CANONBIE
An Aecon Company

PROJECT & ALIGNMENT DELIVERY

Working Group - Risk Management

Final Report

OBJECTIVE:

Establish and implement effective collaborative risk management process for oil/energy industry

SCOPE:

Alberta Energy Industry, Project over $50MM all contract types Risk Management Planning and Management

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PROJECT & ALIGNMENT DELIVERY

Section 1: Summary Report

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PROJECT & ALIGNMENT DELIVERY

Working Group Risk Management Summary Report

CANONBIE CONTRACTING LIMITED

SUITE 301, 1003 ELLWOOD ROAD SW

EDMONTON, AB, T6X 0B3

JUNE, 2017

Introduction

The Objective is to establish and implement an effective risk management process for Alberta Oil/Energy Industry.

Selected Project: Suncor Fort Hills Ore Preparation Plant Wet Side

Parties:

1. **Partnership:** Fort Hills Energy Limited Partnership by its operator, Suncor Energy Operating Inc. by its authorized agent, Suncor Energy Services Inc.
2. **Contractor:** Canonbie Contracting Limited

Contract Framework

Estimated Cost Reimbursable Amount Plus Fixed Fee and Fixed Overhead bases for the project until the last engineering Work Packages (EWP) for the contract was issued for construction (IFC), at which time the compensation structure of the work authorization was converted to Target Reimbursable cost

Project Leadership

Both senior leadership from the Partnership and Canonbie Contracting limited provided a vision to both teams and agreed to have an early engagement, transparency, trust and commitment to share and manage the risks in the project by all parties.

Governance

- The Shared Risk Register review is part of the Stewardship meetings
- Have a maturity assessment regularly to see how the program is improving
- Understand interfaces / integrated plan
- Integrate consequence/motivations for risk management
- Identify how data is collected (process)
- Define the frequency checks on each level of reporting/data updating at each level

Critical Success Factors

- Having a supporting culture
- Continuously thinking about risks; led by senior management and project CMT
- Frequent review of the risks
- Open communications between parties
- Collaboration, trust and commitment to project as partners

The Risk Management process stressed various phases of a risk management including: identification, assessment, managing and tracking the risks. Each phase is important to provide the best value of the process. The process started at the early stage and continued throughout the life span of the project.

People/Competency

Key Factors:

- Ability to collaborate, trust partnership mentality
- Requirement for senior field supervision to participate in risk reviews
- People that are in stewardship position must be influencers
- Decision-making capability of senior leadership
- Broad, forward, anticipatory (proactive) leadership
- Having the right people on the job

Risk Evaluation Process

1. Risk Identification:

The risk identification determined the nature and source of risks, and thus provided a list of the anticipated risks in the project. The basic sources used to identify the risks were historical data and experience.

The process of identifying the risks at the early stage and through the life of the project involved different levels from the executive management, project management, Construction management teams and high level field supervision.

The following factors were considered by the project team during the risk identification process:

- How to get to the right risks
- Identification process that works with some standard
- Granularity of risk arenas is assessed to be appropriate or not
- Apply the right resources in a timely fashion

2. Risk Assessment (measuring the Risk):

Using Historical Data was a good start to assess risks. The assessment went through two steps:

i. Qualifying the Risk:

In this step the probability and the severity of each risk was assigned to determine the risk score. The definitions of the severity and probability of the risks were identified in the Shared Risk Register. **Appendix 2**

ii. Quantifying the Risk:

In this step the potential impact to the cost and schedule was identified as applicable

3. Risk Mitigation:

In this phase a mitigation plan was determined to reduce part of the impact of the risk by reducing either likelihood and/or the consequences of the risk. The risk owner and a time line to mitigate the risk were also determined. The risk level was measured after mitigation at the Risk management phase; decisions were made to control the risks in the project scope, in terms of cost & schedule. Contingency plans were discussed as a means of managing risks, and a contingency budget was determined as well.

The following factors were considered by the project team during the risk mitigation process:

- Identify the most appropriate owner of risk
- Assign clear accountabilities
- Establish a timeline with look-a heads
- Identify opportunities (or facilitate that process)

4. Monitoring & tracking the risk:

On monthly bases, the status of the mitigation and controlling of the risks are reviewed. Tracking the risks in a formal way kept senior managers informed about performance against anticipated and identified risks and, as importantly any new risks that may be identified.

During the reviews the “no longer important” risks are getting closed while remain on the list for reference.

A Shared Risk Register was used to identify and track the risks. **Appendix 2**

Quantifying the benefit of using the risk management process

During the life of the project the identified risks were quantified, a Schedule impact, Cost impact or both were assigned to each risk where applicable; refer to **Appendix 2** - Shared Risk Register. At the completion of the project, the overall benefit of using the risk management process to be quantified. This quantification will be in the form of estimated amount of the project savings as a result of actively manage and mitigate the risks during the life of the project.

Lessons Learned

Lessons learned addressed both Positive and negative items, also any recommendations to improve the risk management process for the future projects.

