for something important. My advice to new recruits is always the same. "No one expects you to know everything there is to know about construction, but they do expect you to know where to go to get the information you need."

NOTE

Contract administration

In situations where an owner lacks the management experience and expertise to handle their own construction process, a professional construction management firm can be hired as an agent of the owner. The agency CM firm works with the general contractor on the owner's behalf. This arrangement mitigates risks for both the owner and the contractor.

NOTE

Pre-Construction

- ❑ On design-bid-build (DBB) projects,
pre-construction activities are **owner-led**, and
contractors have limited to no involvement with the project owner and
design team **during design development**.
- ❖ However, the **emergence of novel project delivery methods** is providing the
general contractor (GC) with opportunities to participate in the pre-construction
phase.
- ❑ On construction management at risk (CMR) projects,
owners will engage a **general contractor early** in the design process for a fee to
assist the designer and owner with the quality of their design.
 - ✓ Under CMR, design activities are **still owner-led**.

Pre-Construction

- ❑ On design-build (DB) projects, the **design-builder entity**
 - usually led by a GC— will also be secured **early in the design process**.
 - ❖ However, **different DB models** will result in a different governance model for the design phase.
- 1. Under progressive DB,
 - ✓ the **owner will lead or co-lead** pre-construction activities and
 - ✓ the **GC will provide assistance**, similarly to **CMR**.
- 2. Under bridging DB,
 - ✓ the **owner will lead** pre-construction activities and
 - ✓ the **GCs will review the outcome** while preparing their **proposals and negotiating** the contract.
- 3. Under competitive DB,
the **design-builder** will
 - ✓ **review** what has been **done by the owner up to the request for proposal (RFP)**
 - ✓ lead **pre-construction activities afterward**.

Pre-Construction – Important activities

❑ Some of the activities that will be performed during pre-construction include:

❖ **Constructability review**, including

evaluation of potential changes to the design to make it easier to build (i.e., less cost and time) and with improved quality and safety goals in mind,

❖ Budgeting,

❖ Scheduling,

❖ **Identification of long-lead materials** (possibly bidding and awarding) and ordering long-lead materials and equipment (such as elevators and structural steel), and

❖ Value engineering.

Pre-Construction – Project startup

- ❑ **Project start-up** is a **sub-set of preconstruction planning**.
- ❑ Once the **construction manager** has been notified that the project has been **won**, he or she must **plan project startup activities**.
- ❑ **Start-up activities** involve establishment and organization of the project office and staff, construction site layout, and mobilization of the jobsite.
- ❑ The **construction manager** selects the construction management team and **involves them** in start-up planning.
 - ❖ Contract files,
 - ❖ project office administrative procedures, and
 - ❖ correspondence management systemsare also established.

Pre-Construction – Project startup

- ❖ Award of subcontracts,
- ❖ Procurement of materials, and
- ❖ Actual mobilization

must **wait until** the notice to proceed (NTP) is received,

but the **planning should be completed**

prior to its issuance, so implementation can begin
immediately upon receipt of the notice.

Pre-Construction – Project startup: Notice to proceed

NOTICE TO PROCEED

To: *Northwest Construction Company* Date: *March 25, 2015*
1242 First Avenue
Cascade, Washington 98202

Project Name: *NanoEngineering Building*

You are hereby notified to commence WORK in accordance with subject contract executed *March 24, 2015* on *March 25, 2015* and you are to complete the WORK within 690 consecutive calendar days thereafter. The date for substantial completion of all WORK is therefore *January 15, 2017*.

By: *Jeffrey Jackson*
Title: *Director, Capital Projects*
Owner: *University of Washington*

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by *Northwest Construction Company* this the 26th day of *March, 2015*.

By: *Sam Peters*
[No Title] *Vice President*
Contractor: *Northwest Construction Company*

- ☐ The **NTP** authorizes the contractor to start work on the project and often is issued at the end of the preconstruction conference.

Pre-Construction – Project startup: Notice to proceed

- ❑ Once the **NTP** has been received, the **construction manager** should buy out the project by
 1. Awarding subcontracts and
 2. Ordering needed materials and equipment, especially those long-lead items.
- ❑ The **NTP often is provided** at the **preconstruction conference** along with verification of owner financing and needed permits.
 - ❖ Project-specific quality control and safety plans need to be **finalized** and, if **required by contract**, submitted to the owner or owner's representative.

Pre-Construction – Project startup: Jobsite planning

- ❑ **Efficient jobsite organization** is essential for a **productive construction project**.
- ❑ The **jobsite layout** affects the **cost** of material handling, labor, and the use of major equipment by the general contractor and the subcontractors.

THIS GATE RESERVED EXCLUSIVELY
FOR THE EMPLOYEES, AGENTS,
SUBCONTRACTORS AND SUPPLIERS OF:

Richardson Electric, Inc.

Acme Roofing Company

Smith Fencing Company

Hi Gloss Painting Contractors

All other persons must use the gate located on
15th Avenue on the east side of the project

Pre-Construction – Project startup: Mobilization

- ☐ The actual mobilization and physical move onto the jobsite is the **superintendent's responsibility**.
- ☐ The **project office** is established, and temporary utilities (electricity, water, sewer, and telephone) are **installed**.
- ☐ **Site access** is secured with adequate fencing, and **gates** are installed to provide needed site access for craftsmen and material delivery.
- ☐ A **project sign** is installed at a visible location on the project site.

Mobilization **occurs soon after** receipt of the NTP to demonstrate the contractor's **commitment to starting** the project.

Pre-Construction – Project startup: Start-up checklist

NORTHWEST CONSTRUCTION COMPANY
1242 First Avenue, Cascade, Washington 98202
(206) 239-1422

PROJECT START-UP CHECKLIST

Project: NanoEngineering Building

Project Manager: Ted Jones

	Scheduled Completion	Date Completed
Cost codes set up:	3/26	<u>3/25</u>
Work packages set up:	5/1	_____
Buyout complete:	7/1	_____
Draft contract complete:	2/11	<u>2/11</u>
Certificate of insurance submitted to owner:	3/20	<u>3/22</u>
Subcontracting plan submitted to owner:	4/1	_____
Safety plan submitted to owner:	4/1	<u>3/28</u>
Quality control plan submitted to owner:	4/1	_____
Subcontracts drafted:	7/1	_____
Subcontracts awarded:	8/1	_____
Subcontractor insurance certificates received :	9/1	_____
Subcontractor safety manuals received:	9/1	_____
Subcontractor preconstruction meeting conducted:	8/15	_____
Building permit in hand:	3/2	<u>3/2</u>
Construction schedule submitted to owner:	2/15	<u>2/14</u>
Schedule of values submitted to owner:	3/20	<u>3/22</u>
Telephone list completed:	8/1	_____
Change order proposal log established:	7/1	_____
Purchase order log established:	7/1	_____
RFI log established:	7/1	_____
Expediting log established:	7/1	_____

Pre-Construction – Project startup: Start-up log

PROJECT START-UP LOG

Project Number: 9821

Project Name: NanoEngineering Building

Project Manager: Ted Jones

Sub/PO Code:	00.01.15	31.00.00	32.12.16	03.30.00	03.20.00	22.00.00	26.00.00
Category:	Temp Fence	Mass Ex	Asphalt	Rebar Fab	Redi-Mix	Plumbing	Electrical
Sub/Supplier:	Smith Fence	Earth Ent	ATB Asph	Steel Fab	Westside	Rainy City	Richardson
Letter of Intent:	NA	NA	4/1/15	4/1/15	NA	4/1/15	4/1/15
Rough Sub/PO:	NA	2/15/15	4/15/15	5/15/15	NA	5/1/15	4/15/15
Final Sub/PO:	3/25/15	3/25/15	5/1/15	5/15/15	5/15/15	5/1/15	4/15/15
Sub/PO Returned:	3/26/15	5/1/15	5/5/15		5/30/15		5/1/15
Insurance Rec'd:	3/26/15	5/1/15		NA	NA		5/1/15
Insurance Expires:	12/21/15	10/31/15		NA	NA		1/31/16
Safety Plan Rec'd:	NA	5/1/15		NA	NA		

Pre-Construction – Project startup: Project buyout

- ☐ The process of **project buyout** involves awarding subcontracts and procuring materials being **furnished by the general contractor** and **comparing** the actual costs to the budgeted costs.
- ☐ The purpose is to determine the **status of the project** with respect to the contractor's budget.
- ☐ A **log** can be used to **buy out** the project.
- ☐ The **major unknown**, which is not reflected on the **buyout log**, is the **labor cost** for self-performed work.
- ☐ This must be **monitored weekly** to track actual expenditures versus budgeted costs.
- ☐ Most construction managers will choose to use electronic spread sheet software, such as Microsoft Excel, to **compare** buyout costs with budgeted costs.

Pre-Construction – Project startup: Project buyout

❑ Buyout log

PROJECT BUYOUT LOG							
Project Number: <u>9821</u>		Project Name: <u>NanoEngineering Building</u>			Project Manager: <u>Ted Jones</u>		
Code	Category	Budget	Buyout	Variance	Date	Sub/Supplier	Comments
01.40.00	Temp fence	\$15,000	\$15,000	\$0	3/25	Smith Fence	Rental allowance
31.00.00	Mass ex	\$1,949,000	\$1,999,000	\$50,000	5/1	Earth Enter.	Added spoils
32.12.16	Asphalt	\$26,000	\$25,050	-\$950	5/1	ATB Asphalt	Picked up striping
32.17.23	Pavement stripe	\$5,000	\$0	-\$5,000	5/1		w/ATB
03.30.00	Rebar supply	\$250,000	\$250,000	\$0	5/15	Steel Fab	
03.20.00	Redi-mix supply	\$1,500,000	\$1,650,000	\$150,000	5/30	Westside	Admixtures
09.30.00	Carpet	\$1,800,000	\$954,000	-\$806,000	2/15	Soft Touch	As Bid
09.65.43	Vinyl	w/carpet	\$750,000	\$750,000	2/15	United	As Bid
22.00.00	Plumbing	\$2,750,000				Rainy City	Negotiating
26.00.00	Electrical	\$4,900,000	\$5,000,000	\$100,000	5/1	Richardson	Temp Power
01.50.00	Temp Power	\$150,000	\$0	-\$150,000	5/1	Richardson	was w/GCs

Pre-Construction - Conference

☐ The **agenda** for this meeting **usually covers** all of the items listed in

1. General conditions and
2. Supplemental conditions

of the **contract** (think back to “The Construction Contract”) but in **much greater detail**.

☐ This initial preconstruction meeting is an **opportunity for the parties** to be introduced and primary relationships to be established.

Pre-Construction - Conference

❑ A number of **common discussion items** are listed next:

❖ **Introductions and accountabilities**

❖ **Mobilization and site logistics**

- ✓ Site access
- ✓ Temporary utilities
- ✓ Temporary facilities
- ✓ Site security
- ✓ Traffic and pedestrian issues

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Pre-Construction - Conference

❑ A number of **common discussion items** are listed next:

❖ **Construction coordination issues**

- ✓ Subcontracts
- ✓ Submittals
- ✓ Shop drawings
- ✓ Requests for information

❖ **Schedule issues**

- ✓ Notice to proceed
- ✓ Sequence of work
- ✓ Work hours
- ✓ Liquidated damages

Pre-Construction - Conference

❑ A number of **common discussion items** are listed next:

❖ **Payment issues**

- ✓ Schedules of value
- ✓ Applications for payment

❖ **Change orders and extra work**

❖ **Dispute issues**

- ✓ Claims
- ✓ Alternative dispute resolution

❖ **Completion procedures**

- ✓ Substantial completion
- ✓ Final inspection
- ✓ Final payment

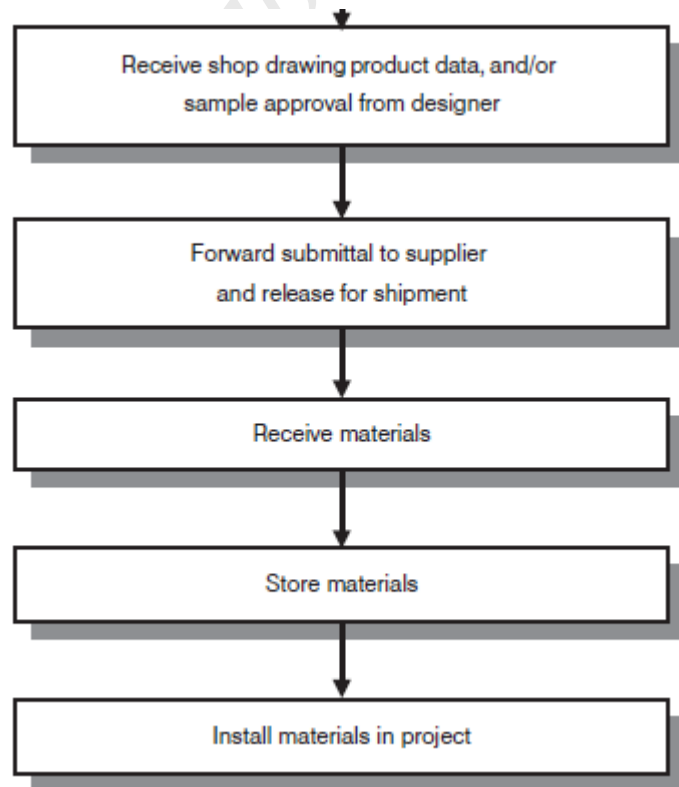
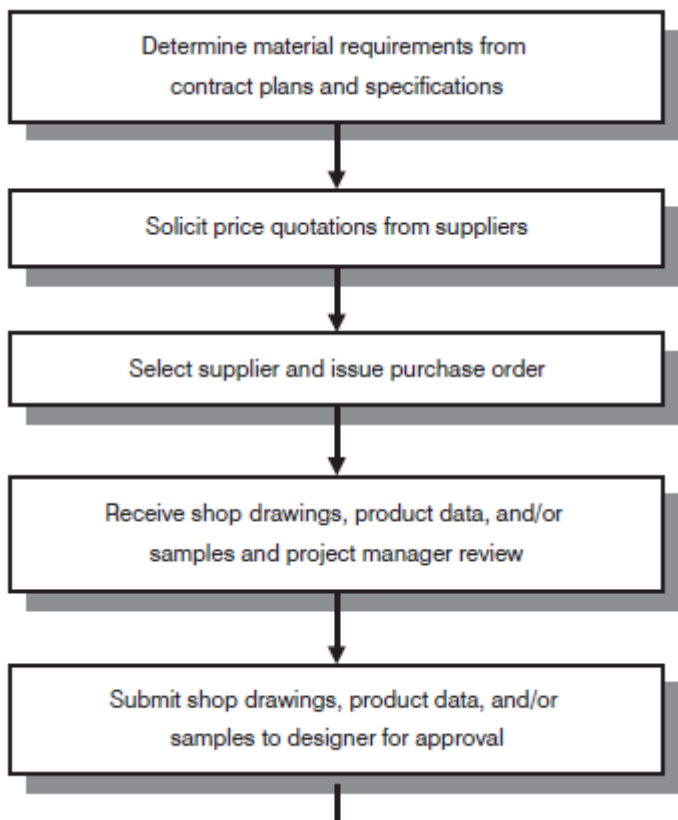
Construction

- ❑ A **design package** is **rarely 100% complete** at the time of the contractor's bid or even when construction commences.
 - ❖ Even when construction expertise is available during pre-construction, it is expected that the **design will further develop during construction**, especially early on, but at a slower pace than during pre-construction.
- ❑ Specialty contractors and suppliers submit their **portion of the design** to the GC, the design team, and the project owner for their reviews.
- ❑ **Design submittals** act as the contractual vehicle to receive preliminary acceptance before further financial commitment.
 - ❖ However, **submittals** are not **limited to design deliverables** but are also used to seek **preliminary approval** to purchase materials, fabricate assemblies, or install materials or assemblies.

Construction – Material management

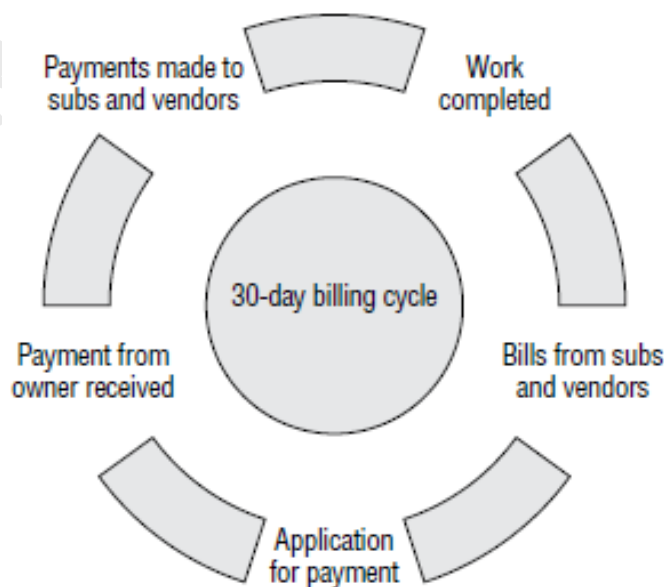
- ❑ **Material deliveries** should be phased so materials arrive on the project site **near the time** they are **needed** to support construction activities.
- ❑ Most project sites are **not large enough** to store all needed materials on site at the same time, and
just-in-time delivery of materials avoids **congesting** the construction site with storage of materials.
- ❑ In addition, stored materials **need to be protected** against theft, damage, and weather.
- ❑ **Damaged materials** do not meet contract **specifications** and must be replaced at the contractor's expense.
- ❑ **Limiting** the length of **on-site storage** minimizes the cost of **providing adequate protection**.

