Risk Management in Design Build An Owner's Perspective





BUILDING A BETTER WORLD

Introduction & Overview

- Introduction by Philip Croessmann, V.P., Director of Risk Management
- Sources of Construction Claims
- Common Types of Construction Claims
- Risk Management Preconstruction & Construction
- Managing Construction Claims Process and Examples
- Questions & Comments



Source of Construction Claims –

Delays

Percentage of Infrastructure Projects that did not Complete on Time



■ 1% - 20% ■ 21% - 50% ■ More than 50% ■ None

one

Source of Construction Claims –

Over Budget

Percentage of Infrastructure Projects Completed Over Budget





Construction Claims on Infrastructure Projects

Percentage of Infrastructure Projects with Disputes





Top Risks for Public Projects

Technical/Design/Engineering Issues

Changes in Schedule

Changes in Costs

Contractual Risk

Political Environment

McGraw-Hill Construction, 2011



Common Types of Claims

Schedule	Critical Path DelayAcceleration
Productivity	Labor & Equipment InefficienciesCumulative Impact of Changes
Differing Site Conditions	Unknown or concealed Subsurface ConditionsChanged Conditions
Design Errors & Omissions	Deficient Design and/or SpecificationsConstructability



Average Size of Claims for Infrastructure Projects

Average Size of Claim



McGraw-Hill Construction, 2011



Risk Management

• Risk Management – Pre-Construction

Claims and Issue Resolution – During Construction

Dispute Resolution – Post Construction



Pre-Construction



Risk Management – Pre-construction

Project Delivery Methods - Traditional Design-Bid-Build -CM@Risk - Design/Build & Progressive Design Build -Integrated Project Delivery



Risk Management

Pre-Construction

Design-Build

- Single Point of Responsibility for Design and Construction
- Costly and Difficult Procurement
- Will I get what I want Prescriptive vs Performance
- Fast Track
- Eliminates Change Orders
- Loss of Control
- Greater Contingencies



Risk Management – Preconstruction

Contract Provisions

- Clear Notice Requirements
- Duty to Mitigate
- Robust Scheduling Requirements
- Definitive Change Order Process
- Coordination with Others Outside Agencies
- **Dispute Resolution Process**



Risk Management – Preconstruction

Bid Review and Contract Award

- Detailed Review of Bid Documents
- Analysis of Contractor's Baseline Schedule
- Contractor Interviews & Qualifications
- Understand Contractor's Assessment of Risk



The Risk Management Workshop



<u>Step 1 – Identifying Project Risks</u>

- Discovery and brainstorming by cross-functional teams (PM, Project Controls, Risk Mgmt, Estimating, Procurement, Designer (Design-Build or MWHA)),
- Performed in the initial stage of the project, prior to the budgeting and planning process
- Risks should involve uncertainty, the possibility of loss, and a time element



Step 2 – Analyzing Risks

Standard Risk Model





Step 2 – Analyzing Risks







Step 3 – Prioritizing and Mapping Risks

100% Risk 1 90% Risk 7 80% Risk 2 70% Risk Likelihood - % 60% Risk 10 **High Priority** 50% Risk 5 Risk Threshold 40% 30% Low Priority 20% Risk 3 10% Risk 6 Risk Risk 9 0% \$-\$500,000 \$1,000,000 \$1,500,000 \$2,000,000 \$2,500,000 Total Loss - \$

Example Risk Map Showing Threshold – Expected Loss Model



Step 4 – Planning Resolution of Targeted Risks

- Develop risk plans to address the drivers of risk (addressing the cause and not the symptoms)
- Action Planning How will the risk be managed?
 - Avoid the risk by reversing the decisions that were made that caused the risk to arise
 - Transfer risk to another entity
 - Provide redundant paths to increase likelihood of success
 - Mitigate risk by developing prevention and contingency plans (schedule, cost, quality)
- Same cross-function teams used to develop action plans
- Assign a "Risk Owner" to individuals who can influence and report on the plan



<u>Step 5 – Monitoring Project Risk</u>

- Develop a consistent method and time for reporting on risks (see Project Risk Register)
- Identify and develop new risks and resolution plans
- Update the risk log and risk map based on changing conditions and expiration or realization of risks
- Document successes and failures of the risk management process for future planning



Preconstruction Risk Log

Project F	Risk and	litigation Plans 🛛 Low 🌒 🛛 Medium 🌖 🛛 High 🔴
Ris	sk	Mitigation
Materia Increa Probability	Il Cost ases Impact	 Commodity Monitoring. MWH Constructors monitors 12 commodity price forecasts to stay ahead of any escalation trends. Competitively bid concrete. We have identified 3 local ready mix suppliers. Price guarantees. Lock in project rates for concrete and steel early in preconstruction if escalation becomes a concern.
Material A	vailability Impact	 Global, national, and local economic forecasts do not currently indicate conditions that would lead to material shortages Establish purchase agreements with multiple suppliers Purchase majority of rebar and yard piping as part of an early GMP