- The pump box fabrication delay, and the building structural steel delivery delay:
  Both items were known months in advance and were on the critical path, therefore, the impact to the project could be significant. Collectively a mitigation plan was developed and executed successfully.

- The risk management process to be followed diligently through all the stages of the project, from start to finish.

- The risk management meetings eventually were not value added due to the lack of structure and forward looking focus on the critical path activities. That could negatively impact the outcome of the project

- Risks were not identified after the project changed from the bulk construction stage to the system turnover stage.

- Consider vendor engagement with the risk process

- Sustaining the momentum of the risk management is critical. Leadership and project teams to monitor during the project lifecycle, handovers, and when team changes occur.

Summary:

- The collaborative risk management process “pilot” was a success. Lessons learned should be incorporated and the process should be applied to future projects
- Identifying risks is both difficult and very important
- Information is obtained based on available information, historical data, and experience
- Risk measurement tool was identified and used to prioritized risks
- Careful analysis for the identified risk is necessary.
- The risk should be allocated to the party that is best able to control it.
- Contingency funds should be managed carefully and based on the items budgeted for

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Appendix 1 – OPP Shared Risk Register

Risk Register

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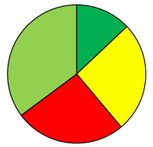
Aecon Division/SBU: Canonbie
Project Name: Fort Hills - OPP General Construction Contract
Job Number: 4600014610
Client: Suncor Energy

Date Prepared: 26-Jan-17
Revision: 5
Prepared by: Project Controls

Instructions: Refer Below

Before Mitigation		
Risks	Low	7
	Med	14
	High	14
	Closed	19
Opportunities	Low	0
	Med	0
	High	0



After Mitigation		
Risks	Low	8
	Med	18
	High	4
	Closed	25
Opportunities	Low	8
	Med	18
	High	0

