

ASSESSING CONTINGENCY

Background

Risk management is defined as the effect of uncertainty on objectives (ISO 31000). Contingency in business terms is the additional cost added to a project estimate to allow for this uncertainty. During planning there are two areas to consider. **Inherent** risk arises from the work that has to be undertaken to deliver the project. The work is described in the project's estimate. **Contingent** risk are those events that may arise and if they do occur could give rise to a significant cost impact.

Deriving the contingency for these two areas of risk requires two separate but similar processes:

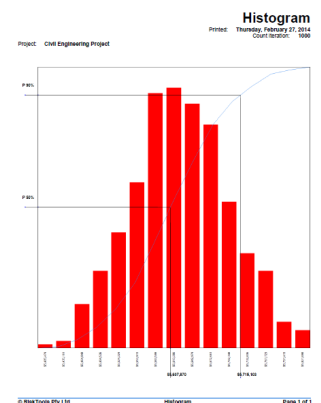
Inherent risk:

- We undertake this using **EstimateManager** which was specifically developed for the process
- A small team undertakes a detailed review of the estimate and assesses a range of values (Best Case and Worst Case) that apply to both the Quantities and Rates
- The values are then used in a Monte Carlo simulation
- The resultant reports detail the inputs, a Histogram showing the range of outputs including P50 and P90 (or other selected) values, and a Tornado diagram that identifies those items with the biggest impact on the "bottom line".
- Reviewing the items regularly over time as the project timeline unfolds enables the accuracy of the estimate to be improved.

Data input screen

Item	Description	Unit	Q WC	Qty	Q BC	R WC	Rate	R BC	Amount	MC DO	Note
Estimate of Costs											
Estimate of Costs No. of lots Roadworks and Drainage Rates											
	Provision for traffic	no	1.00	0	0	0	500.00	0	0	500.00	
Access Place and Street (8.0m Wide Rd, 16.0m Road Reserve) Roads based on CBR 3-47mm pavement											
	Roadworks		0.00	0	0	0	0.00	0	0	0.00	
	- trim and compact		0.00	0	0	0	0.00	0	0	0.00	
	8.0m wide	m2	0.00	8.00	0	0	4.00	0	0	32.00	
	- class 1s (20mm thick)	m3	0.221	0	0	0	50.00	0	0	11.05	
	- Upper Sub base (100mm thick)	m3	0.80	0	0	0	90.00	0	0	72.00	
	- Base course (120mm thick)	m3	0.100	0	0	0	3100.00	0	0	310.00	
	- AC (25mm thick)	m2	0.800	0	0	0	18.00	0	0	14.40	
	- final trim	m2	0.900	0	0	0	3.50	0	0	3.15	
	- Side Drains	m	0.200	0	0	0	30.00	0	0	6.00	
	Concrete kerb and channel (Type M1)	m	0.200	0	0	0	41.00	0	0	8.20	
	Concrete footpath, 1.5m wide	m2	0.150	0	0	0	90.00	0	0	13.50	
	Turfing Footpaths incl Topsoil	m2	0.585	0	0	0	8.00	0	0	4.68	
Collector Street (8.5m Wide Rd, 17.0m Road Reserve) Roads based on CBR 3-495mm pavement											