- Developed During the Preconstruction Phase
- Used to Identify Risks & Mitigation Techniques
- Updated Throughout the Lifecycle of the Project
- Should be a Collaborative Effort with Owner and Contractor



Construction



Communication

- Clear Lines of Communication
- Transparent Decision Making Process
- Accurate Reporting
- **Timely Reporting**
- Resolution of Issues at the Lowest Level Possible



Documentation

- Understand and Follow the Contract Requirements
- Review Information for Accuracy
 - Project Schedule Updates
 - Contractor and Subcontractor Daily Reports
 - Notices
 - Change Requests



Change Management

- Understand and Follow the Contract Requirements
- Timely and Fair Resolution of Changes
- Settle Changes at the Lowest Level Possible
- Disputes are Referred to the Dispute Resolution Process



Early and Decisive Intervention

- Have a defined process for identifying "at risk" contractors.
- Follow an escalation process for forcing compliance with contractual obligations.
- Understand and use the tools to intervene and put the project back on track.
- Maintain the working relationship at the project level.



Managing Construction Claims

Process & Examples



Claims Management Services





- \$165 Million Water Treatment Plant Upgrade
- MWH served as the CM-at-Risk
- Major Subcontractor submits a multi-million dollar claim against the Owner for alleged delays and disruptions
- Low Bidder and No Prequalifications
- 4 weeks to perform analysis and present findings to the Owner



Method of Review and Analysis Of XYZ Contractor Claims

- Analyzed each claim and the relevant Project specifications, Subcontract Agreement, Prime Contract Agreement, and Project documentation
- Reviewed and analyzed claimed costs and associated backup provided by XYZ
- Schedule Analysis
 - MWHC performed an analysis of each claim
 - Hired an independent scheduling consultant



Claim CSF 004 – Pad and Anchor Bolt Rework

Claim S	ummary		10% Markup on LD's
Description	Amount	Notes	and MWHC OH
"Alleged Liquidated Damages" "Alleged Extended Overhead" 10% Overhead on LDs. MWH OH	<pre>\$ 140,000.00 \$ 77,000.00 \$ 21,700.00</pre>	28 days at \$5,00 0 /day 28 days at \$2,750/day	Backcharge
Subtotal Overtime Premium Paid 10% Modifier for OT Inefficiency 10% Profit on Labor	\$ 238,700.00 \$ 6,428.80 \$ 642.88 \$ 707.17	280 Mhrs @ 22.96/hr	No Cost Backup or Analysis Provided for Claimed Labor Costs
Subtotal XYZ's Extended Overhead 10% Profit on Extended OH	\$ 7,778.85 \$ 15,139.83 \$ 1,513.98	28 days @ \$540.71/day	No Cost Backup or
Subtotal 2% Bond Premium on Entire Amount Total	\$ 16,653.81 \$ 5,262.65 \$ 268.395.31		Analysis Provided for Extended Overhead



Claim CSF 004 – Pad and Anchor Bolt Rework Schedule Analysis

January 1, 2011 Update

Ac	tivity ID	Activity Name	Original	Start _	Finish	Total							20)11		
			Duration	, in the second s		Float	с	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
-	Methanol Stor	age Facility	0	14-Mar-11	14-Mar-11	13			1	▼ 14	-Mar-11	Methan	ol Stora	ge Facilit	y	
	CSF15014	Chemical Storage Facility Mechanica	0		14-Mar-11	13	1		1	♦ Ch	emical S	torage I	acility M	lechanic	al Comp	le
=	No P-AREA		0	31-Mar-11	31-Mar-11	0			1 1 1	•	🕈 31-Ma	r-11, No	P-AREA	4		
	MC-WP1	WP1 - MECHANICAL COMPLETION	0		31-Mar-11*	0			1	•	WP1	- MECH	ANICAL	COMPLE	TION	ł

CSF15014 = 13 workdays of float



Claim CSF 004 – Pad and Anchor Bolt Rework Schedule Analysis

January 29, 2011 Update

Ac	tivity ID	Activity Name	Original	Start _	Finish	Total						20	011		
			Duration	Ň		Float	IN	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
-	Methanol Stor	rage Facility	0	06-Apr-11	06-Apr-11	-4		1	1	▼ 06-4	Apr-11, N	lethanol	Storage	Facility	
	CSF15014	Chemical Storage Facility Mechanica	0		06-Apr-11	-4		1	1	Cher	mical Sto	rage Fa	cility Med	chanical	Complete
•	No P-AREA		0	11-May-11	11-May-11	-29		1	1 1 1	1	▼ 11-	May-11	No P-AF	REA	
	MC-WP1	WP1 - MECHANICAL COMPLETION	0		11-May-11*	-29		-	1	1	♦ WP	1 - ME	CHANIC	AL COM	PLETION

CSF15014 = 25 workdays of float



Cumulative Revenue – Planned vs. Actual Work Package #1 Only (S-11, S-14, S-17)





Cumulative Manpower



Acceleration Costs Paid by the City

ECEIVE

No

Subcontractor/Purchase

nent Channe Orde

51254

\$

Description

All costs associated with schedule acceleration to make up (9) days that were lost at the DBF structure as a result of the prolonged installation of the mini-piles.