Construction – Material management



Construction – Getting paid

- ☐ I hope you can see **how critical** it is for payment requests to be handled **correctly**.
- ☐ The superintendent and project team have enough to worry about just keeping the work going.
- ☐ They **sure don't need** to be worrying about delayed payments or cash flow.



Construction – Getting paid: The payment request process

❑ The **official payment request** requires the assemblage of three specific documents:

1. The schedule of values,
2. The pay request continuation sheet, and
3. The application for payment.

Owners who are slow payers get the attention of the construction community. Word gets around, and a slow-paying or cantankerous owner should not be surprised when there are few bidders on their future projects. This can be a real problem for owners because fewer bids usually mean less competition, and sometimes less competition results in higher bids. It's not a good thing for an owner with a strict budget.

NOTE

Construction – Getting paid: The payment request process

❑ The Schedule of values

ABC Construction Company			
1400 Elm Grove Carpenter, CA 83347			
Schedule of Values Spinnaker's Restaurant			
March 17, 2019			
Line Item	Description	Contract Value*	% of Total
1	General Conditions	\$175,550	9.08
2	Site Work	\$196,000	10.14
3	Concrete	\$137,000	7.08
4	Masonry	\$16,500	0.85
5	Metals	\$5,500	0.28
6	Carpentry	\$427,000	22.09
7	Thermal & Moisture Protection	\$76,400	3.95
8	Doors, Windows, Glass	\$58,600	3.04
9	Finishes	\$154,000	7.97
10	Specialties	\$49,500	2.56
11	Equipment	\$106,000	5.48
12	Furnishings	\$126,000	6.53
13	Special Construction	\$0	0.00
14	Conveying Systems	\$0	0.00
15	Mechanical Systems	\$243,000	12.57
16	Electrical Systems	\$162,000	8.38
TOTAL CONTRACT AMOUNT		\$1,933,050	100.00
* Includes overhead and profit			

schedule of values

A budget template established early in the project against which progress payments are measured. The schedule summarizes the total project cost by the various divisions of work.

Construction – Getting paid: The payment request process

❑ The Schedule of values

NORTHWEST CONSTRUCTION COMPANY SCHEDULE OF VALUES WORKSHEET NanoEngineering Building					
CSI Division	Description	GMP Value	% of Subtotal	GC & Fee Prorated	Adjusted Totals
2	Demolition	850,000	1.6%	141,573	991,573
	Reinforcement	850,000	1.6%	141,573	991,573
	Foundations	1,000,000	1.9%	166,556	1,166,556
	Walls & Slabs	6,205,000	11.9%	1,033,481	7,238,481
3	Concrete Subtotal:	8,055,000	15.4%	1,341,611	9,396,611
	CMU	450,100	0.9%	74,967	525,067
	Stone Veneer	1,075,000	2.1%	179,048	1,254,048
4	Masonry Subtotal:	1,525,100	2.9%	254,015	1,779,115
5	Structural & Misc. Metals	803,030	1.5%	133,750	936,780
	Rough Carpentry	457,500	0.9%	76,199	533,699
	Finish Carpentry	480,000	0.9%	79,947	559,947
6	Carpentry Subtotal:	937,500	1.8%	156,146	1,093,646
	Insulation	835,000	1.6%	139,074	974,074
	Roof & Accessories	1,095,000	2.1%	182,379	1,277,379
	Waterproofing	575,000	1.1%	95,770	670,770
	Sheetmetal	575,980	1.1%	95,933	671,913
7	Thermal & Moisture Protection Subtotal:	3,080,980	5.9%	513,156	3,594,136
	Doors	752,000	1.4%	125,250	877,250
	Glazing	1,522,000	2.9%	253,499	1,775,499
	Door Hardware	399,000	0.8%	66,456	465,456
8	Division 8 Subtotal:	2,673,000	5.1%	445,205	3,118,205
	Drywall	1,778,800	3.4%	296,270	2,075,070
	Painting	590,000	1.1%	98,268	688,268
	Acoustical Ceilings	722,000	1.4%	120,254	842,254
	Carpet	954,000	1.8%	158,895	1,112,895
	Tile & Vinyl	750,550	1.4%	125,009	875,559
9	Finishes Subtotal:	4,795,350	9.2%	798,695	5,594,045
10	Specialties	388,290	0.7%	64,672	452,962
11-13	Equipment	2,740,350	5.2%	456,422	3,196,772
14	Conveying Systems (Elevator)	842,000	1.6%	140,240	982,240
21	Fire Protection	772,000	1.5%	128,581	900,581
22	Plumbing	2,750,000	5.3%	458,030	3,208,030
23	HVAC & Controls	11,800,923	22.6%	1,965,517	13,766,440
21-23	Mechanical Subtotal:	15,322,923	29.3%	2,552,128	17,875,051
26	Line Voltage Systems	5,000,000	9.6%	832,781	5,832,781
27	Communication & Security	1,148,000	2.2%	191,207	1,339,207
26,27	Electrical Subtotal:	6,148,000	11.8%	1,023,988	7,171,988
31,33	Earth & Shore & Utilities	3,139,664	6.0%	522,931	3,662,595
32	Paving	255,050	0.5%	42,480	297,530
32	Misc. Site & Landscaping	755,000	1.4%	125,750	880,750
31-33	Sitework Subtotal:	4,149,714	7.9%	691,161	4,840,875
	Subtotal w/o GCs and Fee:	52,311,237	100.0%	5,450,000	61,024,000
	Jobsite General Conditions:	5,450,000			
	Fee & Insurance & Excise & Contingency	3,262,763			
	Subtotal GCs & Fee	8,712,763			
	TOTAL GMP:	61,024,000			

Construction – Getting paid: The payment request process

☐ The pay request continuation sheet

ABC Construction Company 1400 Elm Grove Carpenter, CA 83347 Continuation Sheet Spinnaker's Restaurant Date: June 1, 2019 Billing Period: 05/01/19 – 05/31/19 Payment Request: No. 5							
A	B	C	D	E	F (D + E)	G (F/C)	H (C-F)
LINE ITEM	GENERAL DESCRIPTION	CONTRACT VALUE	PREVIOUS COMPLETION	COMPLETE THIS MONTH	COMPLETE TO DATE	PERCENT COMPLETE	CONTRACT BALANCE
1	General Requirements	\$175,550	\$89,600	\$23,600	\$113,200	64.48	\$62,350
2	Site Conditions	\$16,000	\$16,000	\$-	\$16,000	100.00	\$-
3	Concrete	\$137,000	\$137,000	\$-	\$137,000	100.00	\$-
4	Masonry	\$16,500	\$9,800	\$5,500	\$15,300	92.73	\$1,200
5	Metals	\$5,500	\$1,700	\$2,100	\$3,800	69.09	\$1,700
6	Wood, Plastics & Composites	\$427,000	\$207,500	\$67,800	\$275,300	64.47	\$151,700
7	Thermal & Moisture Protection	\$76,400	\$33,600	\$3,200	\$36,800	48.17	\$39,600
8	Openings	\$58,600	\$47,800	\$2,180	\$49,980	85.29	\$8,620
9	Finishes	\$224,000	\$-	\$-	\$-	0.00	\$224,000
10	Specialties	\$49,500	\$-	\$-	\$-	0.00	\$49,500
11	Equipment	\$106,000	\$33,600	\$7,945	\$41,545	39.19	\$64,455
12	Furnishings	\$126,000	\$-	\$-	\$-	0.00	\$126,000
13	Special Construction	\$9,500	\$650	\$-	\$650	6.84	\$8,850
14	Conveying Systems	\$16,700	\$4,100	\$1,290	\$5,390	32.28	\$11,310
21	Fire Suppression	\$44,000	\$18,000	\$3,300	\$21,300	48.41	\$22,700
22	Plumbing	\$129,000	\$31,000	\$36,000	\$67,000	51.94	\$62,000
23	HVAC	\$114,000	\$10,590	\$19,600	\$30,190	26.48	\$83,810
25	Integrated Automation	\$48,250	\$3,690	\$2,100	\$5,790	12.00	\$42,460
26	Electrical	\$162,000	\$54,900	\$27,444	\$82,344	50.83	\$79,656
27	Communications	\$55,000	\$10,590	\$12,766	\$23,356	42.47	\$31,644
28	Electronic Safety & Security	\$16,000	\$1,980	\$5,132	\$7,112	44.45	\$8,888
31	Earthwork	\$159,500	\$134,000	\$11,290	\$145,290	91.09	\$14,210
32	Exterior Improvements	\$90,500	\$34,000	\$-	\$34,000	37.57	\$56,500
33	Utilities	\$57,000	\$23,000	\$7,600	\$30,600	53.68	\$26,400
CURRENT TOTALS		\$2,319,500	\$903,100	\$238,847	\$1,141,947	49.23	\$1,177,553

Construction – Getting paid: The payment request process

☐ The pay request schedule of values

NORTHWEST CONSTRUCTION COMPANY							
1242 First Avenue, Cascade, Washington 98202				Billing Period: From: 04/01/16			
(206) 239-1422				To: 04/30/16			
NanoEngineering Building				Request #			
14				Invoice #			
1234							
PAY REQUEST SOV CONTINUATION SHEET							
A	B	C	D	E	G (D+E)	G.I (G/C)	H (C-G)
Line Item	Description	Contract Value	Previous Complete	Complete This Mo.	Complete to Date	% Complete	To Go
1.0	General Conditions	5,450,000	2,840,000	237,000	3,077,000	56%	2,373,000
2.0	Demolition	850,000	850,000	0	850,000	100%	0
3.1	Reinforcement	850,000	850,000	0	850,000	100%	0
3.2	Foundations	1,000,000	1,000,000	0	1,000,000	100%	0
3.3	Walls & Slabs	6,205,000	6,205,000	0	6,205,000	100%	0
4.1	CMU	450,100	0	200,000	200,000	44%	250,100
4.2	Stone Veneer	1,075,000	0	0	0	0%	1,075,000
5.0	Steel	803,030	600,000	203,030	803,030	100%	0
6.1	Rough Carpentry	457,500	457,500	0	457,500	100%	0
6.2	Finish Carpentry	480,000	0	0	0	0%	480,000
7.1	Insulation	835,000	0	0	0	0%	835,000
7.2	Roofing	1,095,000	0	1,095,000	1,095,000	100%	0
7.3	Waterproofing	575,000	575,000	0	575,000	100%	0
7.4	Sheetmetal	575,980	0	200,000	200,000	35%	375,980
8.1	Doors & Frames	752,000	0	0	0	0%	752,000
8.2	Glazing	1,522,000	0	0	0	0%	1,522,000
8.3	Door Hardware	399,000	0	0	0	0%	399,000
9.1	Drywall	1,778,800	0	224,000	224,000	13%	1,554,800
9.2	Painting	590,000	0	0	0	0%	590,000
9.3	Acoustical Ceilings	722,000	0	0	0	0%	722,000
9.4	Carpet	954,000	0	0	0	0%	954,000
9.5	Balance of floorcovering	750,550	0	0	0	0%	750,550
10.0	Specialties	388,290	0	0	0	0%	388,290
11.0	Equipment & Casework	2,740,350	0	0	0	0%	2,740,350
14.0	Elevator	842,000	200,000	0	200,000	24%	642,000
21.0	Fire Protection	772,000	200,000	90,000	290,000	38%	482,000
22.0	Plumbing	2,750,000	750,000	250,000	1,000,000	36%	1,750,000
23.0	HVAC & Controls	11,800,923	1,700,000	1,166,000	2,866,000	24%	8,934,923
26.0	Electrical	5,000,000	1,500,000	500,000	2,000,000	40%	3,000,000
27.0	Low-Voltage Electrical	1,148,000	0	0	0	0%	1,148,000
31.0	Earthwork & Utilities	3,139,664	2,894,664	0	2,894,664	92%	245,000
32.1	Paving	255,050	0	0	0	0%	255,050
32.2	Misc. Site & Landscape	755,000	0	0	0	0%	755,000
90.0	Fee, Insur., Excise, Cont.	3,262,763	1,165,150	235,320	1,400,470	43%	1,862,293
Original Total		61,024,000	21,787,314	4,400,350	26,187,664	43%	34,836,336
99.1	Change Order No. 1	20,000	20,000	0	20,000	100%	0
99.2	Change Order No. 2	145,980	0	0	0	0%	145,980
Current Total		61,189,980	21,807,314	4,400,350	26,207,664	43%	34,982,310

Construction – Getting paid: The payment request process

❑ The pay request summary

PAY REQUEST SUMMARY	
Where the basis of payment is a Guaranteed Maximum Price	
Client:	<i>University of Washington</i>
Address:	<i>1101 15th Ave. NE, Seattle, WA 98011, (206) 239-3556</i>
Contractor:	<i>Northwest Construction Company</i>
Address:	<i>1242 First Ave, Cascade, WA 98202, (206) 239-1422</i>
Project:	<i>NanoEngineering Building</i>
Project #	<i>9821</i>
Billing Period From:	<i>04/01/2016</i>
Request #	<i>14</i>
Billing Period To:	<i>04/30/2016</i>
Invoice #	<i>1234</i>
Original Contract Price:	<i>\$61,024,000</i>
Approved Change Orders:	<i><u>\$165,980</u></i>
Current Contract Price:	<i>\$61,189,980</i>
Total work completed to-date, see attached SOV:	<i>\$26,207,664</i>
Less retention held at rate of 5"	<i>-\$1,310,383</i>
Plus applicable state sales tax at 9.95"	<i><u>\$2,607,663</u></i>
Subtotal completed to-date, less retention, plus tax	<i>\$27,504,943</i>
Less prior applications for payment:	<i><u>-\$22,778,285</u></i>
Net amount due this pay period:	<i><u><u>\$4,726,659</u></u></i>
Contractor's Certification:	
I hereby do certify that to the best of my knowledge the above accounts reflect a true and accurate estimate to the values of work complete and that all amounts paid prior have been distributed according to existing contractual requirements and the laws in existence at this jurisdiction at the time of the contract.	
Contractor:	<i>Ted Jones</i>
Date:	<i>4/30/2016</i>
Architect's Certification:	
In accordance with the contract documents and limited on-site evaluations, we have no reason to believe that the accounts presented by the contractor are not reflective of the work accomplished to date.	
Architect:	<i>Norm Riley</i>
Date:	<i>5/1/2016</i>

DOCUMENTATION

Introduction

- ❑ **Early on in their careers, project engineers will be **more involved** with document control processes**
than with cost, schedule, quality, and safety controls directly.
- ❑ **Project site management staff**— including project managers, superintendents, and project engineers—
do **not build construction projects** with hand and power tools like carpenters, laborers, ironworkers, plumbers, and electricians.
 - ❖ Rather, they **make decisions and document** them in paper or electronic records.
 - ✓ Therefore, one of their tools is proper document management and control.

Introduction

- ❑ Any discussion of **construction management** revolves around construction management documents;

in a sense, **almost every component** of construction management relies on **document control**.

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Introduction

❑ Some of the documents that site management use as tools include, in no particular order:

- Requests for Information (RFIs),
- Proposals,
- Architect's supplemental instructions (ASIs),
- Subcontracts,
- Purchase orders,
- Lien releases,
- Submittals,
- Payment requests,
- Schedules,
- Estimates,
- Warranties,
- Operation and maintenance (O&M) manuals,
- Prime contract agreements,
- Memorandums,
- Non-conformance reports (NCRs),
- As-built drawings,
- Shop drawings,
- Safety inspections,
- Logs,
- Letters,
- Daily job diaries,
- Change order proposals,
- Punch lists,
- Work packages,
- Cost forecasts,
- Insurance certificates,
- Permits,
- Meeting notes ... and many more.

Submittals

- ❑ By definition, the **submittal** is a document or product generated by the **construction team**

to **verify** that what they **plan to** purchase, fabricate, deliver, and ultimately install is in fact what the design team intended by their drawings and specifications.

- ❑ It serves as **one last check** of the design validity.

- ❑ **Submittal requirements** for a project are contained in the **specifications of the contract**.

submittals

Data, samples, details, colors, and product literature required by the terms of the contract to be presented to the architect by the contractor for approval prior to ordering and installing them.