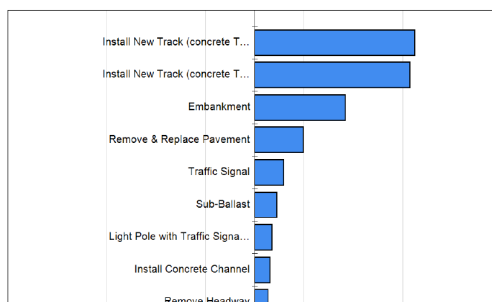
Histogram output



Tornado

Printed: Thursday, February 27, 2014
Count Iteration: 1000

Project: Civil Engineering Project



Tornado Diagram

Project: Civil Engineering Project

Item	Q BC	Quantity	Q WC	R BC	Rate	R WC	Unit
Contractor Mobilization	\$1.00	\$1.00	\$1.00	\$2,200.00	\$2,500.00	\$3,500.00	Item
Contractor Mobilization	\$1.00	\$1.00	\$1.00	\$800.00	\$833.00	\$1,500.00	Item
Soldier Pile retaining Wall with "vicat"	\$1.00	\$1.00	\$1.00	\$4,000.00	\$4,050.00	\$4,800.00	LS
Remove Headway	\$4.00	\$5.00	\$7.00	\$4,500.00	\$5,000.00	\$5,500.00	EA
Install 45° RCP	\$170.00	\$175.00	\$190.00	\$220.00	\$250.00	\$300.00	LF
Install Concrete Readyway	\$5.00	\$5.00	\$5.00	\$14.00	\$15.00	\$18.00	EA
Install Concrete Channel	\$1,500.00	\$1,548.00	\$1,650.00	\$28.00	\$30.00	\$35.00	LF
ICB Culver Extension at MP 39.74	\$1.00	\$1.00	\$1.00	\$20,000.00	\$20,000.00	\$22,000.00	LS
ICB Culver Extension at MP 39.95	\$1.00	\$1.00	\$1.00	\$2,000.00	\$2,000.00	\$2,500.00	LS
ICB Concrete Channel improvements	\$1.00	\$1.00	\$1.00	\$19,000.00	\$20,000.00	\$23,000.00	LS
Install Sign Post	\$4.50	\$4.50	\$4.50	\$70.00	\$75.00	\$100.00	Item

Input report

Contingent Risk:

- Requires a workshop with the team to identify and analyse the risks associated with a project
- A smaller team then identifies those risks that, if they occurred, would have a direct cost to the project.
- The direct costs are then assessed in terms of Best, Most Likely and Worst case values.
- The likelihood is described in terms of a probability percentage.
- A Monte Carlo simulation is run and as before -
- Reports are derived which detail the inputs, a Histogram showing the range of outputs including P50 and P90 values, and a Tornado diagram that identifies those items with the biggest impact on the "bottom line".

The two results are then reviewed to ensure there is no double dipping and the two P50 and P90 values from each process are added to give the total contingency allowance.

We use **RiskValuer** (which is also built into **RiskOrganizer**) to undertake this process. Outputs are similar to the **EstimateManager** reports.

Process - Inputs

- ▶ Risks that have a direct cost impact are identified.
- ▶ The likelihood of the risk occurring is assessed as a percentage probability. (1)
- ▶ The cost if the risk was to occur is assessed in terms of best case, most likely and worse case values. (2)
- ▶ The desired P level and number of iterations are selected and the simulation run. (3)

RiskValuer standalone

The screenshot shows the RiskValuer standalone interface for 'Sewer Main Rehabilitation'. A search bar at the top contains 'Sewer Main Rehabilitation'. Below it is a table of risks. Red circles and numbers 1, 2, and 3 highlight specific elements: 1 points to the risk ID, 2 points to the Probability, Best Case, Most likely, and Worst Case columns, and 3 points to the P50 and 1000 iteration settings and the Run Simulation button.

ID	Risk	Probability	Best Case	Most likely	Worst Case	Notes
1	a Force majeure incident will arise	8%	A\$50,000.00	A\$100,000.00	A\$120,000.00	Delayed project completion, Site restoration, Increased project management cost
2	damage may occur to Public or Private Assets	50%	A\$2,000.00	A\$5,000.00	A\$10,000.00	Contractor may be required to bear part of the expenditure incurred for reconstr
3	variations arise as a result of latent conditions or minor scope chang	8%	-A\$20,000.00	A\$50,000.00	A\$250,000.00	Contract variations costs (maximum up to 10% of Contract Sum)
4	Defects will be identified after defects liability period	50%	A\$0.00	A\$2,000.00	A\$5,000.00	

RiskValuer within RiskOrganizer

The screenshot shows the RiskValuer interface within RiskOrganizer. It displays details for a risk named 'a Force Majeure incident will arise'. Red circles and numbers 1, 2, and 3 highlight key fields: 1 points to the Likelihood (percentage) field set to 10%, 2 points to the Best Case (\$50,000), Most likely case (\$100,000), and Worst Case (\$120,000) fields, and 3 points to the Number of iterations (1000) and P Level (90) fields, along with the Run simulation button.

Benefits

- The above processes enable a more enlightened contingency assessment that reflects the risks at a point in time. (The days of adding 10% to the bottom line are

For more information please visit our website www.risktools.com.au where you can download our free eBook which has more details or contact us at: queries@risktools.com.au