		Identification					Qualify The Risk & Opportunity				Quantify The Risk & Opportunity					Risk Mitigation Values		R&O Responses and Controls Plan							Monitor and Control R&O	
	Item No.	Risk Category	Risk Subcategory	Description of Risk	Contingency Builder Risk	Location of Risk	Probability	Severity	Risk Score	Anticipated Risk Arrival Data	Potential Impacts	Estimated Schedule Impact (Calendar Days)	Contingency (cost impact * probability)	From	To	Risk Mitigation %	Risk Mitigation Values	Mitigation Plan/Control	Risk Response Classification	Risk Owner Lead	Action Required By	Probability After Mitigation	Severity After Mitigation	Risk Score After Mitigation	Status of Mitigation Plan/Control	Actual Schedule Impact (Calendar Days)
Bidding Stage	1	Bidding Risk	RFP	Risk of not having Engineering complete by the time of mobilization	yes	External	0	-1	0		8 missing ewps will not be included in the IFC target price	TBD - Potential growth in EHT	$ -	$ -	$ -	0%	$ -	Regular coordination meetings in a timely manner. Canonbie to attend design review meetings with Suncor. Changes to be dealt with Change Management within the contract	Mitigate	JP	31-Oct-14	0	0	0	Closed	
	2	Bidding Risk	RFP	Risk of estimating mis-interpreting discipline scope information provided Suncor	Yes	Internal	0	-2	0		Vague scope/information might lead to inaccurate pricing.	%5 Extension	$ -	$ -	$ -	0%	$ -	Raise RFI questionnaire as appropriate. Discipline review meetings to be held prior to submittal of IFC target price	Mitigate	RD	30-Sep-14	0	2	0	Closed	
	3	Bidding Risk	Procurement Risk	Risk of mismanaging the coordination / control between subs and packages in development stage	Yes	Internal	0	-4	0		May compromise quality of the work and/or lead to rework and increased costs / schedule delays	TBD	$ -	$ -	$ -	0%	$ -	Conduct coordination meetings between Subs in a timely manner.	Mitigate	SM/RS	15-Nov-14	0	2	0	Closed	
	4	Bidding Risk	Specs, drwgs and quantities	Risk of not being able to accurately verify Electrical Quantities from proposal	Yes	external	0	-3	0		Engineer cable lengths being less that actual cable lengths	11	$ 300,000.00	$ 200,000.00	$ 400,000.00	100%	$ 300,000.00	Construction review and contribute to the verification of the cable take off quantities	Mitigate	MM/JH	15-Sep-14	0	2	0	Closed	
	5	Bidding Risk		Actual scaffold requirements higher than planned	Yes	Internal	0	-4	0		Insufficient budget for manpower included in the IFC target price. Material are OK	N/A	$ 400,000.00	$ 300,000.00	$ 500,000.00	100%	$ 400,000.00	Validation of manpower requirements included in IFC target price estimate	Mitigate	DR/CS	01-Oct-14	0	2	0	Closed	
	6	Bidding Risk		Indirect support requirements exceed estimate	Yes	Internal	0	-4	0		Not having money in the budget to pay for required resources	N/A	$ 800,000.00	$ 100,000.00	$ 1,500,000.00	0%	$ -	Evaluate estimate and adjust IFC target price estimate to include for required indirects. I.e.. Snow removal. Review indirects/support staff during estimate review - Include additional fund in IFC Target	Mitigate	RD/RS	01-Oct-14	0	2	0	Closed	
	7	Bidding Risk	Escalation	Escalation is greater than what has been allowed for in IFC estimate	Yes	External	0	-2	0		Unforeseen price escalation over the project life may compromise the project margin	N/A	$ -	$ -	$ -	0%	$ -	Escalation included in budget 6.09% of total cost	Mitigate	VD/SM	On going	0	2	0	Closed	
	8	Bidding Risk	Qualify the proposal	Risk of converting contract from cost reimbursable to target price	yes	Internal	0	-4	0		Increased costs that are not client driven, Canonbie will absorb these costs. Accuracy of estimate will determine cost impact to this risk	YES	$ -	$ -	$ -	0%	$ -	Present a well studied and optimized estimate. Adjust estimate to address constructability review outcome	Mitigate	RD/RS	On going	0	2	0	Closed	