Submittals

- ❑ **Shop drawings** and **other design submittals** are a major group of submittals.
- ❑ **Early on** in the construction phase or **late** in the pre-construction phase, construction **mock-ups** are also *common for specific areas of work* to allow the **design team** to establish **expected quality levels**.
- ❑ **Mock-ups** are often regarded by contractors to be expensive submittals, because that **work is performed out of sequence**.

mock-up

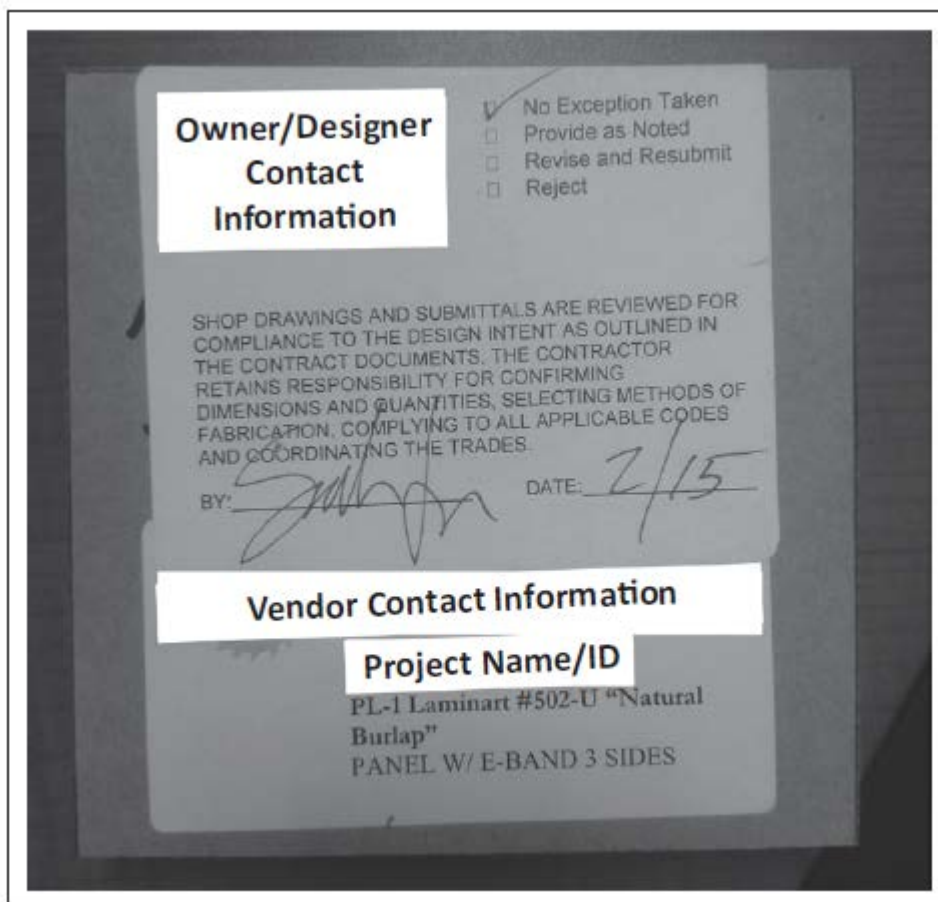
Physical models or small samples constructed to allow the architect and owner to review the appearance and function of materials, colors, textures, and other aesthetic features before incorporating them into the actual project.

Submittals – Example

Example

A general contractor does not want to be in the situation of receiving 100 kitchen refrigerators that lack ice-makers if the contractual documents required refrigerators equipped with this feature. Although the supplier could solve this issue by retrofitting the refrigerators in the field, the resulting two-week schedule delay will also affect the schedule of the plumber who has completed his or her rough-in for the ice-makers and is expected to connect them. If a supplier had been required to submit the product data for the refrigerators before ordering them, this issue would not have arisen. Moreover, even if the issue can be solved, the two-week delay may impede turning the building over to the project owner in a timely fashion, which will delay the leasing of the apartments. In return, the project owner will delay release of retention funds to the general contractor and may request compensation for the delay, if this is allowed by the liquidated damages clause in the prime contract.

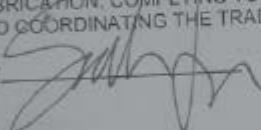
Submittals – Submittal of a physical sample of material



Owner/Designer Contact Information

☒ No Exception Taken
☐ Provide as Noted
☐ Revise and Resubmit
☐ Reject

SHOP DRAWINGS AND SUBMITTALS ARE REVIEWED FOR COMPLIANCE TO THE DESIGN INTENT AS OUTLINED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR RETAINS RESPONSIBILITY FOR CONFIRMING DIMENSIONS AND QUANTITIES, SELECTING METHODS OF FABRICATION, COMPLYING TO ALL APPLICABLE CODES AND COORDINATING THE TRADES.

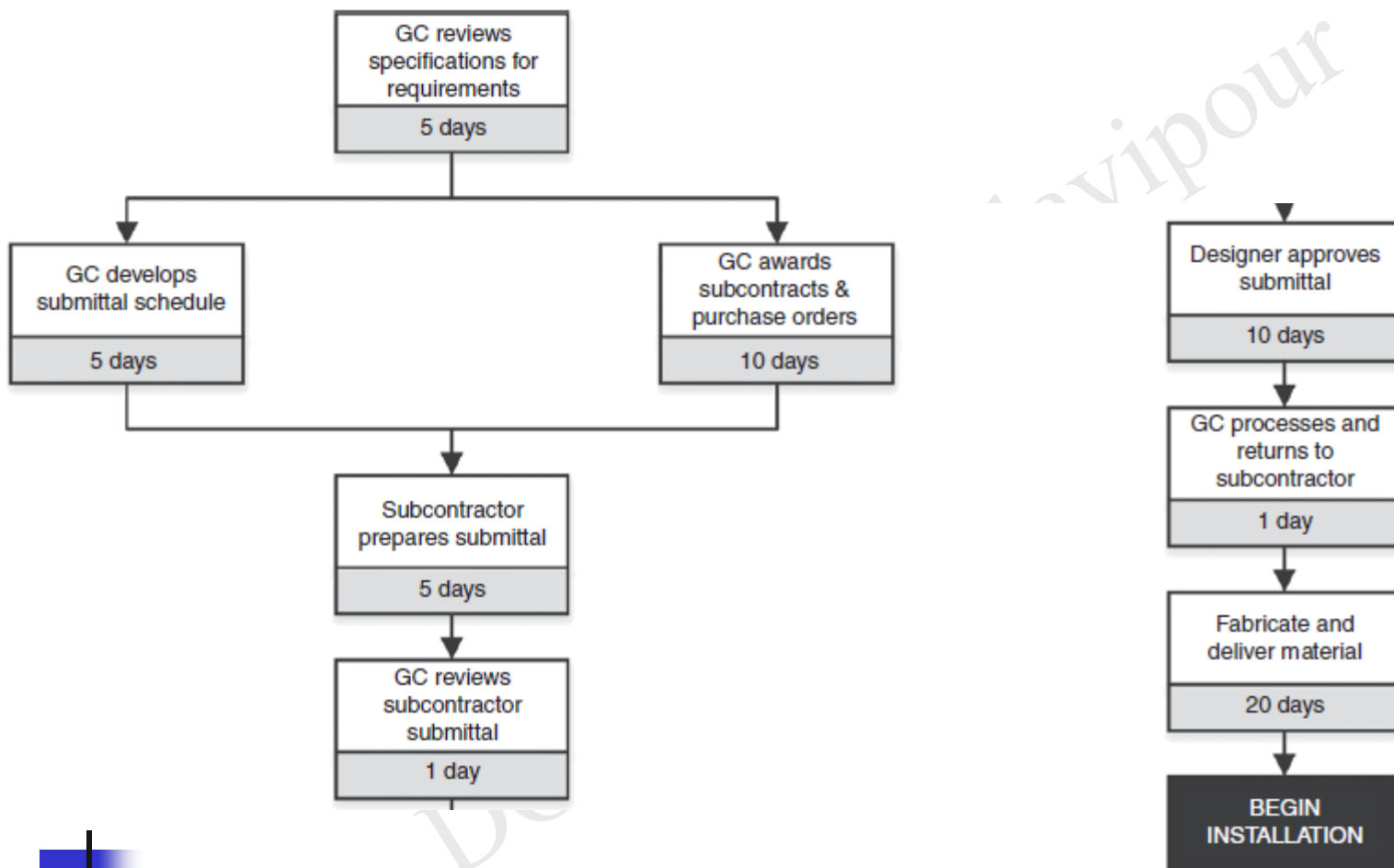
BY:  DATE: 2/15

Vendor Contact Information

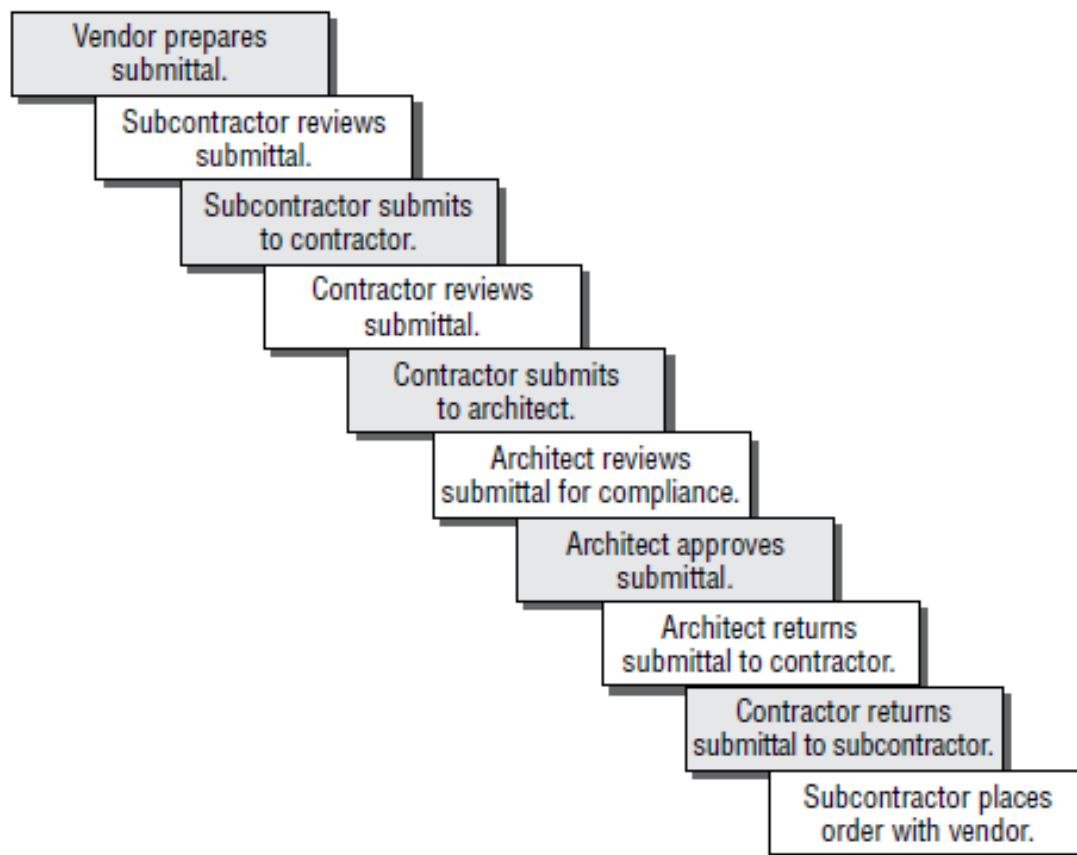
Project Name/ID
 PL-1 Laminart #502-U "Natural Burlap"
 PANEL W/ E-BAND 3 SIDES

Alavipour
SUBUTE

Submittals – Process



Submittals – Process: Information flow



Submittals – Design submittals

❑ In fact, design submittals include:

- Shop drawings,
- Fabrication drawings,
- Installation drawings, and
- Coordination drawings.

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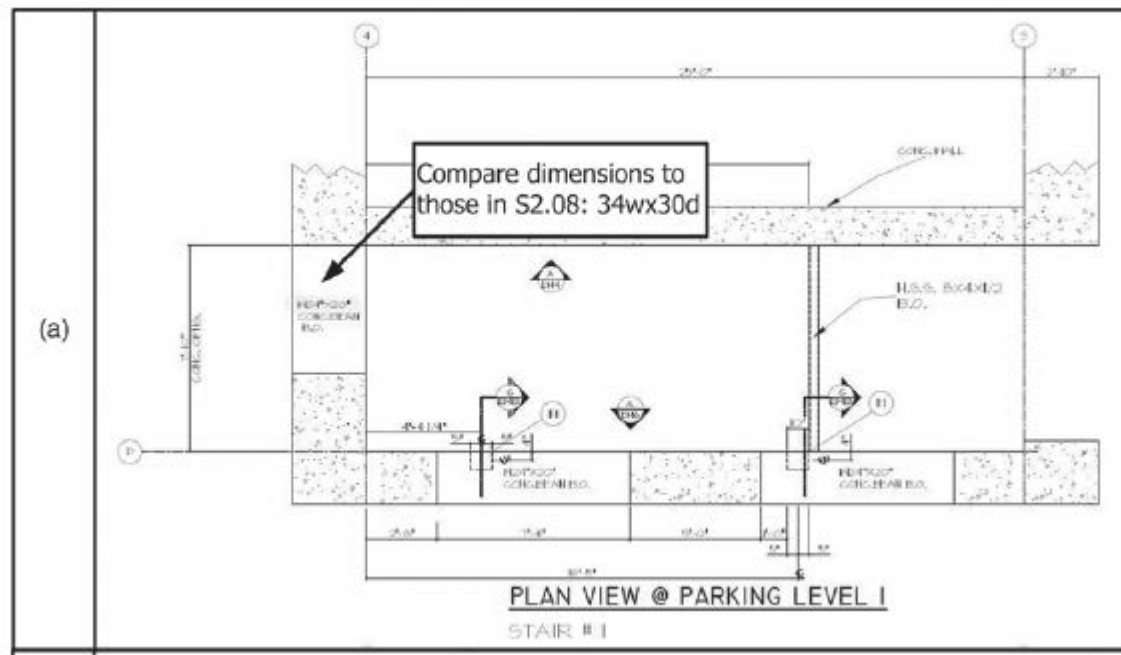
Submittals – Design submittals: Shop drawings

- ☐ **Many items** associated with construction **cannot be ordered** out of a product catalog or off the **shelf**.
- ☐ **Many items** have to be **fabricated** in a shop or manufactured specifically for the job.
- ☐ In these instances, a special type of submittal called a **shop drawing** is required.
- ☐ Shop drawings include details, dimensions, and configurations of the item to be **fabricated**.
- ☐ Shop drawings are **typically prepared** by a subcontractor or a vendor and **then submitted** to the general contractor for review.
- ☐ drawings.

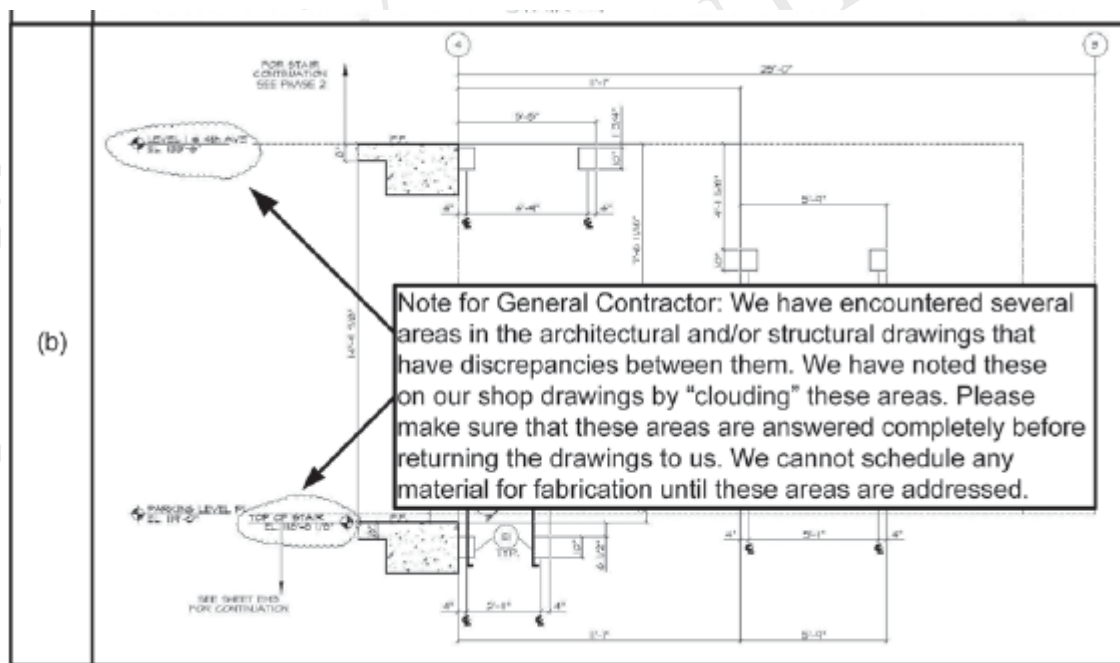
Submittals – Design submittals: Example communications on design submittals

shop drawing

A supplemental drawing to the plans and specifications that details fabrication methods, materials, and models of a product or installation associated with the project.