DATE

6-1-10

OD WWH

a contractor of

herein comprises the total compensation due to the SUBCONTRACTOR, and all of its low-field subcontractors and supp or change defined herein, including, but not limited to, any impact on unchanged work. SUBCONTRACTOR further acknow agrees on behalf of theil, and its low-firster of subcontractors and suppliers. Nat the stipulated compensation includes paym	id cost) set forth liers, for the wor ledges and ent for all work
comparison of the second secon	ot, ripple effect, e Il mutual accord he
itself, and all of its lower-tiered subcontractors and supplians, agrees to waive all injust, without exception or reservation of a whatsoever, to file any further claim related to this SCO. No further claim or request for equitable adjustment of any type for foreseeable cause shall arise out of or as making this SCO. When there is a first or equivalent of the amointer of the schedule of any type for the schedule out of the schedule of the schedule of the schedule of the schedule of the amointer of the schedule of the	c, on behair or ny kind any reasonably
and a set of the work under	the Centract.
The original Contract Value was	5,454,250.00
The Contract Value prior to this Subcontract Change Order was	4,464.00
The Contract Value will be changed by this Subcontract Change Order in the amount of	51,818,22
The new Contract Value including this Subcontract Change Order will be	5,501,604.22
The contract ouration will be changed by	0 Day
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Wharton-Smith, for	
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withelym R. Nowatry By Multiplese My	n



51,818.22



Cumulative Manpower





October 15, 2010 Notice to Cure

CONSTRUCTORS	CONSTRUCTORS EVILANCE A NETTER WORLD
October 15, 2010	Your projected combined September billing for Subcontracts S-7012395-014 and S-7012395- 017 was to be in the amount of \$1,155,400. Your actual September billing for these two subcontracts is in the amount of \$833,324,a 29%, shortfall, and your monthly placement of work continues to lag behind the rate of work placement needed to achieve a timely completion.
Cure: Subcontracts S-7012395-014, S-7012395-017, and	To date, Mark One has only increased its crew by four craftsmen, which we cannot believe is going to make a significant difference in your rate of progress on the S-7012395-021/22 Subcontract.

In assessing the status of your work progress in the latest updated schedule, it is apparent that, after nine months, the status of has not yet been able to demonstrate your ability to adequately manage, supervise, and provide the necessary properly skilled workman in which to prosecute your work to achieve the Project's critical substantial completion dates.

We, therefore, will be monitoring your progress on a weekly basis, and if your performance does not significantly show improvement, we are prepared to withhold, from a second is future monthly progress payments, amounts equal to accrued potential liquidated damages until such time that your progress demonstrates that you will timely achieve substantial completion of your work.

> No additional time or work activities were considered or added to your schedule to accommodate your extensive concrete repairs and patching that will be required.

XYZ response to Notice to Cure

Wharton Smith is currently working on all structures in WP 2A with the exception of VAC/Truck area. It is our intention to mobilize into this area next week. Below clease find comments concerning each of the

remaining areas

FOG

As acknowledged in your correspondence with a subcontracted out the remainder of the structures in WP 2A to Mark One. In response to this award Mark One added 4 men to the crew on site with 4 more men starting on 10-19-10. This build up will continue as needed to staff they project. As a part of the subcontracting with the subcontracting received schedules for each area of WP 2A to ensure the work is completed per the latest CPM update. In addition to Mark One with One work one work and also added 3 more men to our staff.

Dewatering Building

premium time.

In an effort to overcome the delay associated with the concrete material problems at the 1st level columns worked overtime to complete removal and re pour the columns. Further the 2nd level deck was broken into 2 pours to allow placement and allow work to proceed. The 2nd half of the deck at El 82 is scheduled to pour this week which will keep the area on schedule. In order to achieve this authorized to work overtime. As discussed will absorb the costs for this



Cumulative Manpower



January 3, 2011 – Notice of Continued Delays

	3. Activity PST 03020 " Primary Sludge Thickener Wall Pours #3 & #4;"
January 3, 2010	This Activity had zero float and was scheduled to be completed by 12/30/10. Your present

As we have repeatedly notified you in the past, your continued untimely performance is going to delay work access of follow-on critical trades and subcontractors. Since we now only have three months left to achieve mechanical completion of most of this work, we are again directing you to take the necessary corrective actions to achieve recovery of the lost time.