	9	Construction Risk	Time Limit	Risk of Aggressive Execution Schedule (IFC Schedule)	yes	Internal	4	-4	(16)		Schedule slippage. Risk not meeting substantial Completion date	90	$ 3,075,000.00	$ 2,000,000.00	$ 4,150,000.00	75%	$ 2,306,250.00	Close follow up for critical path activities. Immediate measures corrective measures in case of delays. Perform P70 Evaluation of level 4 schedule, optimize opportunities for pre assembly	Mitigate	JL	On going	4	4	16	Open	
	10	Construction Risk		Risk of Mobilizing too early	Yes	Internal/External	0	-5	0		Work fronts & client supplied material/equipment not available to start progressable work, burn hours and reduce productivity	14	$ 4,250,000.00	$ 3,500,000.00	$ 5,000,000.00	0%	$ -	Continuous communication with Suncor regarding other contractors progress and appropriate time to mobilize. Slower paced ramp up ensuring sufficient work front availability	Mitigate	RS/JL	19-Nov-14	0	4	0	Closed	
	11	Construction Risk		Turn over of SPP and Annex building foundations from other contractors - Delays	Yes	External	0	-5	0		dribble chute and reject pad foundation completion could impact crane placement. Delays in completing SPP and Pump Annex building. Delays in Annex building could affect pump box mitigation plans	TBD	$ -	$ -	$ -	0%	$ -	Continuous communication with Suncor regarding other contractors progress and appropriate time to mobilize. Slower paced ramp up ensuring sufficient work front availability	Mitigate	RS/JL	04-Nov-14	0	5	0	Closed	
	12	Construction Risk		Turn over of major foundations from other contractors - Quality	Yes	External	2	-5	(10)		Rework of steel or foundation anchor bolts to allow for steel / mechanical equipment installation	Yes - TBD	$ -	$ -	$ -	0%	$ -	Conduct a pre inspection before acceptance of equipment foundations. Potential costs to be dealt within change management process provide in the contract	Mitigate	KF	On Going	2	5	10	Closed	
	13	Construction Risk		Client supplied structural steel to support preassembly - delays	Yes	External	3	-5	(15)		Delay in preassembly and erection sequence resulting in schedule delays	Yes - TBD	$ 225,000.00	$ 150,000.00	$ 300,000.00	50%	$ 112,500.00	Coordination meetings with Suncor and sub contractors. Follow subcontract procedures for change management to capture costs associated with delays	Mitigate	FK/JL	On going	3	5	15	Closed	
	14	Construction Risk		Further delays of client supplied pump boxes	yes	external	0	-3	0		Delays to RWS installation and build steel erection	16 weeks	$ 650,000.00	$ 500,000.00	$ 800,000.00	50%	$ 325,000.00	Canonbie rep to be sent to pump box fabricator's shop to monitor fabrication and advise of any further delays	Mitigate	KF	on going	0	3	0	Closed	
	15	Construction Risk		Revising building construction sequence due to mitigate pump box delays and required site work	Yes	External	0	-5	0		FIWPs not being ready for Suncor approval and construction activities, steel delivery may not support revised sequence, schedule delays and increased cost	YES	$ -	$ -	$ -	0%	$ -	Revise schedule and planning activities, sequencing of work, continuous communication with Suncor and Suncor Vendors	Mitigate	JJ/FK/GD	On Going	0	4	0	Closed	
	16	Construction Risk		Insufficient laydown space to facilitate site panelization and other preassembly activities	yes	External	4	-4	(16)		increased costs (double handing and transportation), schedule delay, reduced productivity	YES	$ -	$ -	$ -	0%	$ -	Clear communication of laydown requirements to Suncor and when they will be required	Mitigate	JL/KM/FK	On Going	2	4	8	Closed	
	17	Construction Risk		Preassembly subcontractor schedule delays	No	Internal	2	-5	(10)		Delay in erection sequence resulting in schedule delays	YES - TBD	$ -	$ -	$ -	0%	$ -	Subcontractor selection. Coordination meetings with preassembly subcontractor. Station designated coordinator in preassembly yards.	Mitigate	FK/JL	On going	2	4	8	Closed	
	18	Construction Risk		Further delays in RWS Unit 3	No	External	2	-4	(8)		Delays in closing the building before winter weather - reduction in productivity	YES-TBD	$ -	$ -	$ -	0%	$ -	Constant communication with Suncor and the RWS vendor. Revise building erection sequence	Mitigate	FK/KF	On going	2	4	8	Closed	