Submittals – Design submittals: Example communications on design submittals



Submittals – Expediting log

EXPEDITING LOG

Project No.: 9821

Project Name: NanoEngineering Building

Project Manager: Ted Jones

No.	Description	Supplier	Committed Shop Dwg Submittal	Actual Shop Dwg Submittal	Fabricate/ Delivery Duration	Scheduled Delivery Date	Actual Delivery Date	Responsible Person
1	Import sample	Earth Enterprises	8/20/15	8/20/15	NA	9/6/15	9/6/15	Peterson
2	Pea gravel	Earth Enterprises	8/20/15	8/20/15	NA	9/14/15	9/13/15	Peterson
3	Silt fence	Seattle Lumber	8/20/15	8/21/15	NA	9/9/15	9/10/15	Peterson
4	Perforated pipe	Seattle Lumber	8/20/15	8/28/15	2 days	9/20/15	9/16/15	Peterson
5	Footing rebar	Steel Fabrication	8/1/15	8/7/15	2 weeks	10/7/15		Peterson
6	Embed steel	Steel Fabrication	9/6/15	10/7/15	2 weeks	9/22/15	9/19/15	Peterson
7	Concrete mix	University Redi-Mix	9/6/015	9/15/15	NA	10/20/15		Peterson
8	SOG wire mesh	Steel Fabrication	9/1/15		1 week	9/24/15	9/24/15	Peterson
9	Asphalt specification	ATB Asphalt			NA	9/14/16		Peterson
10	Column rebar	Steel Fabrication	9/1/15		2 weeks	10/25/15		Peterson

Submittals – Submittal log

SUBMITTAL LOG

Project No.: 9821

Project Name: NanoEngineering Building

Project Manager: Ted Jones

No.	Originator	Sub's No.	Specification Section	Description	Date Submitted	Date Return Requested	Date Returned	Disposition*
1	Earth Enterprises	1	Civil drawings	Import sample	8/20/15	8/27/15	8/26/15	A
2	Earth Enterprises	2	Civil drawings	Pea gravel pipe bedding	8/20/15	8/27/15	8/26/15	A
3	Northwest Construction	NA	Civil drawings	Silt fence data sheet	8/21/15	8/22/15	8/23/15	A
4	Northwest Construction	NA	Civil drawings	Perforated pipe sample	8/28/15	9/15/15	9/10/15	AN
5	Steel Fabrication	1	032000	Footing rebar shop drawings	8/7/15	8/14/15	8/15/15	AN
6	Steel Fabrication	2	Structural drawings	Steel embed shop drawings	10/7/15	10/14/15		

*A — approved, AN — approved as noted, RR — revise and resubmit, and R — rejected



Submittals – Submittal cover sheet

NORTHWEST CONSTRUCTION COMPANY

1242 First Avenue, Cascade, Washington 98202
(206) 239-1422

SUBMITTAL

Project: *NanoEngineering Building* Date: *August 7, 2015*
Area/System: *Footing Rebar* Submittal Number: *5*
To: *ZGF Architects* First Submittal? *Y*
Address: *522 West 10th Street* Re-Submittal? *NA*
Seattle, WA 99801 Previous Number(s): *NA*
Attention: *Norm Riley*
Required Response Date: *August 14, 2015*

Subcontractor/Supplier providing submittal: *Steel Fabrication* Originator's
Number: *1*

Specification Section	Description	Drawing No.	Action Taken
<i>032000</i>	<i>Two sheets of spot footing reinforcement steel shop drawings</i>	<i>S1 & S2 Prints</i>	<i>Checked</i>

Remarks by Contractor: *Please review and approve. Keep one set of prints for record. Return balance for copying and distribution.*

Submitted by: *Mary Peterson, Project Engineer*

Space below for Architect/Engineer:

Reply: *Approved, Approved as noted, Revise & Resubmit, Rejected*

Signed: *Norm Riley* ZGF

Date: *August 15, 2015*

Contractor's Job No./File Code: *9821/032000*

ذکر مطالب فوق تنها در صورت ذکر منبع بلامانع است.



Submittals – Drawing log

DRAWING LOG

Date: September 14, 2015

Sheet: 1 of 5

Project:	NanoEngineering Building		Job Number: 9821	
Document Number	Description	Rev 0	Rev 1	Rev 2
A0.00	Cover Sheet	8/21/15		
A0.01-2	Master Sheet Index	11/10/14	8/21/15	
A0.02	Vicinity Map	11/10/14	8/21/15	
A1.01	Site Plan	8/21/15		
LS.01	Life Safety, Lower Levels	10/24/14	11/10/14	8/21/15
LS0.2	Life Safety, Upper Levels	10/24/14	11/10/14	8/21/15
A2.01	Floor Plan Level B1	11/10/14	8/21/15	
A2.03	Floor Plan Level 1	11/10/14	8/21/15	
A2.04	Floor Plan Level 2	11/10/14	8/21/15	
A3.10	Building Section, E-W	11/10/14	8/21/15	
A3.11	Building Section, N-S	11/10/14	8/21/15	
A4.01	Exterior Details	11/10/14	8/21/15	
A7.01	Interior Elevations	8/21/15		
LF1.01	Lab Furnishings, General Notes	8/21/15		
LF1.02	Lab Furnishings, Schedules	8/21/15		
S0.01	Structural Notes	10/24/14	11/10/14	8/21/15
S2.01-2	Foundation Plan, Level B	10/24/14	11/10/14	8/21/15
S2.04-2	Framing Plan Level 2	10/24/14	11/10/14	8/21/15
M0.01	Mechanical Symbols	10/24/14	11/10/14	8/21/15

Superintendent's daily job diary

- ☐ **All the construction documents** are important to a project's success, and this is particularly true of the **superintendent's daily diary**.
- ☐ **Some construction professionals** also refer to the diary as a daily journal, log, or report.
- ☐ The **job diary** is one of the most important construction management tools and jobsite records.

*It is viewed as **contemporaneous documentation** of each day's events.*



Superintendent's daily job diary

GATEWAY CONSTRUCTION COMPANY

2201 First Avenue, Spokane, Washington 99205

(509) 642-2322

Sample Entry on the Superintendent's Job Diary for the I-90 Case Study Project

Daily Job Diary

Project: Interstate 90 Highway Overpass Job Number: 1732
Superintendent: Randy Buckwater, Date: October 14, 2018, Day: Monday
Today's Weather: Sunny, 56 degrees, Slight NW Wind at 7 MPH

Activities Completed:

Shoring for upper deck is ongoing, should be complete by 11/1. Electrical subcontractor is installing underground electrical ductbank at the SE off-ramp. Flagging traffic each day.

Problems Encountered:

There was a passenger car accident, unrelated to our project about 10:00 am this morning. No one was injured, but the ambulance and police showed up. Traffic backed up considerably and impacted our truck and equipment access to the site. The State Patrol interviewed me and Cathy our flagger. I asked the Trooper to send a report to our home office in Spokane.

Materials and Equipment Received Today:

Formwork, Rebar, Light Tower, backhoe for electrician

Rental Equipment Returned:

Walk-behind jumping jack

On-Site Labor/Crafts/Subcontractors/Hours Worked:

Carpenters: 6 craftsmen at 8 hours
Laborers: 2 men at 10 hours
Ironworkers: 2 ironworkers at 8 hours
CM Finishers: _____
Masons: _____
Electricians: 4 sparkies (2 men and 2 women) at 6 hours each
Drywallers: _____
Plumbers: _____
HVAC Tinnars: _____
Painters: _____
Other: Forklift OE at 8 hours, Flagger @ 10 hours

Superintendent's daily job diary

NORTHWEST CONSTRUCTION COMPANY

1242 First Avenue, Cascade, Washington 98202

(206) 239-1422

Daily Job Diary

Project: NanoEngineering Building Job Number: 9821
 Superintendent: Jim Bates Date: August 12, 2015 Day: Wednesday
 Today's Weather: Sunny, 76 degrees, Slight SW Wind at 5 MPH

Activities Completed:

Towercrane foundation has been completed and passed inspection. The TC rental firm along with the erection firm met onsite to discuss erection procedures for next weekend. Foundation work within the building pad continues. Electrical and Plumbing under-slab rough-in continues - still pending inspections.

Problems Encountered:

The University will not allow early delivery of towercrane materials as summer school is still in session. We felt that due to the smaller enrollment we would be able to mobilize on Thursday and Friday. Also we are going to need to pay for an official City of Seattle Police Officer for traffic control, our flagger will not suffice.

Materials and Equipment Received Today:

Replacement forklift (#2), additional plumbing and conduit, last footing rebar shipment

Rental Equipment Returned:

Forklift #1 which had ongoing hydraulics problems

On-Site Labor/Crafts/Subcontractors/Hours Worked:

Carpenters: 3 men and 1 woman at 8 hours/day
 Laborers: 4 all day, clean up, concrete prep
 Ironworkers: 1 at 10 hours, stayed late to prep for pour
 CM Finishers: 1 guy doing some patch and sack, 4 hours
 Masons: _____
 Electricians: 2 men at 8 hours, 1 apprentice at 5 hours
 Drywallers: _____
 Plumbers: 2 men, including a non-working foreman, at 8 hours/day
 HVAC Tanners: _____
 Painters: _____
 Other: TC inspector Don Smith for 3 hours

Superintendent's daily job diary

❑ Some of the important **information that should be recorded** in a superintendent's diary

are:

- Project name and job number,
- Name of superintendent authoring the diary,
- Date and week day,
- Weather conditions, including wind speed,
- Manpower for all contractors, including the GC's direct crafts,
- Active work areas and daily progress,
- Hindrances or delays,
- Deliveries, including construction equipment,
- Visitors, including the owner, architect, and inspectors, and
- Accidents, although they will also be noted on an accident report.

Meeting notes

- ❑ There are many different **meeting types**; some of the more common include:
- Pre-bid meetings, conducted by the lead designer;
 - Pre-construction meetings:
 - between the project owner, designer, and contractor,
 - between the GC and any required authority having jurisdiction (AHJ), and
 - between the GC and subcontractors, chaired by the GC's project manager (PM);
 - Safety meetings led by the GC's superintendent or safety inspector;
 - Foremen meetings led by the GC's superintendent;
 - Subcontractor coordination meetings led by the GC's PM;
 - Weekly owner– architect/ engineer– contractor (OAC/ OEC) meetings led by the GC's PM; and
 - Weekly change order, RFI, and submittal coordination meetings.

Meeting notes

- ❑ We will utilize the **weekly OAC/OEC meeting** as the basis for this discussion on **meeting notes**;

the **processes and products** are similar for most meetings.

This meeting should follow a **written agenda**.

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Meeting notes

☐ There are many additional uses for **meeting notes**, including:

- List of meeting attendees,
- Record of meeting discussions and decisions,
- Record of pending items from previous meetings that were discussed,
- List of action items and due dates,
- Transmission of any handouts distributed during the meeting, and
- Announcement of next meeting.

Prepared by Dr. Alavipour
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Meeting notes

- ☐ Similarly to the daily diary, **meeting notes** provide a formal historical record and are relied upon heavily in case of a dispute.
- ☐ Meeting notes often serve as **supportive data** for letters, change orders, and RFIs.
- ☐ They should be **filed and stored** along with the project files.
- ☐ **Meeting note formats** may occasionally vary according to specific projects, topics, and attendees.

Purchase orders

- ❑ POs are contracts for the manufacture and/or sale of materials and equipment.
- ❑ There are **two different** types of POs used on construction projects.
 1. Long-form PO that is used for **major material purchases**, typically **prepared** by the **construction manager** or the **construction firm's purchasing department**.
 2. Short-form PO typically used in the **field** by **superintendents** to **order materials** from local suppliers.
 - ❖ The superintendent may be assisted by a CM when preparing short-form POs.

*When preparing a PO, the construction team needs to provide a **complete description**, quantities required, unit prices, and total cost for each item.*



Purchase orders – Long form purchase order

MATERIAL PURCHASE ORDER CONTRACT

Northwest Construction Company

1242 First Avenue
Cascade, Washington 98202
(206) 239-1422

CONTRACT NO. 9821/03.32

ORDER NO.: 101

FOR: *NanoEngineering Building*

QUOTATION

TO: *Steel Fabrication, Inc.*
Post Office Box 113
Seattle, WA 99801

TERMS: 30 days

DATE: *June 1, 2015*

SHIP TO: *Jobsite:*
1105 15th Ave NE
Seattle, WA 99801

VIA: *Your trucks*

REQUIRED DELIVERY DATE: *10/07/15*

Item No.	Quantity	Description	Code or Equip. No.	Unit Price	Amount
		<i>Supply all reinforcement steel for installation by Northwest Construction Company</i>	03-20-00		
		<i>Excludes Installation</i>		<i>lump sum</i>	<i>\$58,000.00</i>

This contract is not assignable by Seller.

This Purchase Order Contract is subject to the terms and provisions printed on the reverse hereof.

SELLER:

By *Henry Smith*

Title: *Project Manager*

BUYER:

Northwest Construction Company

By *Ted Jones*

Purchase orders – Purchase order log

PURCHASE ORDER LOG

Project No.: 9821

Project Name: NanoEngineering Building

Project Manager: Ted Jones

P.O. No.	Supplier	Materials Delivered	Date Sent	Date Materials Due	Date Materials Received	Date Supplier Paid
101	Steel Fabricators	Reinforcement Steel	6/1/15	10/7/15		
145	Seattle Lumber	Surveying and flagging stakes	8/15/15	8/17/15	8/17/15	9/01/15
146	Seattle Lumber	2x4s and plywood	8/20/15	8/20/15	8/21/15	9/01/15
147	Arctic Mechanical	Temporary drain pipe	8/20/15	8/25/15	8/24/15	9/01/15
148	Seattle Lumber	Silt fence	9/02/15	9/09/15		
149	University Redi-Mix	1 load quarry spalls				

Record documents

- ❑ There are **several different types of record drawings** that the GC will utilize and retain, including:
 - ❖ The set of drawings estimated and bid from;
 - ❖ The documents referenced in the original contract;
 - ❖ The permit set of drawings, as stamped by the municipality— this set is required to be available in the contractor's office for review by the inspector;
 - ❖ Approved submittal drawings;
 - ❖ The current set of contract drawings, as incorporated into the contract through change orders; and
 - ❖ As-built drawings.

Request for information

- ❑ Requests for information are one of the **most important tools for contractors** during the construction control and administration phase.
- ❑ **RFIs** allow contractors to **submit inquiries** to the designer and the owner on **unclear aspects** of the design.

*Even with the technology tools available today, some conflicts will **not be discovered** until work is well underway.*

Request for information

RFI#	Title	Initiated By	Sub RFI#	Date Sent	Assigned To	Date Due	Date Returned	Drawing/ Spec Ref	Posted to Contractual Documents	Status
001	Underpinning pile installation sequence	Sub 1	01	3/31/2015	Geotechnical consultant	4/7/2015	4/17/2015		5/28/2015	Closed
002	Drywall shaftwall clarifications	GC		4/6/2015	Geotechnical consultant	4/13/2015	4/6/2015	A6.00-A6.20	4/6/2015	Closed
003	Unit demizing wall clarification	GC		4/6/2015	Architect	4/13/2015	4/6/2015	A2.70-A2.85	4/6/2015	Closed
004	Roof patio framing	GC		4/6/2015	Architect	4/13/2015	4/6/2015	A8.26	4/6/2015	Closed
005	Shoring tiebacks conflict with side sewers	GC		4/9/2015	Geotechnical consultant	4/16/2015	4/23/2015	SH drawings	5/29/2015	Closed
006	Garage entry door	GC		4/16/2015	Architect	4/23/2015	4/17/2015		4/16/2015	Closed
007	Crane surcharge W-2 to W-5	Sub 1	02	4/27/2015	Structural engineer	5/4/2015	4/28/2015		5/29/2015	Closed
008	Utility sheds pile interference at north property line	GC		4/29/2015	Owner	5/1/2015	4/30/2015	SH2.0	5/29/2015	Closed
008.1	Underpinning piles at utility sheds	GC		5/12/2015	Geotechnical consultant	5/13/2015				Open
009	Soldier pile utility conflicts at north-east corner	GC		4/29/2015	Geotechnical consultant	5/1/2015		SH2.0		Open
010	Lagging attachment to south-east property footing	Sub 1	03	5/4/2015	Geotechnical consultant	5/5/2015	5/5/2015		5/29/2015	Closed
011	Underpinning benching	Sub 1	04	5/4/2015	Geotechnical consultant	5/5/2015	5/6/2015		5/29/2015	Closed
012	Pile S-1 to S-4 modifications	Sub 1	05	5/5/2015	Geotechnical consultant	5/5/2015	5/5/2015	SH3.2	5/29/2015	Closed
012.1	Pile S-1 to S-7 modifications revised	Sub 1	06	5/6/2015	Geotechnical consultant	5/8/2015	5/7/2015	SH3.2	5/29/2015	Closed
013	Stud rail base plate size	GC		5/5/2015	Structural engineer	5/12/2015	5/14/2015	S7.06	5/29/2015	Closed
014	South building foundation over property line	GC		6/26/2015	Structural engineer	7/3/2015				Open
015	Existing conditions – 8" side sewer	GC		5/7/2015	Architect	5/14/2015		C6.00		Open
016	Foundation at pile S-4	GC		5/18/2015	Geotechnical consultant	5/25/2015	5/18/2015		5/29/2015	Closed
017	Tower crane foundation pier move	GC		5/18/2015	Structural engineer	5/25/2015				Open
018	Piles N-1 to N-8 modifications	Sub 1	07	5/19/2015	Geotechnical consultant	5/21/2015	5/19/2015		5/29/2015	Closed
019	Duct bank routing in garage	GC		5/26/2015	Architect	6/2/2015				Open
019.1	Duct bank routing in garage – Revised	GC		7/27/2015	Architect	8/3/2015	8/11/2015	S2.07	8/14/2015	Closed
020	Pile N-8 modification	Sub 1	08	5/27/2015	Geotechnical consultant	5/28/2015	5/27/2015		5/29/2015	Closed
021	P-7 plumbing sump vaults – Mat footing	Sub 2	01	6/8/2015	Structural engineer	6/15/2015	6/15/2015	S3.01	8/14/2015	Closed

Request for information

❑ Regardless of the author or originator of the RFI,

there are a **few basic rules** that should be followed by project teams.