Should **Should** fail to recover the necessary time to permit follow-on trades and Subcontractors to access their work areas on the dates indicated in the December Project Schedule Update, **MWHC** will direct such trades and Subcontractors to work accelerated work hours in order to mitigate potential Owner assessed delay damages.

All costs for acceleration and any resultant Owner delay damages will be for account and will be deducted from your respective Subcontract amounts.

Activity GBT 03365 " Pour Gravity Belt Facility Col A Beams;"

This Activity had one day float and was scheduled to be completed by 12/23/10. Your present three week look-ahead forecasts completion this coming Friday, 01/07/11, fourteen calendar days late.







February 17, 2011 – Schedule Review Meeting





Cumulative Manpower





Work Package #1 Claims

Overview of Work Package #1





Bid Results Summary

	Work Package 1 (Liquids)					Work Package 2A (Solids)							
	S-14	4 Bid Amount	S-1	7 Bid Amount	S- 2	21 Bid Amount	S-	22 Bid Amount					
	\$	5,072,000	\$	3,247,000	\$	3,777,000.00	\$	657,000.00					
Next Lowest Bidder	\$	6,090,000	\$	4,050,000	\$	4,250,000.00	\$	1,107,524.00					
Difference	\$	(1,018,000)	\$	(803,000)	\$	(473,000)	\$	(450,524)					

Total Difference in Bids (XYZ versus next lowest)

\$2,744,524







- \$240 Million Water Treatment Plant Upgrade
- MWH serving as the CM-at-Risk
- Unforeseen Condition Delays Construction of a Facility
- Major subcontractor submits a claim for delay and cost escalation totaling \$363,512



Method of Review and Analysis Of Subcontractor's Claims

- Analyzed the relevant project specifications
- Requested additional documentation and backup for claims
- Performed a schedule analysis to determine actual delay
- Analyzed the claimed costs versus actual



Schedule Analysis

 2010
 2011
 2012

 Sep-09
 Oct-09
 Nov-09
 Dec-09
 Jan-10
 Feb-10
 Mar-10
 Apr-10
 Jun-10
 Jul-10
 Sep-10
 Oct-10
 Nov-10
 Dec-10
 Jan-11
 Feb-11
 Mar-11
 Apr-11



Labor and Cost Analysis

- Subcontractor claimed an additional 846 crane operator hours for Facility 36 due to inefficiencies caused by the delay
- Total actual crane operator hours for Facility 36 = 367
- Subcontractor claimed an additional 5 months of extended crane equipment costs for Facility 36
- Total actual crane time for Facility #36 was approximately 2 months

Where We Are Today

- Meetings held between Subcontractor and MWH to discuss claim items and lack of merit
- Report and recommendation prepared for Client
- Subcontractor has submitted a revised claim, 50% lower than original
- Anticipated settlement of approximately \$50,000. savings of \$300,000
- Contractor chose to withdraw claim



Α

Risk Management

Design-Build

- The integration of the supply chain into the design process
- Elimination of Paper work
- Integration vs Specialization
- BIM



Impact of BIM on Project Risk

71% of Respondents believe that BIM Reduces Risk on Construction Projects



McGraw-Hill Construction, 2011

Decrease Risk No Impact Increase Risk



Impact of Integrated Teams

77% of Respondents Believe that Integrated Teams Reduce Risk on Construction Projects



McGraw-Hill Construction, 2011

Decrease Risk No Impact Increase Risk



Minworth Alliance

Project Overview

- Project Cost \$202 Million
- 3-year capital expansion project
- Replacement, refurbishment, and improvements of existing facility
- Co-Location of Client, Design-Builder and Major Vendors – over 100 staff
- \$24 Million in savings





Commercial Arrangements reflect the Business Plan

- We will deliver outputs with Programme Control Targets
- We will only build what is necessary
- We will eliminate waste from our contract and non-contract costs
- We will have the right incentives to deliver value
- We will forecast outputs and cash accurately

- We appreciate the needs of our suppliers
- We will pay on time
- We will be collaborative
- We will use transparent risk management
- We will encourage Tier 2 relationships to reflect our values
- We will de-risk when appropriate

Key Performance Indicators

KPI	Indicator	Information
KPI 1	Health & Safety	Lost Time Incidents
KPI 2	Environment	Pollution Incidents
KPI 3	Customer Satisfaction	Written Customer Complaints
KPI 4	Client Satisfaction	Average KPM Score
KPI 5	Time	Milestone Dates set at Gate 2
KPI 6	Quality	Compliance with QA Systems
KPI 7	Cost	Accuracy of Forecast
KPI 8	Supply Chain	Creditor Days
KPI 9	Innovation	Gate 5 Cost v Gate 2 Budget
KPI 10	People	Staff Turnover Rate



Questions