Risk Register October 2012
Risk Categories are as per policy # 2.10 Appendix E - RM Best Practices Guideline No. 3 Attachment 3

Risk Register

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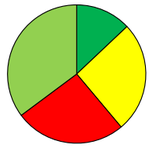

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Construction Risk	19	Construction Risk		Client supplied material to support preassembly (Panelization) - Coordination	Yes	External	5	-4	(20)		Material sent to incorrect location (site rather than assembly yard)	30	$ -	$ -	$ -	0%	$ -	Coordination meetings with Suncor and sub contractors. Properly identify destination of each piece mark. Follow subcontract procedures for change management to capture costs associated with delays	Mitigate	FK/JL	On going	4	3	12	Closed	
	20	Construction Risk		Client supplied material/modules/equipment/ piping - Quality	No	External	3	-5	(15)		Rework at site or in preassembly yard, impact on project work flow and productivity	90 days	$ 3,000,000.00	$ 2,000,000.00	$ 4,000,000.00	10%	$ 300,000.00	Costs to be capture within change management. Extensive quality checks at vendors shops by Suncor. Perform site checks upon receipt of equipment	Mitigate	FK/JL	On going	2	5	10	Open	
	21	Construction Risk		Client supplied material/modules/equipment/ piping - Delays	No	External	2	-5	(10)		Schedule delays, resequencing of work, lost productivity	180 Days	$ 3,000,000.00	$ 2,000,000.00	$ 4,000,000.00	75%	$ 2,250,000.00	Costs to be capture within change management. Open lines of communication with Suncor, submittal and sequencing of FIWPs, development of priority material list	Mitigate	BH/FA	On going	0	1	0	Open	
	22	Construction Risk		Inaccurate or poor quality drawings & shipping documentation for client supplied material leading inaccurate receipt of material	No	External	4	-5	(20)		Schedule delay, cost of replacing missing components,	21 days	$ 500,000.00	$ 400,000.00	$ 600,000.00	75%	$ 375,000.00	Follow material receiving procedure, sufficient discipline support, Bill of Material lists from shipper in advance to plan resources, sufficient quarantine area for receiving,	Mitigate	KM/AS/CF	On going	1	3	3	Open	
	23	Construction Risk		Delays to panel installation due to high winds	Yes	External	2	-2	(4)		Safety risk, lost productivity due to reallocation of manpower,	10 days	$ 200,000.00	$ 150,000.00	$ 250,000.00	90%	$ 180,000.00	Monitor extended forecasts for extreme weather delay work force shift start. Coordinate site works. Inclusion of downtime in IFC estimate labour rates	Mitigate	KF	On going	1	1	1	Open	
	24	Construction Risk	Time Limit	Not identifying all costs associated with a change i.e.. Subcontractor, equipment, material, scaffold, indirects, cranes etc.	Yes	Internal	2	-5	(10)		Risk of losing the entitlement for a change order or any extension of time and cost impact.	0	$ 3,000,000.00	$ 2,000,000.00	$ 4,000,000.00	20%	$ 600,000.00	Follow change management procedure in contract. Develop extra work order check list for indirect costs. No Work outside FIWP, clear understanding of indirect costs associated with EWOs	Mitigate	RS/FA	On going	1	5	5	Open	
	25	Construction Risk	Inclement Weather	Risk of extreme winter weather	Yes	External	3	-4	(12)		Productivity loss, safety risk,	10	$ 250,000.00	$ 150,000.00	$ 350,000.00	0%	$ -	Monitor extended forecasts for extreme weather delay work force shift start. Coordinate site works. Heating and hoarding.	Mitigate	JL/FK/KF	On going	3	4	12	Open	
	26	Construction Risk	Inclement Weather	Risk of lightning delays	yes	External	3	-3	(9)		May result in nonworking hours leads to time and cost impacts.	5						Follow Canonbie's lighting policy. Proper training program and supervisor communication.	Mitigate	JL/FK/KF/FA	On going	3	3	9	Open	
	27	Construction Risk	Procurement Risk	Transportation and access to the site (equipment)	Yes	External	0	-4	0			0	$ -	$ -	$ -	0%	$ -	Proper planning for material delivery and insure client access and laydown availability	Mitigate	KM/AS/HD	On going	0	0	0	Closed	
	28	Construction Risk	Labor	Risk of labor Productivity not meeting placement rates	Yes	Internal	3	-5	(15)		Not meeting KPIs, growth in labour costs and schedule	16 days	$ 1,250,000.00	$ 1,000,000.00	$ 1,500,000.00	94%	$ 1,175,000.00	Ensure accurate placement rates within IFC target estimate. Follow FIWP, Schedule and foreman manual. Monitor daily productivity targets.	Mitigate	JL/FK	On going	2	2	4	Open	
	29	Construction Risk	Labour	Risk of Alberta labour availability	Yes	External	4	-4	(16)		Broader geographical distribution of labour than originally planned	N/A	$ 125,000.00	$ 50,000.00	$ 200,000.00	75%	$ 93,750.00	Active recruiting in Alberta and western Canada, hold supervision accountable for their crew composition, communicate Alberta labour requirements, track and monitor Alberta labour levels. CCN issued to cover risk of larger geographical area	Mitigate	RS/JL/MD/PF	On going	3	3	9	Open	
	30	Construction Risk	Labour	Staff turnover over the project life	yes	External/Internal	5	-4	(20)		increase learning curve, additional training hours, loss of continuity,	N/A	$ -	$ -	$ -	0%	$ -	Building a culture, open door policy, career development opportunities Senior management commitment to maintain project CMT	Accept	RS/JL/FK/KF	On going	3	2	6	Open	
	31	Construction Risk	Labour	Craft turnover over the project life	Yes	External/Internal	2	-5	(10)		increase learning curve, additional training hours, loss of continuity, loss of productivity and inability to meet KPIs, not maintaining Canonbie safety culture with new hires	YES - TBD	$ -	$ -	$ -	0%	$ -	Building a safety culture, open door policy, career development opportunities, keep moral up, branding and accountability to processes and procedures, communication, consistency, potential retention program	Accept	RS/JL/FK/KF	On going	3	2	6	Open	
	32	Construction Risk		Camp room availability	Yes	External	4	-3	(12)		Camp rooms not available when additional manpower is needed - ramp up and change management acceleration Potential crew split between camps resulting in additional transportation and timing of shift start	YES - TBD	$ 75,000.00	$ 50,000.00	$ 100,000.00	95%	$ 71,250.00	Provide timely notification of room requirements. Develop accurate manpower forecasts, communicate changes as they occur. Ensure work force levelled by shift to ensure consistence room requirements	Mitigate	RS/FA/KA	On going	3	2	6	Open	
	33	Construction Risk		Camp and aviation back charges	Yes	external	3	-5	(15)		costs for missed flights and unused rooms	n/a	$ 75,000.00	$ 50,000.00	$ 100,000.00	0%	$ -	Develop clear policy for missed flights and include it in hire on packages Accurate notification 48hrs prior to individuals flights - if flights are missed. Train workers of requirements, post signs in lunch room trailer Communication of laid off, quit or terminated workers between hrs., pay roll and logistics to avoid booking flights and accommodations Supervisors communicate crew changes to logistics With hold costs from travel allowance as per PLA agreement	Transfer	RS/KA/MD	On going	3	5	15	Open	