- ❖ RFIs should be submitted in writing
- ❖ Subcontractors and suppliers must route RFIs through the GC
- ❖ RFIs should be submitted according to the requirements in the contractual documents
- ❖ RFIs should be focused
- ❖ RFIs should be clearly written
- ❖ RFIs should lead to a buildable response



Request for information

RELIABLE CONSTRUCTION COMPANY

1401 Waterfront Avenue, Portland, OR 97201
(503) 719-9874

REQUEST FOR INFORMATION

Project: *Rose Collective Mixed Use Apartment* Date: *July 19, 2018*
Area/System: RFI No. *101*
To: *Creative Spaces, Inc* Related RFIs: *NA*
Address: *444 Hill Street*
Portland, OR
Attention: *Robert Jackson*
Required Response Date: *July 27, 2018*

Subcontractor/Supplier Forwarding Question: *NA* Sub's RFI No. *NA*

Subject: *Door 6-06 Fire Rating*

Detailed Description/Request:

The door schedule calls out the 6-06 conference room door as a 20 minute rated door. However, this door has to be installed within a one hour rated wall. Please confirm the fire rating of this door.

Attached/Referenced Drawings/Photographs/Specifications:

Cost or Schedule Impacts: *Unknown at this time*

Please reply to: *Jennifer Forsythe, Project Engineer*

Architect/Engineer Response:

Signed: *Robert Jackson* Date: *July 22, 2018*

File Code: *414/RFI*

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Request for information

ABC Construction Company

REQUEST FOR INFORMATION

Project: Spinnaker's Restaurant

RFI No. 042

Date: May 14, 2020

Required Response Date: May 20, 2020

To: Tony Parisi
Parisi & McDylan Architects
1650 First Street, Suite 2A
San Piatra, CA 96744
(701) 667-9871

From: A.L. Jackson
ABC Construction
1400 Elm Grove
Carpenter, CA 83347
(509) 711-8223

Subject: Grout color in men's & women's restrooms

Description of Request: The finish schedule shown on sheet #A-17 indicates that the grout color for the men's and women's restrooms is to be "Buff #032." The specifications call for all tile grout to be "Charcoal #016" throughout. The tile setters will be starting tile work on May 25, 2020. Please advise regarding correct grout color.

Support Documents Attached: Drawings A-17, Spec Section 09310

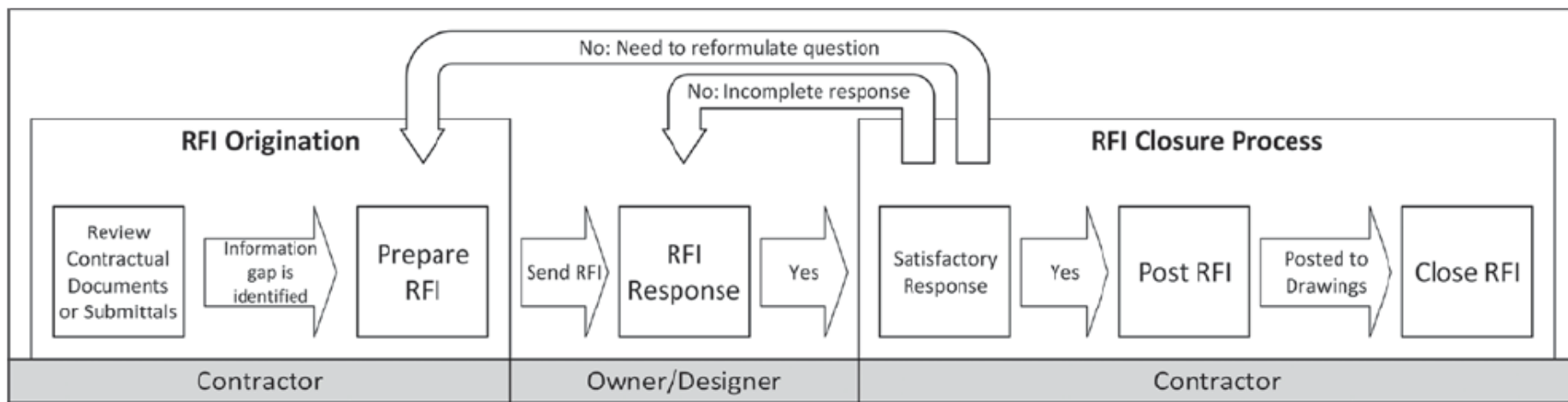
REPLY: The grout in the Men's and Women's restrooms is to be Charcoal # 016 as indicated in the specifications. Please correct the finish schedule to reflect this change.

We assume that this change is a non-cost item.

Signed: Tony Parisi
Parisi & McDylan Architects

Date: May 17, 2020

Request for information – RFI management process



CLAIMS AND DISPUTES

Managing changes

- ❑ **Plans** are based on assumptions, and
it is **common** for these assumptions to **change over** a project's life.
- ❑ Changes can **occur at any time** during the project development phases,
even before a construction firm is **selected**.

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Managing changes – Types of changes

1. Functional changes
2. Legal changes

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Managing changes – Types of changes: Functional changes

❑ **Functionally**, changes can be classified as

1. Changes to project **scope** and
2. Changes to project **development**

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Managing changes – Types of changes: Functional changes

❑ Changes to **project scope** can be further divided into

1. Required
2. Elective

(CII 1994)

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Managing changes – Types of changes: Functional changes

- ☐ **Required changes** to project scope are those that the project team must implement and cannot avoid.
- ☐ These changes are often necessary to
 - (a) “meet the basic, defined **venture/business** objectives,”
 - (b) “meet **regulatory** or **legal** requirements,” or
 - (c) “meet defined **safety** and **engineering** standards”

(CII 1994; p. 15).
- ☐ In addressing these necessary changes, “the project team must **determine if the project remains viable**” (CII 1994; p. 15).

Managing changes – Types of changes: Functional changes

- ❑ Elective changes to project scope include **all other scope changes**.
 - ❖ They “are those that are proposed to **enhance the project**, but are not required to meet the original project objectives.
 - ❖ Elective changes, therefore, are those that **may or may not be implemented**” (CII 1994; p.15).
- ❑ These changes do not need to happen but are **made to satisfy** the **desire** of some project team member.

Managing changes – Types of changes: Functional changes

- ❑ Changes to **project development** are those that are **necessary to achieve the original scope of work** and achieve the project objectives (CII 2017).
- ❑ A common example is when **specified materials are not available**,
so the project team is **forced to select similar materials**,
possibly with a **longer lead-time** and **different costs**.
- ❑ Other examples include
 - ❖ **Price and currency escalations**,
 - ❖ Changes in **labor productivity**, and
 - ❖ **Design errors and omissions**.

Managing changes – Types of changes: Functional changes

1. Functional changes

1. Changes to project **scope** and
 - a) Required
 - b) Elective
2. Changes to project **development**

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Managing changes – Types of changes: Legal changes

- ☐ As project delivery relies highly **on contractual relationships**, project changes often have legal implications.
- ☐ **Legally**, changes can be classified into three groups:
 1. Directed changes
 2. Constructive changes
 3. Cardinal changes

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Managing changes – Types of changes: Legal changes

- ❑ A **directed change** is **ordered** by the owner and **implemented** by the contractor.
- ❑ The instruction to implement the change can manifest itself either as
 1. A change order directive or
 2. A change order
- ❑ The **process** for implementing a directed change is usually described in a change order contractual clause within the contract.
- ❑ This also describes **how cost and time implications** will be taken into account in the form of corrections to the contracted cost and time.
- ❑ These types of changes need to be directed by the owner before occurring, **even if** they are initiated by the contractor through
 1. A **change order proposal** or
 2. A **request for information**

Managing changes – Types of changes: Legal changes

- ☐ **Constructive changes** are also known as changes by implication and include those changes that are **not ordered by the owner** but that either occur or are necessary to achieve the project objectives.
- ☐ Whereas constructive changes are **not explicitly requested** by the project owner, they may have **cost and time implications** for the construction team.
- ☐ Sometimes, a contractor can **propose a change** to the project owner, who **can agree** to the change by accepting the change order proposal.

Managing changes – Types of changes: Legal changes

- ❑ Whereas **directive** and **constructive** changes can be handled while the construction contract is kept in place,
addressing a **cardinal change** would require **adjustments** that are beyond the scope of the contract.
- ❑ This is because they would **require the contractor** to perform work beyond the types of changes that were **expected when** the contractor **entered into the contract**.
- ❑ To address these circumstances, **case law** has established the cardinal change doctrine, which provides a way for **contractors to walk away** from a contract, while retaining the **right for claims**.

Managing changes – Types of changes: Legal changes

- ☐ The cardinal change doctrine can only be invoked under circumstances that are **rare in the industry** and need to be proven,
so contractors **rarely follow this path** and only when they deem it is necessary.
- ☐ As a result, **project engineers** are rarely involved in managing cardinal changes,
except when they may be **called to provide testimony** during legal proceedings.
- ☐ Such testimony is intended to **help substantiate** the nature, impact, and quantity of changes
that the cardinal change produced and the dramatic effect on the project delivery.

Managing changes – Types of changes: Functional changes

1. Functional changes

1. Changes to project **scope** and
 - a) Required
 - b) Elective
2. Changes to project **development**

2. Legal changes

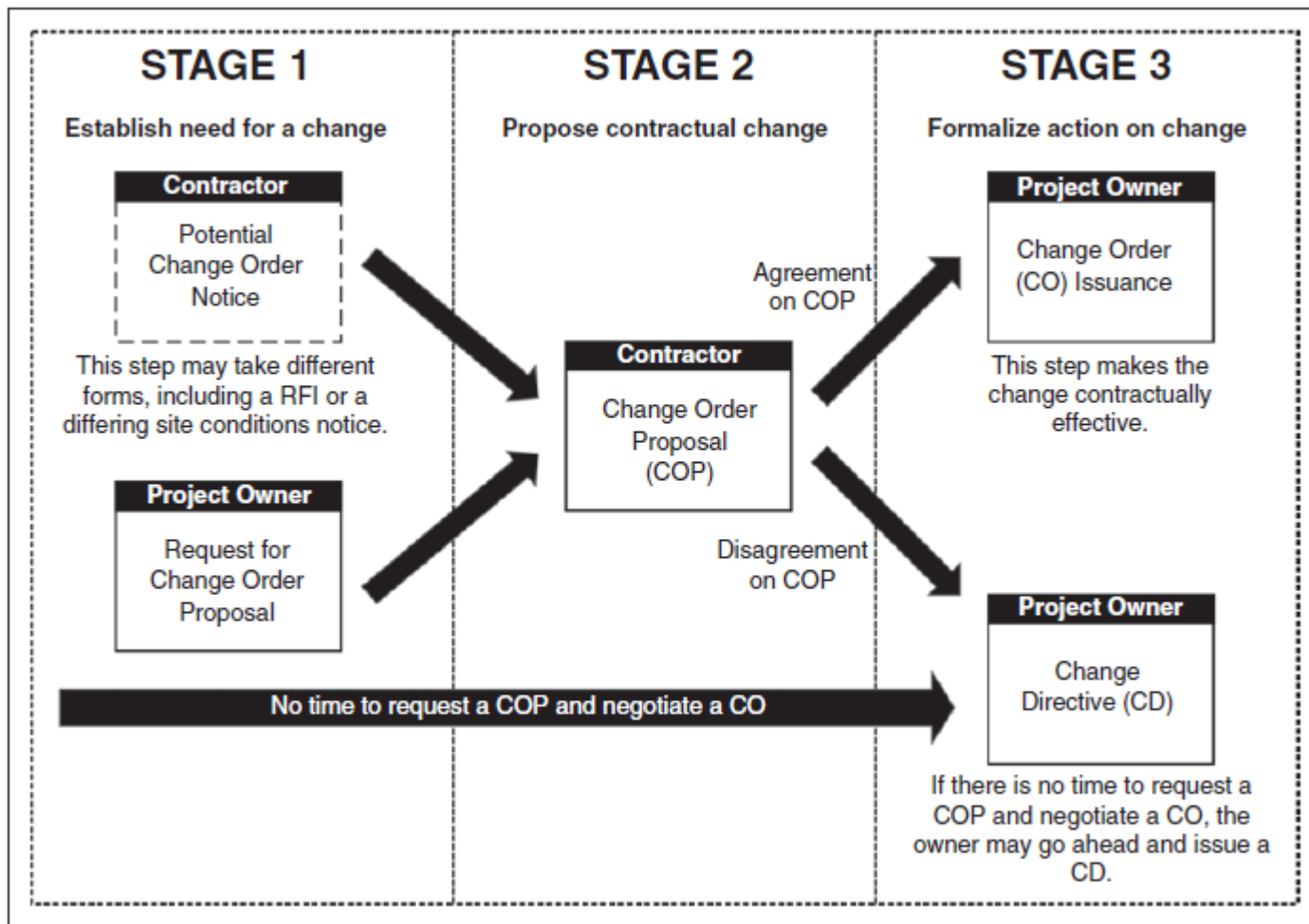
1. Directed changes
 - a) Change order directive
 - b) Change order
2. Constructive changes
3. Cardinal changes

Managing changes – Change order sources

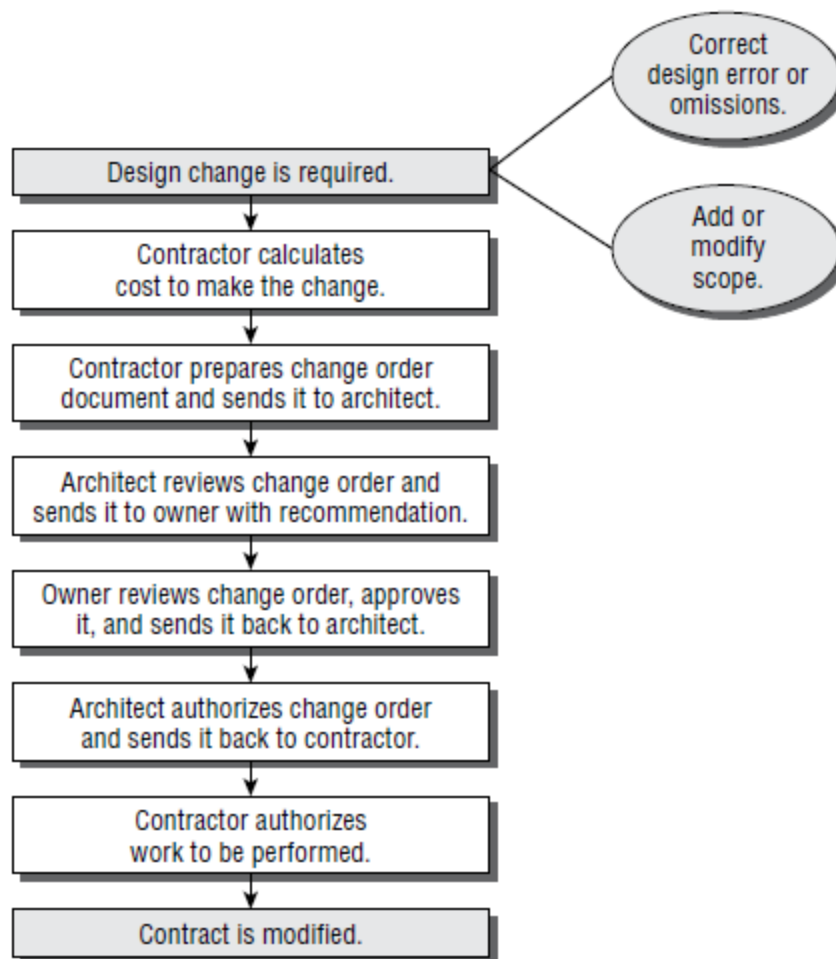
Change Order Sources

- Designer-generated scope changes, change in material specifications
- Contractor-generated material or detail change or value engineering proposal
- Design errors, discrepancies, or lack of coordinated multi-discipline design
- Discovery of unknown or hidden conditions
- Municipality-generated changes, code interpretations or permit review changes
- Not-in-contract equipment discrepancies, utility connections, size variations
- Client scope changes, additions, or changes to the program
- Specified product is unavailable or no longer manufactured
- Interference from third party or another contractor not under the control of the general contractor
- Unusually adverse weather

Managing changes – Change order process



Managing changes – Change order process



Managing changes – Change order process: Change order proposal

NORTHWEST CONSTRUCTION COMPANY

1242 First Avenue, Cascade, Washington 98202

(206) 239-1422

NanoEngineering Building

Change Order Proposal Number: 23

Date: 10/27/16

Description of Work: Enclose pipes and conduits in pipe chase in the first floor lobby with hard-rated lid.