Risk Register

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Aecon Division/SBU: Canonbie
Project Name: Fort Hills - OPP General Construction Contract
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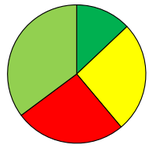

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34	Construction Risk		Subcontractor flight and accommodation requirements	yes	external	1	-4	(4)		costs for missed flights and unused rooms	N/A	$ -	$ -	$ -	0%	$ -	Requirements are included in subcontract agreement, back charges when applicable, subcontractor to provide accurate man power loading/requirement,	Transfer	RS/KA/SM	On going	1	4	4	Open	
35	Construction Risk		Not obtaining Canonbie safety culture buy in by employees		Internal	1	-5	(5)		Not meeting KPIs and not received Safety Bonus - LTI occurrence and WCB rates	3-4 Days	$ 400,000.00	$ 300,000.00	$ 500,000.00	90%	$ 360,000.00	Site Orientations, Green Hand, Effective safety meetings/tool box, leadership from supervision, accountability/proper disciplinary procedures, consistent implementation of safety rules	Mitigate	BH/JL/RS	On going	1	4	4	Open	
36	Construction Risk		Subcontractors not meeting Canonbie's safety culture		Internal	1	-4	(4)		Not meeting KPIs and not received Safety Bonus - LTI occurrence	See data base	$ 625,000.00	$ 500,000.00	$ 750,000.00	25%	$ 156,250.00	Weekly subcontractor meetings, review subcontractor safety plan, safety performance, attendance of safety meetings, clear communication of safety rules and requirements, EHS premobilization check list	Mitigate	RS/JL	On going	1	5	5	Open	
37	Construction Risk		Risk of not managing construction equipment costs (including ST & C)	Yes	Internal	3	-5	(15)		Equipment costs exceeding budget Lost revenue off of small tools and consumables	N/A	$ 1,500,000.00	$ 1,200,000.00	$ 1,800,000.00	40%	$ 600,000.00	Follow equipment management process/work instruction, capture EWO time on LEMs, efficient equipment utilization, manage equipment PM, follow FIWPs	Mitigate	KF/FK/AS	On going	2	5	10	Open	
38	Construction Risk		Delays in change order approval resulting in schedule delays	No	External	2	-5	(10)		Demobilization of man power, schedule impact, continuity of work	TBD	$ 425,000.00	$ 350,000.00	$ 500,000.00	25%	$ 106,250.00	Providing accurate CPs with appropriate back up, weekly change management meetings with Suncor, hold client accountable for review and approval	Mitigate	RS/FA/JB	On going	1	5	5	Open	
39	Construction Risk	Subcontractors	Risk of Subcontractor performance and quality	Yes	External	1	-4	(4)		Rework due to poor quality. Schedule slippage.	6Weeks	$ 212,500.00	$ 175,000.00	$ 250,000.00	95%	$ 201,875.00	Weekly subcontractor meetings, early review of turn over documents, audit of product of services, 3 week look ahead	Mitigate	RS/FA/JP	On going	3	3	9	Open	
40	Construction Risk	Execution Risks	Delivery sequence not supporting rotary wet screens installation sequence	YEs	External	0	-4	0		Schedule delay, lost productivity	YES-TBD	$ -	$ -	$ -	0%	$ -	Communication with Suncor and the Vendor to ensure delivery sequence supports installation activities. Vendor shop visit.	Mitigate	GK/KF/FK	19-Nov-14	0	0	0	Closed	
41	Construction Risk	Consultants / Designer	Risk of poor technical quality of engineering drawings impacting construction	Yes	External	0	-4	0		Time waiting for and accuracy of RFI responses resulting in delays, lost productivity and increase cost Multiple revisions of the same drawing being issued causing project delays and rework	1 week	$ 750,000.00	$ 500,000.00	$ 1,000,000.00	10%	$ 75,000.00	Thorough drawings review to identify issue, address engineering issues with RFI, review RFI log and follow up, identify RFIs that cause changes, establish working relationship with Suncor site engineering team / coordinator	Mitigate	JP/ML	On going	0	4	0	Closed	
42	Construction Risk	Consultants / Designer	Risk of subcontractor shop drawing submittal/approval delays	Yes	Internal / External	0	-3	0		Approval time may delay construction and result in costs impacts.	YES-TBD	$ -	$ -	$ -		$ -	clearly identify priority shop drawing review, maintain log of shop drawing transmittals and monitor their return,	Mitigate	JP/ML	On going	0	3	0	Closed	
43	Construction Risk	Subcontractors	Site interface with other contractors	Yes	External	4	-5	(20)		Schedule delay (FAM dribble chutes, cable tray building enclosure), lost productivity, resequencing work	20	$ 175,000.00	$ 150,000.00	$ 200,000.00	100%	$ 175,000.00	IAP meetings, coordination meetings with Suncor contractors, establish communication protocol, proactively identify interfaces, interface milestone in schedule,	Mitigate	JL/SS	On going	0	5	0	Open	
44	Construction Risk	Construction	Unclear fiber optic scope definition and delineation		External	0	-3	0		schedule and cost impacts due to unclear scope definition and interface between Suncor contractors	Yes	$ -	$ -	$ -		$ -	Continue to meeting with Suncor to develop a clear definition of Canonbie's scope related to fiber optic installation	Mitigate	JH	On going	0	1	0	Closed	
45	Construction Risk	Owner / Third Party participations	Risk of Owner Interference		External	0	-3	0		Interruption and confusion of work, loss of productivity, schedule delay	Yes - TBD	$ -	$ -	$ -		$ -	open communication with Suncor, follow the contract, following operation handbooks, communication between project sponsorship	Mitigate	RS/BB/CB	On going	0	3	0	Closed	
46	Construction Risk	Time Limits	Extra work not being fully integrated into the construction schedule - GCC and Misc. contract	NO	Internal / External	3	-4	(12)		Unaware of impacts that extra work will have on base scope	Yes - TBD	$ -	$ -	$ -		$ -	Integrating extra work in the schedule by establishing logic with existing activities and analyzing impacts	Mitigate	RS/FA	Ongoing	0	3	0	Closed	
47	Construction Risk	Construction	Material covered by snow in laydown	No	External	3	-4	(12)		Unable to find material, lost of productivity	Yes-TBD	$ -	$ -	$ -		$ -	Place signage with MRR numbers, establish grid systems in laydowns and record location of material	Mitigate	RS/FK/CF	On going	1	4	4	Open	
48	Construction Risk	Construction	Large number of deficiencies at the time of turn over / walk down	no	Internal	2	-2	(4)		Additional time required to return to work face and complete deficiencies; schedule impact, loss of productivity	Yes - TBD	$ 975,000.00	$ 750,000.00	$ 1,200,000.00	60%	$ 585,000.00	Establish progressive walk downs after FIWPs are 90% complete to identify deficiencies. Allocate 5% of hours within FIWPs to address deficiencies	Mitigate	JP/JL/JH/BH	On going	1	2	2	Open	
49	Construction Risk	Construction	Clearly identifying extra work that has the potential to result in a schedule extension	no	Internal	3	-3	(9)		missing scheduled end date, inefficiencies due to trade stacking and congestion	Yes - TBD	$ 2,500,000.00	$ 1,500,000.00	$ 3,500,000.00	90%	$ 2,250,000.00	Possible night shift, coordination between trades, scheduling what-if scenarios around potential changes,	Mitigate	RS/JL/FA	On going	1	3	3	Open	