Referenced Documents: RFI #241, CD #7, and Sketch #16

Estimate Summary:

		Total
1	Direct Labor: (See attached detail pricing recap)	\$ 1,000
2	Supervision: 15" of DL	\$ 150
3	Labor Burden: 50" of DL	\$ 500
4	Safety: 2" of DL	\$ 20
5	Total Labor:	\$ 1,670
6	Direct Materials and Equipment: (See attached pricing recap)	\$ 2,315
7	Small Tools 3" of DL	\$ 30
8	Consumables 3" of DL	\$ 30
9	Total Materials and Equipment:	\$ 2,375
10	Total Direct Work, Items 1-9	\$ 4,045
11	Subcontractors: (See attached subcontractor quotes)	\$15,000
12	Overhead on Direct Work Items: 0"	\$ 0
13	Fee on Direct Work Items: 3"	\$ 121
14	Fee on Subcontractors: 3"	\$ 450
15	Subtotal Overhead and Fee:	\$ 571
16	Subtotal all Costs:	\$20,188
17	Insurance and Excise Taxes 2"	\$ 404
18	Total this COP:	\$20,592

This COP may or may not have a schedule impact, the extent of which cannot be analyzed until the work is completed.

Approved by: *Jeffrey Jackson*

Jeffrey Jackson, University of Washington

11/5/16

Date



Managing changes – Change order process: Change order proposal

Gateway Construction Company
2201 First Avenue
Spokane, WA 99205

CHANGE ORDER PROPOSAL

COP Number: 25 Date: 7/1/18

Description of work: On-site material was not suitable for landscape topsoil as had been indicated in the specifications and geotechnical report. This work proceeded under verbal direction of the State's landscape architect.

Referenced documents: Phone memo dated 6/15/18 and RFI 123 in process

COP Estimate Summary:

				Extended Cost:
1	Direct Labor:	10 hours @ \$41/hour	(See att'd)	\$410
2	Supervision:	2 hours @ \$55/hour		\$110
3	Labor Burden:	20% of labor:		\$105
4	Safety:	2% of labor:		\$8
5	Total Labor:			\$633
6	Direct Materials and Equipment:	1000 CY @ \$20/CY	(See att'd)	\$20,000
7	Small Tools	1% of DL		\$4
8	Consumables	1% of DL		\$4
9	Total Materials and Equipment:			\$20,008
10	Subtotal Direct Work (Items 1 through 9):			\$20,641
11	Subcontractors (See attached subcontractor quotes):	Landscaper		\$5,000
12	Overhead on Direct Work (w/fee)			\$0
13	Items:			
13	Fee on Direct Work	13% of direct L & M		\$2,683
14	Items:			
14	Fee on Subcontractors:	13% of subs		\$650
15	Subtotal Overhead and Fee:			\$3,333
16	Subtotal all costs:			\$28,974
17	Liability Insurance:	1% of subtotal		\$290
18	Total this COP # 25			\$29,264

This added work has an impact on the overall project schedule, the extent of which cannot be thoroughly analyzed until after the change is incorporated into the contract and the work has been completed.

Please indicate acceptance by signing and returning one copy to our office within five days of origination.

Approved by:

Jeremy Short 7/6/2018
Montana State Resident Engineer Date

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Managing changes – Change order process: Change order

CONTRACT CHANGE ORDER

Where the basis of payment is a Guaranteed Maximum Price

Client: University of Washington

Address: 1101 15th Avenue, Seattle, WA 98011, (206) 239-3556

Contractor: Northwest Construction Company

Address: 1242 First Avenue, Seattle, WA 98202, (206) 239-1422

Project: NanoEngineering Building

Project Number: 9821

Change Order Number: 2

Change Order Date: 12/21/15

Original Contract Price: \$61,024,000

Previously Approved Change Orders: Through Change #: 1 \$ 20,000

Previous Contract Price: \$61,044,000

Incorporate the following agreed Change Order Proposals. See attached COP log.

3 Rated Lid \$ 4,351

4 Column Rebar \$ 222

5 Carpet \$ (1,200)

8 Low Voltage Lighting \$ 3,600

9 T.I. Finishes \$139,007

Total added/reduced/unchanged this CO: \$145,980 \$ 145,980

Current and revised Contract Price: \$61,189,980

Previous Contracted Schedule Completion:

1/15/2017

Net change per this CO: 0 Days added/reduced/unchanged: 0

Current and Revised Contracted Schedule Completion: 1/15/2017

Contractor's Approval: *Ted Jones*

Date: 12/21/15

Architect's Approval: *Norm Riley*

Date: 12/21/15

Client's Approval: *Jeffrey Jackson*

Date: 12/21/15

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Managing changes – Change order process: Change directive

CHANGE DIRECTIVE

Where the basis of payment is a Guaranteed Maximum Price

Client: *University of Washington*
Address: *1101 15th Avenue, Seattle, WA 98011, (206) 239-3556*

Contractor: *Northwest Construction Company*
Address: *1242 First Avenue, Seattle, WA 98202, (206) 239-1422*

Project: *NanoEngineering Building* **Project Number:** *9821*

Change Directive Number: *7* **Change Directive Date:** *10/22/16*

In conformance with ConsensusDocs® Contract 500, Article 9.2 and in conjunction with special conditions Article 00-50-00, the Client provides the following direction to the contractor in regards to the following changed conditions:

According to ZGF's response to RFI 241, the contractor is hereby directed to incorporate the added ceiling in the elevator lobby. This change was originated by the Fire Marshal.

The client directs the contractor to incorporate this Change Directive into the work as follows:

- ☒ Develop a COP cost estimate to be negotiated. Do not yet proceed with the work
- ☐ Proceed with the work on a T&M basis. Keep track of all costs
- ☐ Proceed with the work, cost and time impacts to be negotiated later
- ☐ Proceed with the work. There is not cost or time impact associated with this CD
- ☐ Proceed with the work according to the architect's estimate for \$_____

Contractor's Approval: *Ted Jones* **Date:** *10/22/16*

Architect's Approval: *Norm Riley* **Date:** *10/22/16*

Client's Approval: *Jeffrey Jackson* **Date:** *10/22/16*

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Managing changes – Change order process: Change order proposal log

NORTHWEST CONSTRUCTION COMPANY 1242 First Avenue, Cascade, Washington 98202 (206) 239-1422									
CHANGE ORDER PROPOSAL LOG									
Project No.: 9821			Project Name: NanoEngineering Building			Project Manager: Ted Jones			
COP No.	Originating Document	Description	Originating Date	COP Date	Amount Requested	Date Approved	Approved Amount	CO No.	Comments
1		Permit documents	8/15/15	9/1/15	0	9/1/15	0	1	No impact
2	IDC #1	Over excavation for footings	9/15/15	10/1/15	\$21,500	10/10/15	\$20,000	1	
3	RFI, ASI	Rated lid in basement	10/17/15	11/5/15	\$4,351	11/7/15	\$4,351	2	
4		Column rebar change	10/12/15	10/15/15	\$222	11/15/15	\$222	2	
5	RFI	Carpet manufacturer change	10/12/15	11/1/15	(\$1,200)	11/1/15	(\$1,200)	2	
6	Submittal	Toilet accessory backing	11/1/15	11/15/15	\$475	NA	NA	NA	Rejected
7		Beam and duct conflict	11/1/15						
8	CD #3	Low voltage light controls	11/15/15	12/1/15	\$3,500	12/1/15	\$3,600	2	
9	CD #4, ASI	TI Package for basement	11/16/15	11/16/15	\$155,550	12/15/15	\$139,007	2	Negotiated
22		Sprinkler and duct conflict	10/1/16	10/1/16	\$11,575	NA	NA	NA	Rejected
23	RFI 241, CD 7	Ceiling in lobby	10/22/16	10/27/16	\$20,592				Pending

Managing changes – Time extensions

❑ Time **extensions** are **processed** just like any other change order but are often more difficult to get approved. There are **many reasons why a time extension** might be appropriate:

- ◆◆ Delays resulting from severe weather
- ◆◆ Delays caused by slow responses to RFIs
- ◆◆ Delays caused by slow processing of submittals or shop drawings
- ◆◆ Delays caused by delinquent deliveries
- ◆◆ Delays caused by labor strikes
- ◆◆ Delays caused by slow permit processing
- ◆◆ Delays caused by the architect (poor-quality contract documents, work interference)
- ◆◆ Delays caused by the owner (slow decision making, work interference)
- ◆◆ Delays caused by outside protests (political groups, environmental groups, others)

Managing changes – Pricing change orders

- ☐ In order for the **GC and their subcontractors** to be paid for extra work performed, they must have their **COPs approved**.
- ☐ The **easiest way** to achieve this goal is to be realistic with respect to pricing on direct and subcontract cost estimates.
- ☐ **Quantity measurements** are generally verifiable and should not be inflated.
- ☐ **Wage rates paid** to craft employees are verifiable and should not be inflated.

Things go wrong – Claim

❑ **Construction claims** typically result from one of the following causes:

- ◆◆ Disagreements regarding the terms of the contract
- ◆◆ Defective or deficient contract documents
- ◆◆ Denied and unresolved change orders
- ◆◆ Denied time extensions resulting from delays beyond the contractor's control
- ◆◆ Differing site conditions that resulted in extra cost to the contractor

claim

An issue that occurs during construction and remains unresolved after the job is complete.

Things go wrong – Claim

- ☐ The **owner or architect** must formally respond to the contractor's claim.
- ☐ If they reject the contractor's claim for additional compensation, the matter becomes a **formal contract dispute**.
- ☐ Some form of dispute resolution must be implemented;
most construction contracts today **call for methods** other than traditional litigation.

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Things go wrong – Dispute resolution

**Dispute Resolution Techniques
Ranked in Order of Increasing Cost
and Time to Resolution**

1. Negotiation
2. Mediation
3. Dispute Resolution Board
4. Arbitration
5. Litigation

Things go wrong – Dispute resolution

DISPUTE RESOLUTION BOARD SPECIFICATION

1. A dispute resolution board (hereinafter 'Board') will be established to assist in the resolution of disputes in connection with, or arising out of, performance of the work of this contract.
2. Either the owner or the contractor may refer a dispute to the Board. Such referral shall be initiated as soon as it appears that the normal dispute resolution procedure is not working and prior to initiation other dispute resolution techniques.
3. The Board shall consist of one member selected by the owner and one member selected by the contractor, with these two members to select the third member who will serve as the Board Chair. All three members shall be mutually acceptable to both the owner and the contractor. No member shall have a financial interest in the work, except for payment for services as a Board member. The Board will be considered established once the attached Three-Party Agreement among the owner, the contractor, and all three Board members has been executed. This agreement establishes the scope of Board services and the rights and responsibilities of the parties.
4. The Board will formulate its own rules of operation, except to the extent any such rules are provided herein or in the Agreement. To keep abreast of the work, the members shall regularly visit the project, keep a current file, and regularly meet with the other members of the Board and representatives of the owner and contractor. The frequency of these visits shall be as established in the Agreement.
5. Compensation for Board members and Board operating expenses shall be shared by the owner and the contractor equally. Based upon the expected schedule and scope of the NanoEngineering Building Project the owner and the contractor shall include in their respective budgets a stipulated line item totaling \$50,000 each. If for some reason the scope of the Board increased, or the process extends beyond the anticipated schedule of 22 months, then the parties agree to mutually update this budget.
6. Requests for Board review of a dispute shall be submitted in writing to the Board Chair and the other party. The request for review shall state in full detail the specific issues of the dispute and provide full documentation. The Board Chair will request a response from the other party and establish a hearing schedule that provides adequate time for both parties, as well as the Board members, to review the documentation. During the hearing both parties will have an opportunity to present their position and respond to the other party's position. The Board may or may not ask questions of the parties and may or may not request additional supporting documentation. After the hearing the Board will meet separately and provide a written response and recommendation to the parties to resolve the dispute.
7. Board recommendations are not binding on either the contractor or the owner. Within two weeks if either party disagrees with the Board's recommendation, that party will be required to provide written notice to the other party and the Board and pursue other alternative dispute resolutions as prescribed in the contract. The Board's finding and recommendation will be made available for review in subsequent proceedings.

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CLOSE-OUT

Introduction

- ❑ As the **physical construction** of a project nears completion,
contractors will transition into a closeout phase.
- ❑ The **jobsite team** should develop a project **close-out plan** to manage the **numerous activities** involved in closing out the job.
- ❑ Just as **start-up activities** are essential when initiating work on a project,
good close-out procedures are essential to **timely completion** of contractual requirements,
receipt of final payment, and release of retention funds.

Close-out planning

- ❑ The **close-out planning** process should **begin** once the contract is signed,
if **not** when the project was **initially considered for bid**.
- ❑ The **time** it takes to properly close out the project and receive the final retention can be **considerable**.
- ❑ If **contractual requirements** for the final close-out are deemed excessive,
they could **financially damage** the general contractor or its subcontractors.
Thus, it is better to address these risks early rather than later.
- ❖ *For example, if early or partial releases of the retention are going to be requested by the GC and/ or its subcontractors, they need to be negotiated into the prime contract agreement upfront.*

Close-out planning – Close-out log

SUBCONTRACTOR AND SUPPLIER CLOSE-OUT LOG												
Reliable Construction Company												
Project Name: <u>Rose MXD, Project Number 414</u>				Project Manager: <u>Jason Campbell</u>					Updated: <u>10/19/19</u>			
Description	Shoring	Site Utilities	Supply Rebar	Plumbing	HVAC	Electrical	Drywall	Ceramic Tile	Vinyl Flooring	Paint	Elevator	Landscape
Punch complete	X	X	NA									
Turn in permits	X	X	NA		NA		NA	NA	NA	NA		
Extra materials	NA	NA	NA	NA	Filters	Lamps	NA				NA	NA
O&M manuals	NA	X	NA									
As-built drawings	By RCC	By RCC	NA				NA	NA	NA	NA	NA	NA
Final lien release	X	X	X									
Test certificates	NA	X	NA				NA	NA	NA	NA	X	NA
Union affidavits	X	X	NA				X				X	NA
Back charges clear	X	X	X				X				X	
Demobilized	X	X	NA				X				X	
Warranties	X	X	NA				X				X	
Retention released			NA									

Close-out implementation

❑ **Construction close-out** is defined as

1. Process of completing all of the **construction tasks** and
2. Assembling all **documentation**
required to close out the contract.

❑ The **prime construction contract** will address requirements for substantial completion and final payment.

❑ If **mismanaged**, close-out can **take up to a year after** the receipt of a certificate of occupancy,

which results in financial stress to the general contractor and its subcontractors.

Close-out implementation – Commissioning

- ❑ **Commissioning** basically involves testing and re-testing most, if not all, the **systems and components** to ensure the project meets the **owner's requirements**.
- ❑ The purpose of this phase is to **minimize surprises** when the **project owner assumes control and operates** the completed facility themselves.

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Close-out implementation – Construction close-out

- ❑ As was the case with physical mobilization, most of the work related to completing construction execution and closing out physical aspects of the project is the responsibility of the **project superintendent**.
- ❑ Some of the **construction activities associated** with closing out construction execution include:
 - Verifying construction completeness in accordance with **contract requirements**,
 - Developing the formal punch list and the resolution of **outstanding items**,
 - Obtaining **certificates** of substantial completion and occupancy,
 - **Facilitating** project move-in and occupancy, and
 - **Demobilizing** resources.

Close-out implementation – Construction close-out

PUNCH LIST

Project: *Middle School* Inspection Date: *12/5/16*
Area/System: *Exterior/Shell/Site* Status Date: *12/10/16*
Inspection Participants: *Nancy Rogers, Jason Brown, Jim Johnson, Maggie Prince*

Item	Description	Complete?	Verified?
1	Downspout splash blocks not installed	NIC	OK
2	Front door hardware requires adjustment	Yes	OK
3	Phase II site work pending spring weather		
4	Parking lot requires sweeping	Yes	OK
5	Two handicap signs to be squared and straightened	Yes	
6	Re-paint entrance arrows, too light	Yes	OK
7	Fuel oil tank certificate requires exterior display	Yes	
8	Remove temp silt fence along stream (next spring)		
9	Remove GC's project sign	Yes	OK
10	Add building address for Fire Marshal	Yes	
11	Remove dumpster		
12	Clean exterior of windows	Yes	OK
13	Incorrect door mat installed: Check specifications		
14	General site clean-up	Ongoing	Partial

Close-out implementation – Construction close-out: Occupancy

Certificate of Occupancy

City of Seattle, Washington

NanoEngineering Building

This Certificate issued pursuant to the requirement of Section 306 of the International Building Code, as amended, certifying that at the time of issuance this structure was in compliance with various ordinances of the City of Seattle, regulating building construction or use for the following:

Use Classification:	<i>Educational Building, Classrooms, Laboratories</i>
Permit No.	<i>BLD97-00514</i>
Occupancy Group:	<i>B, A3, S2, Low Hazard Storage</i>
Construction Type:	<i>1A, Fully Sprinkled</i>
Owner of Building:	<i>University of Washington</i>
Owner Address:	<i>4100 15th Ave NE, Seattle, WA, 98102</i>
Building Address:	<i>1701 NE Grant LN</i>
Legal Description:	<i>The West 1/2 of the NW 1/4 and the NW 1/4 of the SW 1/4 lying East of 15th Ave NE</i>
Building Official:	<i>Christian Roust</i>
Date Issued:	<i>January 7, 2017</i>

Close-out implementation – Contractual close-out

- ❑ **Contract close-out** begins with checking the specifications for close-out requirements.
- ❑ Ideally this happens during project start-up,
so that the requirements are delineated in **each subcontract** and **major purchase order**.
- ❑ The **project manager** or **project engineer** should make a list of
what they think needs to be done and **then ask the design team** for verification.
 - ❖ This list provides a **basis for developing a close-out log**,
which is **similar to an early submittal log**.
- ❑ Some of the **major items** that the project team will submit **during the close-out process** include
as-built drawings, operation and maintenance manuals, test reports, extra finish materials, and signed-off permits.

Close-out implementation – Contractual close-out: Close-out log

SUBCONTRACTOR AND SUPPLIER CLOSE-OUT LOG

Project No.: 9821

Project Name: NanoEngineering Building

Project Manager: Ted Jones

Description	Site Work	Supply Doors	Utilities	Plumbing	HVAC	Electrical	Drywall	Tile	Flooring	Paint	Insulation	Supply Rebar
Complete punch list	10/11/16	NA	10/5/16									NA
Sign final change order	10/11/16	11/13/16	10/10/16									12/11/16
Turn in permits	NA	NA					NA	NA	NA	NA	NA	NA
Extra materials	NA	NA	NA	NA	NA		NA				NA	NA
O&M manuals	NA						NA			NA	NA	NA
As-built drawings	NA											
Final lien release	10/15/16											
Second tier lien releases	10/15/16											
Test certificates	NA											
Union affidavits	10/15/16											
Back charges clear	Yes											
Demobilized	Yes											
Warranties	NA											
Retention released	11/11/16											

Close-out implementation – Financial close-out

- ☐ The **GC's project manager** is also responsible for **financially closing out** the project with both the CM and the GC's subcontractors.
- ☐ Upper management and project engineers may **assist** in this task.
- ☐ The financial close-out of a project includes several tasks, including
 1. Negotiating **final change orders** with the project owner and,
 2. In return, **negotiating final change orders** with the subcontractors and suppliers.
- ☐ Additionally, financial close-out includes
 1. Receipt of **final pay requests** from subcontractors and,
 2. In turn, issuing of the **final pay request** to the project owner.

Close-out implementation – In-house close-out

- ❑ There are many **additional in-house** close-out activities that are the responsibility of the project team. Some of these include:
 - ❖ The as-built schedule
 - ❖ The as-built estimate

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Close-out implementation – Warranty management

Richardson Electric, Inc.
800 Pacific Highway
Seattle, Washington 98902

WARRANTY FOR: Electrical Work

We hereby warrant and guarantee all electrical work which we have installed and/or furnished in the NanoEngineering Building project in Seattle, Washington is in compliance with the contract documents for one year from the date of substantial completion.

We agree to repair or replace to the satisfaction of the Architect all work that may prove defective in workmanship or materials within that period, ordinary wear and tear and unusual abuse or neglect excepted, together with all other work which may have been damaged or displaced in so doing.

All repairs or replacements shall have a warranty period equal to the original warranty period as herein stated, dated from the final acceptance or repairs or replacement.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time after being notified in writing, we collectively and separately do hereby authorize the Owner to proceed to have defects repaired and made good at our expense, and will pay the costs and charges therefore immediately upon demand.

Date: January 11, 2017

Rick Richardson
Richardson Electric, Inc.

Ted Jones
Northwest Construction Company

Close-out implementation – Warranty management: Warranty log

WARRANTY SERVICE LOG				
Project Name: <i>NanoEngineering Building</i>			Project Manager: <i>Ted Jones</i>	
Project No.: <i>9821</i>				
Item	Date Claim Received	Date Subcontractor Notified	Date Claim Resolved	Remarks
<i>Fan in Lab 280B inoperable</i>	<i>July 10, 2017</i>	<i>July 19, 2017</i>	<i>July 22, 2017</i>	<i>Fan replaced</i>

**CM ROADMAP
RELATED TO THIS SECTION**

CM Roadmap – Hard skills

مهارت‌های سخت (Hard Skills) - سطح کارشناسی و اجرایی					
سطح ۵	سطح ۴	سطح ۳	سطح ۲	سطح ۱	دپارتمان‌ها
	استاندارد مدیریت ساخت CMAA	متدولوژی Prince2	راهنمای PMBOK	مدیریت پروژه‌های صنعت ساخت	مدیریت پروژه
	تامین مالی پروژه			مدیریت مالی و هزینه پروژه ارزیابی اقتصادی پروژه	مدیریت مالی و هزینه
				برنامه‌ریزی و کنترل پروژه نرم‌افزار MSP نرم‌افزار P6	مدیریت برنامه‌ریزی و زمان‌بندی
		مدیریت کیفیت پروژه			مدیریت کیفیت
اجرای پروژه به روش CM			مدیریت ادعاء و اختلافات	آنالیز تاخیرات پروژه	مدیریت قرارداد
		مدیریت ایمنی پروژه			مدیریت ایمنی
مدیریت طرح		مدیریت چابک Agile	مدیریت پروژه به روش Lean دفتر مدیریت پروژه (PMO)		مدیریت طرح و برنامه
		مدیریت پایداری پروژه			مدیریت پایداری
			مدیریت ریسک پروژه		مدیریت ریسک
			نرم‌افزار Power BI	مدیریت اسناد و مدارک پروژه	مدیریت اطلاعات
	مدیریت BIM در پروژه		نرم‌افزارهای BIM		مدیریت مدل‌سازی اطلاعات ساختمان (BIM)

Relevant comprehensive courses



<https://dralavipour.com/general-course/claim2>



<https://dralavipour.com/general-course/delay2>

Relevant comprehensive courses

**CM Delivery systems
Next years...**

**[https://dralavipour.com/gener
al-course/CM-delivery](https://dralavipour.com/gener-al-course/CM-delivery)**

CM Roadmap – Hard skills

مهارت‌های سخت (Hard Skills) - سطح ارشد استراتژی					
سطح ۵	سطح ۴	سطح ۳	سطح ۲	سطح ۱	دپارتمان‌ها
		منشور اخلاق در مدیریت پروژه			مدیریت پروژه
			استراتژی مدیریت هزینه و مهندسی ارزش		مدیریت مالی و هزینه
			استراتژی مدیریت برنامه‌ریزی و زمان‌بندی		مدیریت برنامه‌ریزی و زمان‌بندی
	استراتژی مدیریت کیفیت				مدیریت کیفیت
		استراتژی مدیریت قرارداد		اصول مدیریت ساخت	مدیریت قرارداد
	استراتژی مدیریت ایمنی				مدیریت ایمنی
استراتژی مدیریت طرح و برنامه					مدیریت طرح و برنامه
	استراتژی مدیریت پایداری				مدیریت پایداری
		استراتژی مدیریت ریسک			مدیریت ریسک
		استراتژی مدیریت اطلاعات			مدیریت اطلاعات
استراتژی مدیریت BIM					مدیریت مدل‌سازی اطلاعات ساختمان (BIM)

Relevant comprehensive courses



<https://dralavipour.com/video-course/web10>

Relevant comprehensive courses

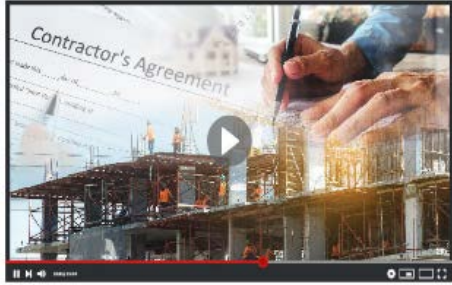


Video Course

موسسه تخصصی
مدیریت ساخت و راهبری

روش اجرای عامل چهارمی CM-AT-RISK با
قرارداد حداکثر قیمت تضمین شده (GMP)

<https://dralavipour.com/video-course/web15>

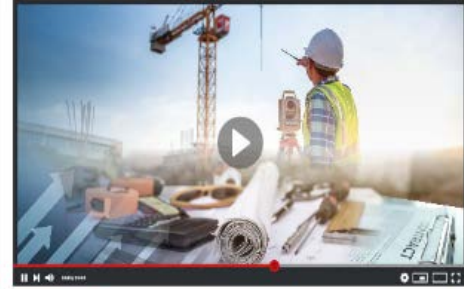


Video Course

موسسه تخصصی
مدیریت ساخت و راهبری

روش اجرا و قراردادهای دو عاملی طرح و
ساخت (Design-Build)

<https://dralavipour.com/video-course/db>



Video Course

موسسه تخصصی
مدیریت ساخت و راهبری

قراردادهای سه عاملی طرح-مناقصه-ساخت و
نکات مهم برای بهبود آنها

<https://dralavipour.com/video-course/web22>

Relevant comprehensive courses



<https://dralavipour.com/general-course/contract-management>

CM Roadmap – Management skills



منتورینگ (Management Skills) - سطح مدیریتی

سطح ۵	سطح ۴	سطح ۳	سطح ۲	سطح ۱
پیش‌نیاز ورود	پیش‌نیاز ورود	پیش‌نیاز ورود	پیش‌نیاز ورود	پیش‌نیاز ورود
داشتن مدرک مدیریتی سطح ۴	داشتن مدرک مدیریتی سطح ۳	داشتن مدرک مدیریتی سطح ۲	داشتن مدرک مدیریتی سطح ۱	دارای مدرک کارشناسی در زمینه مهندسی
تسلط بر مباحث مهارت‌های سخت و نرم سطح ۵	تسلط بر مباحث مهارت‌های سخت و نرم سطح ۴	تسلط بر مباحث مهارت‌های سخت و نرم سطح ۳	تسلط بر مباحث مهارت‌های سخت و نرم سطح ۲	تسلط بر مباحث مهارت‌های سخت و نرم سطح ۱

CM Roadmap – Consulting skills



مشاوران (Consulting Skills) - سطح مشاوره

سطح ۵	سطح ۴	سطح ۳	سطح ۲	سطح ۱
مدیریت درس آموخته‌های پروژه	مدیریت کیفیت پروژه	جلوگیری و حل اختلاف در پروژه	برنامه‌ریزی پروژه	
	مدیریت ایمنی پروژه	آنالیز و مدیریت ریسک پروژه	مدیریت تغییرات پروژه آنالیز و اجرای ساخت‌پذیری پروژه	

Relevant comprehensive courses

Dispute avoidance and resolution
Next years...

<https://dralavipour.com/general-course/dispute-resolution>

Change Management
Next years...

<https://dralavipour.com/general-course/change-management>

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مدیریت پروژه‌های صنعت ساخت (ساختمانی، زیرساختی و صنعتی)

فصل هفتم: مدیریت ریسک
فرآیند مدیریت ریسک

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

دانشگاه Illinois Tech آمریکا



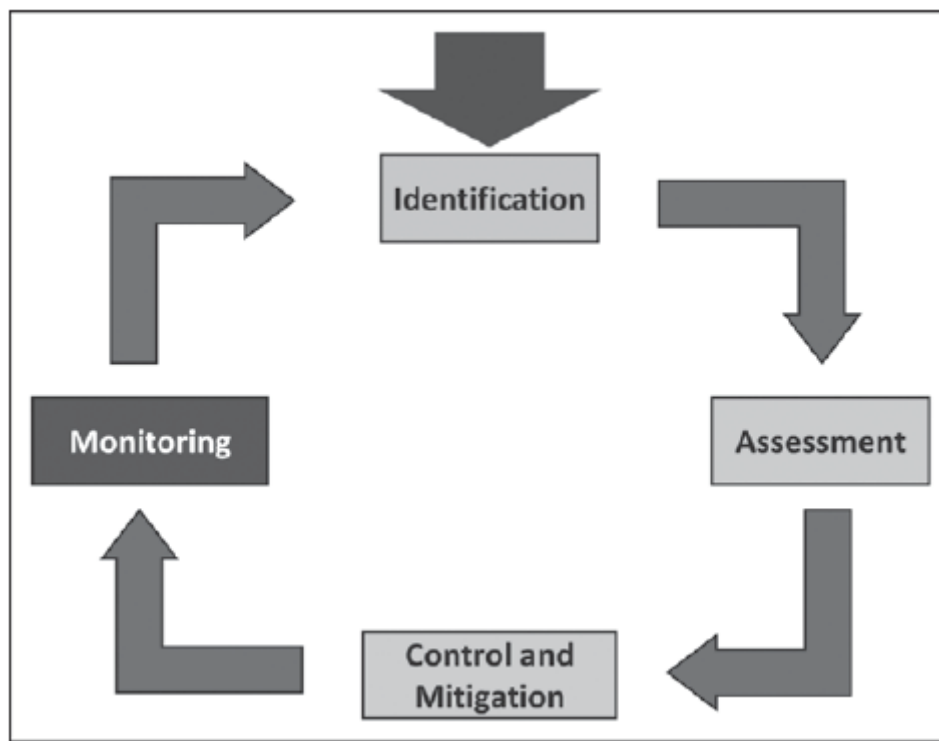
What we will learn?

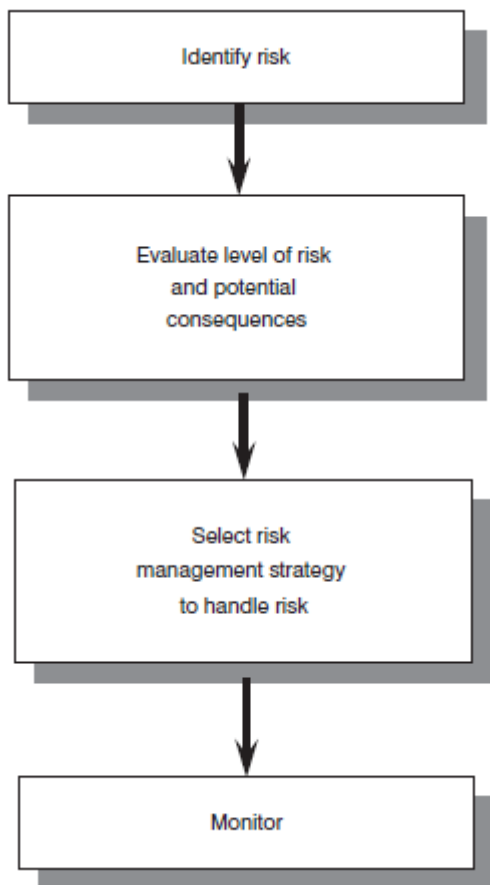
- ☐ Risk management process
- ☐ Transferring or sharing risks
- ☐ CM roadmap related to this section

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RISK MANAGEMENT PROCESS

- ❑ A **diligent approach** to risk management should incorporate **four major elements** that are implemented on a project throughout its delivery.





Risk identification

- ❑ The first step of the risk management process is to **recognize risks**, which means the **project team** should identify **events that can potentially** affect either the project as a whole or one of the project team members,
including the project owner, the designer, the general contractor, or any of the subcontractors and vendors.
- ❑ The **use of risk checklists** is quite **common** among organizations in the built environment.
- ❑ Whereas **large project owners and contractors** develop and maintain **their own checklists**, various organizations have developed **lists for use by anyone**.
 - ❖ *For instance, the Construction Industry Institute (CII) performed a study that identified 107 risks that are commonly encountered on construction projects (CII 2006).*

Risk identification

❑ Although every project will have its own unique variety of risks, all will generally fall under one of the **following six categories**:

1. Pre-bid risks
2. Design risks
3. Construction risks
4. Political/legal/regulatory risks
5. Financing risks
6. Environmental risks

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Risk identification – Pre-bid risks

- ☐ Contract risks
- ☐ Owner risks
- ☐ Price risks
- ☐ Time risks
- ☐ Work/labor risks
- ☐ Location risks
- ☐ Estimate preparation risks

See more in assessment section.