Risk Register

CANONBIE
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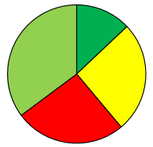
Aecon Division/SBU: Canonbie
Project Name: Fort Hills - OPP General Construction Contract
Job Number: 4600014610
Client: Suncor Energy

Date Prepared: 26-Jan-17
Revision: 5
Prepared by: Project Controls

Instructions: Refer Below

Before Mitigation		
Risks	Low	7
	Med	14
	High	14
	Closed	19
Opportunities	Low	0
	Med	0
	High	0



After Mitigation		
Risks	Low	8
	Med	18
	High	4
	Closed	25
Opportunities	Low	8
	Med	18
	High	0

		Identification					Qualify The Risk & Opportunity				Quantify The Risk & Opportunity					Risk Mitigation Values		R&O Responses and Controls Plan							Monitor and Control R&O	
	Item No.	Risk Category	Risk Subcategory	Description of Risk	Contingency Builder Risk	Location of Risk	Probability	Severity	Risk Score	Anticipated Risk Arrival Data	Potential Impacts	Estimated Schedule Impact (Calendar Days)	Contingency (cost impact * probability)	From	To	Risk Mitigation %	Risk Mitigation Values	Mitigation Plan/Control	Risk Response Classification	Risk Owner Lead	Action Required By	Probability After Mitigation	Severity After Mitigation	Risk Score After Mitigation	Status of Mitigation Plan/Control	Actual Schedule Impact (Calendar Days)
	50	Construction Risk	Construction	Large number of vendor deficiencies at the time of turn over / walk down	no	External	4	-5	(20)		Additional time required to return to work face and complete vendor deficiencies; schedule impact, loss of productivity	6 weeks	$ 3,000,000.00	$ 2,000,000.00	$ 4,000,000.00	0%	$ -	Vendor skid walk downs by Magna/ CCL & Suncor	Mitigate	JP / JL / JH / BH	On going	3	5	15	Open	
	51	Construction Risk	Subcontractors	Site interface with other contractors (civil and OPC Utilities	Yes	External	4	-5	(20)		Schedule delay , lost productivity, resequencing work due to access to areas	60	$ 300,000.00	$ 250,000.00	$ 350,000.00	75%	$ 225,000.00	IAP meetings, coordination meetings with Suncor contractors, establish communication protocol, proactively identify interfaces, interface milestone in schedule,	Mitigate	JL / SS	On going	2	5	10	Open	
	52	Construction Risk	Pre-Existing Conditions	Blocked FAM Supplied conduits		External	0	-3	0		Interruption of work, loss of productivity, schedule delay	Yes - TBD	$ 60,000.00	$ 45,000.00	$ 75,000.00	25%	$ 15,000.00	Inspection of Conduit; Seal ends of Conduit. Change management process provided in contract	Transfer	JH	Ongoing	0	3	0	Closed	
Financial / Commercial	53	Financial / Commercial	Cash Flow	Delayed payments		Internal	1	-4	(4)		negative cash flow, financing costs, demobilization of man power,	Yes - TBD	$ -	$ -	$ -	0%	$ -	Timely submittal of invoicing, follow invoicing schedule and process, ensure invoice accuracy with required backup, appropriate signature, hold client accountable, accurate payment certificate	Mitigate	LP / RS / JB	On going	0	-5	0	Open	
Financial / Commercial	54	Financial / Commercial	Cash Flow	Delays of payment certificate and invoices approval from Client		External	1	-4	(4)		negative cash flow, financing costs, demobilization of man power,	Yes - TBD	$ -	$ -	$ -	0%	$ -	Timely submittal of invoicing, follow invoicing schedule and process, ensure invoice accuracy with required backup, appropriate signature, hold client accountable, accurate payment certificate	Mitigate	LP / RS / JB	On going	0	-5	0	Open	
Total													$ 32,097,500.00	$ 22,320,000.00	$ 41,875,000.00		$ 13,238,125.00									
																	41.24%									

Instructions:

1. *Fill out the information in the grey box, rows 3 to 6.*
2. *Complete the risk items working from left to right, using rows 16 to 45, with the following considerations:*
   a) *If more rows are needed please ensure they are inserted in the middle of the template, not on the line above the total line or the line below column header line.*
   b) *Columns B & C include drop down menus. Choose the application risk category and subcategory from the drop down menu. If the one your require does not exist, go to the "Categories Library" excel tab below and enter it over the lowest numbered TBD cell highlighted in orange. This will now be included as part of the drop down menu for you to select. For additional guidance on risk categories and to see samples of the risk categories and subcategories please refer to the "Risk Categories" excel tab below.*
   c) *Columns F, G, R, & S include drop down menus that are fixed between 1 and 5. When ranking the risk refer to the "Risk Ranking Matrix" excel tab below for further guidance.*
   d) *Column O includes a drop down menu with four options. Choose the most appropriate option when filling out the necessary risk items.*
   e) *Columns H & T include formulas, which are illustrated above in the table and pie chart. These columns will be automatically calculated based on the selections in columns F, G, R, & S. Please do not adjust the formulas in these cells.*
   f) *All other columns are to be filled out manually, as necessary.*

CANONBIE
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PROJECT & ALIGNMENT DELIVERY

Section 2 - Business Case

CANONBIE
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PROJECT & ALIGNMENT & DELIVERY

BUSINESS CASE

RISK REGISTRY IMPLEMENTATION

CANONBIE CONTRACTING LIMITED
SUITE 301, 1003 ELLWOOD ROAD SW
EDMONTON, AB, T6X 0B3

JUNE, 2017

CANONBIE
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PROJECT & ALIGNMENT DELIVERY

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PROJECT & ALIGNMENT & DELIVERY

1. Executive Summary

Risk Management is a key process to any project. It should start at the very early stage of any project and carried through until the project completion. The overall Risk management process provides lots of benefits such as:

- ***Enhanced internal collaboration and discussions***
- ***Increased ability to manage risks proactively***
- ***Gives the ability to make risks more explicit to the project team and decision makers***
- ***Increase confidence in project decision -making***
- ***Gives the ability to manage project costs & Schedule more effectively***[i]

This document recommends a risk management tool which has been used in a recent project, and satisfied the requirement of a successful risk management process.

2. The challenge

Having an effective risk management tool might be challenging. There are different tools and techniques to manage risks, but any successful tool should at least:

- ***Proactively focus on identifying risks before they manifest themselves***
- ***Having a mitigation plan for the identified risks***
- ***Have a tracking mechanism to ensure all risks are addressed properly***
- ***Have a mechanism for regular reviews and updates for the risks status.***

3. Solution Options

Canonbie recommends using the Risk Registry tool. It is a powerful tool that manages the risks from the very early stage, throughout the life span of the project. The recommended Risk Registry system will accomplish the following:

- ***Ensure that all risks are identified***
- ***Ensure that a strategy is developed to address each identified risk***
- ***Ensure that all risks are assessed and rated***
- ***Determine the impacts for the risks (Schedule and cost)***

- ***Ensure that all risks are mitigated***
- ***Provide a mechanism to track risks (both expected and unexpected) during the project execution***
- ***Provide a mechanism to address risks that occur during project execution which were either unexpected or for which the prepared mitigation mechanisms are insufficient***
- ***Close the risks as they become mitigated and are cannot have any further impact on the project.***
- ***Ensure that information about significant risks encountered in the field is shared for future reference (Lessons Learned), and that such information is fed back for future projects.***[ii]

The project sponsor and the project management team should adapt the risk management process for the project, and ensure to have dedicated resources to manage and maintain regular scheduled reviews and analysis for any potential risks the project might have. They should also encourage having the required level of trust, open communications and transparency among the parties involved in the project

4. BENEFIT ANALYSIS

As described in the Solution Options section, the Risk registry tool covers the requirements to: identify, assess, mitigate and track the risks. This tool was implemented at the Suncor Fort Hills Ore Preparation Plant project under Canonbie work scope.

The implementation started at the very early stage of the project, all anticipated risks were Identified based on the project information, historical data and the team experience. All identified risks were logged in the register, assessed based on the risk identification matrix in the attached Shared Risk Register form. Once the risk was assessed, the potential impact was determined (Schedule and cost), and mitigation plan was determined and assigned to a risk owner.

During the life of the project Fifty-Four (54) risks were Identified with a total potential impact of *$32M*.

Fourteen risk were classified as high risks, with a total potential impact of $13.2M. Ten of the 14 high risks with a total Estimated value of *$6.8M* were diverted to either to Medium, low or no risk items.

One example of the diverted risks was the Site interface with other contractors, (refer to Item number 43 in the attached Shared Risk Register). As Canonbie scope had multiple interfaces with other contractors on site, the potential impact was to have either: schedule delays, or change in the work sequence by other contractors, which would have an impact on Canonbie work schedule. The impact was estimated by the project team as possibly 20 days of schedule impact and a total estimated cost impact of $150,000 to $200,000

The mitigation plan was to have coordination meetings with Suncor contractors, establish communication protocol, proactively identify interfaces, interface milestone in schedule and communicate any potential issues.

This mitigation resulted in lowering the risk score from ***(-20)-high risk*** before mitigation to ***(0)- No risk*** after mitigation. There are multiple other cases in the Shared Risk Register showing the change of the risk score before/after mitigation.

5. RECOMMENDATION

- The Shared Register tool was used successfully in a recent project
- Using of the Shared Risk Register tool is essential, easy to use, satisfies the risk management process requirements, and it is being implemented in a recent project
- The use of the risk register should start at the very early stage of the project (Bidding Stage)
- The tool should be presented to the project team, attached with a work instruction
- Maintaining the Risk Registry and the regular reviews and updates are key factors for a successful process

[i] ***Construction Industry Institute. 2014. Adding value through a practical and proactive project risk management process. CII special publication 181-3: Benefits of risk management process. The University of Texas at Austin. 49 pp.***

[ii] ***Aecon Corporate guide line. 2010. Risk Management, Guideline No.3***