Risk identification – Design risks

Design Risks	Description
Poor-quality or inadequate design, drawings, or specs	The information and detail needed to construct an element of work is missing, incomplete, or inaccurate.
Noncompliance with design standards	The design doesn't meet the building code or other regulations.
Owner-directed changes	The owner changes their mind about the design after construction begins.
Excessive design review by owner, architect, or agency	Reviews and the approval process associated with design submittals take longer than typically allowed.
Changes in design standards or regulatory requirements	Regulatory requirements in place at the beginning of the project may change during construction.
Inaccuracies associated with supplemental design information such as soil reports, environmental reports, and so on	The information needed by the contractor and provided by the architect or owner is inaccurate.
<i>Latent design defects</i> affecting contractor's warranty	Defective design details that result in flawed construction after occupancy of the facility (such as a roof flashing leaks because of poor design).

Risk identification – Construction risks

Construction Risks	Description
Labor availability and quality of labor pool	If the contractor can't access the proper labor needed to complete a project, significant delays may be experienced. Quality issues resulting from an inexperienced workforce can also result in rework and cost overruns.
Differing site conditions	Sometimes the conditions on the building site are not communicated in the plans and specs. This discovery can lead to significant cost increases and delays.
Site access, traffic, parking issues	Projects located in highly congested areas can cause significant delays and storage issues for the contractor when trying to coordinate work.
Property damage or theft issues	The project site might be located in an area where security is an issue. The contractor has to protect the project, materials, and equipment against vandalism and theft.
Coordination with utilities, adjoining neighbors, and so on	Significant coordination efforts must be made when tying in electrical, plumbing, water, and gas lines to main supply lines. This often requires working with a local utility office, and their schedule and the contractor's schedule do not always coincide. Utility coordination can cause big delays.
Adverse weather	Weather is one of the most unpredictable construction risks. Contractors try to plan activities to avoid adverse weather conditions, but it isn't always possible. Having to place concrete in February in Minnesota can be a challenge and add cost to the job.

Construction Risks	Description
Labor disputes, strikes	The use of union labor on public projects is often a requirement in some jurisdictions. When this is the case, delayed labor negotiations, disputes, and even strikes are always a possibility.
Availability of materials	The architect may specify materials that are difficult to get or have significant lead times.
Safety	Safety should be paramount on any project. Injuries always impact construction operations at some level and should be avoided at all cost. OSHA inspections will also have an impact on the project workflow and schedule.

continues

Risk identification – Political/legal/regulatory risks

Political/Legal/Regulatory Risks	Description
Changes in the law	Changes in local, state, and federal laws can affect construction (such as minimum wage law or documentation of employees).
Changes in sales tax or other tax structures	Unanticipated increases in sales or use taxes will impact material costs.
Protester actions, disputes	Any project that might be related to a public concern can get tangled up in a political web. Projects such as prisons, sewage plants, industrial facilities, and even schools can be targets for protest.
Community or adjoining business impacts	Dust, noise, mud, visibility, lights, working hours, and access issues can impact neighbors, the community, or adjoining businesses. For example, if the rerouting of traffic for your project impedes easy access to the parking lot of an adjacent business, you may be opening yourself up for a lawsuit.
Harassment issues	Breaches by employees or subcontractors can affect company harassment or professional conduct policies.

Risk identification – Financing risks

Financing Risks	Description
Economic climate	Economic downturns add the risk of bankruptcy, bid shopping by clients, and other negative impacts to a project. On the other hand, economic booms cause price escalation.
Contractor cash flow	Limited lines of credit or the unavailability of credit can cause delays in material buyouts, subcontractor payments, and workflow.
Interest rate increases	If lines of credit are utilized by the contractor or the client to fund projects, then any increase in interest rates would have an adverse effect on the project.
Insufficient client funds	If a client is unable to make timely payments to the contractor, it will shut down the job.
Subcontractor/supplier bankruptcy	Both large and small subcontractors can get into financial trouble. When this happens, every project the sub has a contract on will also be impacted. If bankruptcy should occur, the general contractor will have to hire another subcontractor to take over the job, causing major delays, cost overruns, and headaches for the project.

Risk identification – Financing risks

Environmental Risks	Description
Environmental permits and approvals	Environmental permit approvals are delayed or require more time to negotiate than expected.
Hazardous materials or site contamination	Unknown site contaminates or hazardous materials are discovered after the work has commenced.
Archeological findings/ unknown burial sites	Unknown artifacts are discovered or an unknown burial site or cemetery is unearthed, requiring the work to stop.
Endangered species	The project has known or unknown endangered species sightings that will require protection and special care during construction.
Wetlands, coastal protection, or flood plain issues	Wetlands, coastlines, and flood plains all require special protection and can impact overall construction approach.

Risk assessment

- ☐ Assess the possibility of happening and potential impacts with regards to usually
 1. Cost
 2. Time
 3. Quality
 4. Safety

- ☐ Usually done **qualitatively**, however some larger contractors use **risk analysis methods**.

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Risk assessment

Project Risk Register

Project: NanoEngineering Building

Date: January 7, 2015

Risk Statement		Risk Analysis		Risk Response Strategy	
Description of Risk	Construction Phase in which Risk may occur	Risk Probability	Risk Impact	Risk Response	Trigger
Public safety during initial site utility construction	Initial site construction	High	Reduced productivity and potential public injuries	Install all site utilities including street and sidewalk trenching at night	Sitework subcontractor starting work
Erection of tower crane	Start of structure construction	High	Traffic impact of movement of crane components and erection with hydraulic crane	Install the tower crane on Saturday for minimum traffic interference with crane erection	Completion of site and foundation work
Traffic control during equipment and material deliveries	Throughout the project	High	Local pedestrian and vehicle traffic interfering with equipment and material deliveries	Hire retired Seattle police officer to control pedestrian and vehicle traffic enabling timely delivery of equipment and materials	Occupation of the project site
Cold weather concrete placement	Winter construction of concrete structure	High	Delayed placement of concrete components or cold temperatures during curing	Provide heaters and thermal blankets to protect concrete if cold temperatures occur	Cold temperatures during concrete placement
Late delivery of critical materials	Any phase requiring contractor purchased materials	Moderate	Delay in construction	Identify long-lead materials and place purchase orders early	Supplier notification of time required for delivery

Risk assessment

- ☐ Severity?
- ☐ **Monte Carlo simulations** are frequently used to find contingencies.
- ☐ *Risk exposure factor = Product of risk changes and impacts*

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Risk assessment – Pre-bid risks

(0 = low risk, 3 = high risk)	Factor Scores	Total Score	Bld/No Bld Assessment
Contract Risks	0-3	2/15	Risk Limitations
Changes in work	0		4 or more total points: increase profit margin, 6 or more total points: consider not bidding, 9 or more total points: do not bid
Force majeure	0		
Payment process	0		
Retainage requirements	1		
Warranty requirements	1		
Owner Risks	0-3	2/12	Risk Limitations
Reputation	1		4 or more total points: increase profit margin, 6 or more total points: consider not bidding, 9 or more total points: do not bid
Ability to fund project	0		
Payment history	0		
Company culture	1		

continues

(0 = low risk, 3 = high risk)	Factor Scores	Total Score	Bld/No Bld Assessment
Price Risks	0-3	4/21	Risk Limitations
Cost of self-performed work	0		6 or more total points: consider joint venture partner, 9 or more total points: consider not bidding, 15 or more total points: do not bid
Cost of subcontract labor	0		
Cost of overhead	0		
Cost of equipment	0		
Cost of materials	0		
High price materials/equipment	2		
Total project cost	2		
Time Risks	0-3	2/12	Risk Limitations
Overall contract time	1		4 or more total points: consider joint venture partner, 6 or more total points: consider not bidding, 9 or more total points: do not bid
Subcontractor reliability	0		
Time of year	0		
Regulatory bureaucracy	1		

Risk assessment – Pre-bid risks

(0 = low risk, 3 = high risk)	Factor Scores	Total Score	Bld/No Bld Assessment
Work/Labor Risks	0-3	2/21	Risk Limitations
Familiar work processes	0		6 or more total points: increase profit margin, 9 or more total points: consider not bidding, 12 or more total points: do not bid
State-of-the-art components	2		
Major demolition or site work	0		
Insufficient ground investigation	0		
Self-performed/sub work ratio	0		
Aggressive unions	0		
Adequate labor pool	0		
Location Risks	0-3	1/12	Risk Limitations
Proximity to office	0		6 or more total points: consider not bidding, 9 or more points: do not bid
Familiar with area	0		
Difficult/remote access	0		
Site congestion	1		

(0 = low risk, 3 = high risk)	Factor Scores	Total Score	Bld/No Bld Assessment
Estimate Prep Risks	0-3	0/18	Risk Limitations
Adequacy of pricing data	0		6 or more total points: consider not bidding, 9 or more points: do not bid
Familiarity of subcontractors	0		
Unable to visit the site	0		
Confusing/contradictory docs	0		
Excessive prep cost	0		
Insufficient time, personnel	0		

If the constructor decides not to pursue the contract, then all the additional risks associated with the project are a moot point. However, if after proper analysis and assessment the decision is to go forward with the bid, then there are several other types of risks to consider.

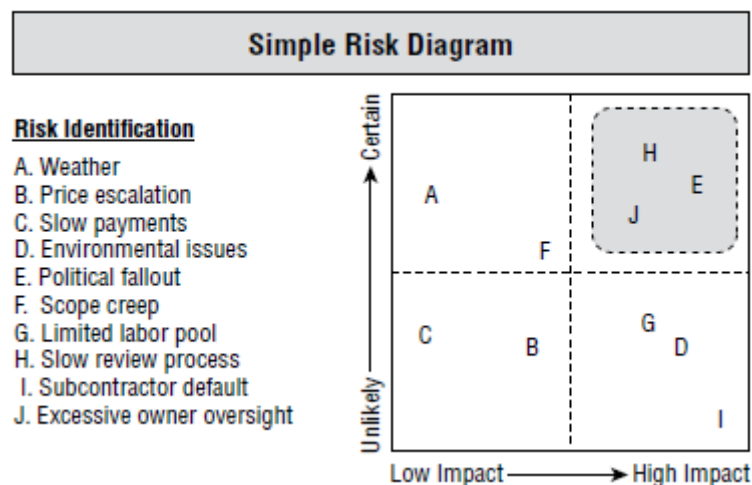
Risk assessment – Pre-bid risks

Quantifying Risks

<u>Identified Risk</u>	<u>Probability</u>	<u>Impact</u>	<u>Rating</u>
Confusing, contradictory, or incomplete plans and specs	2	1	2
Differing subsurface conditions	2	2	4
Adverse weather	1	1	1
Community protests	2	3	6
Once risks are rated, it can be determined which ones to focus on and how best to mitigate them.			

Risk control and mitigation

- ❑ The **results of risk assessment** allow the construction team to recommend the **most appropriate method** for risk control and mitigation.
- ❑ **Mitigation strategies** can be categorized into **four groups**:
 1. Risk avoidance
 2. Risk retention
 3. Loss control
 4. Transferring/sharing risks



Difference with what has been said in PMBOK?

Risk control and mitigation – Risk avoidance

- ☐ When a **risk event** is considered probable and of high impact.
- ☐ Contractors may **avoid it** by changing the construction plan
- ☐ **Commonly selected** when the risk assessment returns high severity.
 - ❖ *For instance, a contractor may decide to **not bid on a large project** if they find out that the project owner lacks appropriate management of the financial cash flow, which would create financial stress on all project participants.*

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Risk control and mitigation – Risk retention

❑ Two types:

1. Active retention

- ❖ Occurs when a **contractor** evaluates a specific risk event and consciously decides to take it **without mitigating it**.
- ❖ **Price** and **schedule** can be **adjusted accordingly**

2. Passive retention

- ❖ **Contractor** is **retaining a risk** because they do not know about it, so they cannot do anything to select any of the other mitigation approaches.
- ❖ This is the **most damaging outcome** from unknown risks.

Risk control and mitigation – Loss control

❑ Two types:

1. Loss prevention

❖ Reducing the **chance** of a risk event occurring.

✓ *Hand tools are missing and probably stolen. Solution?*

2. Loss reduction

❖ Reducing the **severity** of the risk occurrence

✓ *Raises some of the minimum requirements for safety to reduce the number of events that result in deaths, injuries, or lost time from work.*

Risk control and mitigation – Transferring/sharing risks

- ❑ This is one of the **most common methods** for mitigating construction risks and **mostly relies** on shifting risks from one party to another through **legal documents**.
- ❑ **Several approaches** exist for transferring risks to other companies or sharing them.

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Risk control and mitigation – Plan

Risk Analysis Probability × Impact = Risk Rating

	Type of Risks	Probability	Impact	Risk Rating	Potential Consequences	Mitigation Strategy
Design Risks						
1	Incomplete drawings and specifications	2	2	4	Delays, rework, increased costs	Thoroughly check drawings for errors or omissions.
2	Owner-directed changes	3	2	6	Delays, rework, increased costs	Develop a clear understanding of owner's objectives.
3	Incomplete or incorrect soil/geotechnical data	1	1	1	Delays, rework, increased costs	Hire a pre-qualified expert consultant.
4	Non-compliance to standards and codes	1	2	2	Delays, redesign, increased costs, re-work	Integrate code reviews into the design process.
5	Design defects affecting constructability	1	1	1	Delays, rework, increased costs	Integrate construction knowledge into the design process.

continues

Dr

Risk control and mitigation – Plan

Risk Analysis Probability x Impact = Risk Rating (continued)

	Type of Risks	Probability	Impact	Risk Rating	Potential Consequences	Mitigation Strategy
Construction Risks						
6	Availability of materials	3	2	6	Delays, increased costs, material changes	Proper material management with emphasis on long lead items.
7	Safety	2	2	4	Worker injury, litigation, project delay	Injury Illness Prevention Plan (IIPP), consult OSHA.
8	Weather	3	2	6	Delays, material damage, increased costs	Follow accurate weather reports, include weather days in schedule.
9	Earthwork issues	2	2	4	Need for special equipment, delays, increased costs	Proper site research, add contingency (%).
10	Re-work, defective work	2	1	2	Delays, re-work, increased costs	Hire qualified subcontractors, maintain documentation.
11	Supplier delays	1	2	2	Delays, increased costs	Collaborate with suppliers/ manufacturers during design process.
12	Workforce availability	1	2	2	Increased labor costs, possible decrease in construction quality	Implement effective QA/QC personnel that remain independent of the construction operations of the company.
13	Constructability issues	2	1	2	Decrease in construction quality, possible construction rework	Integrate construction knowledge into the design process, implement effective QA/QC personnel.

ذکر مطالب فوق تنها در صورت ذکر منبع بلامانع است.

Risk control and mitigation – Plan

Risk Analysis Probability x Impact = Risk Rating (continued)

	Type of Risks	Probability	Impact	Risk Rating	Potential Consequences	Mitigation Strategy
14	Trade quality	2	2	4	Potential construction rework, decreased owner satisfaction	Implement effective QA/QC personnel that remain independent of the construction operations of the company.
Financial Risks						
15	Material price escalation	1	1	1	Increased costs, material changes	Lock in prices as soon as the job is secured.
16	Gas prices	2	1	2	Increased costs	Purchase local materials to reduce shipping, use energy-efficient vehicles.
17	Lack of owner funding	1	1	1	Project shutdown, delays, litigation	Thoroughly research source of funds and verify stability before job start.
18	Damage to property or theft	1	2	2	Increased costs, decreased profits, delays	Fence the job site, lock all equipment, hire security.
Political/Legal/Regulatory Risks						
19	LEED-NC 2.2 Rating System Change over to LEED-NC 3.0	3	3	9	LEED Certification delay, certification fee increase	Train personnel in office and in field on LEED 3.0.
20	Community protests	1	1	1	Delays, increased costs, negative publicity	Organize community information sessions and install a hot line for questions.
Environmental Risks						
21	Unforeseen site/facility contamination	1	2	2	Delays, fines, increased costs	Remain familiar with local environmental abatement contractors.

Risk control and mitigation – Plan

Risk Analysis Probability x Impact = Risk Rating (continued)

	Type of Risks	Probability	Impact	Risk Rating	Potential Consequences	Mitigation Strategy
22	Wetlands	3	3	9	Delays, fines, increased costs	Investigate site conditions before work begins, consider wetlands banking option.
23	Endangered species	2	2	4	Delays, increased costs, project stop order	Check on seasonal sightings and investigate regulation requirements before work begins.

Risk monitoring

- ❑ Once a **set of mitigation strategies** has been selected and implemented on a project, it is the role of the construction manager and superintendent to **continue monitoring** how they are working, as well as the occurrence of **unknown risks**.

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TRANSFERRING OR SHARING RISKS

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

دفتر آموزش



تهران، بلوار فردوس شرق، مجتمع آبگینه، طبقه سوم اداری، واحد C42



+۹۸ ۲۱ ۴۶ ۱۰۰ ۴۴۵



+۹۸ ۲۱ ۴۶ ۱۰۰ ۴۵۰



info@dralavipour.com



www.dralavipour.com



@alavipour_pm



@acemi_social



@alavipour_pm



@IRANACEMI

