

Project Crashing Using QM

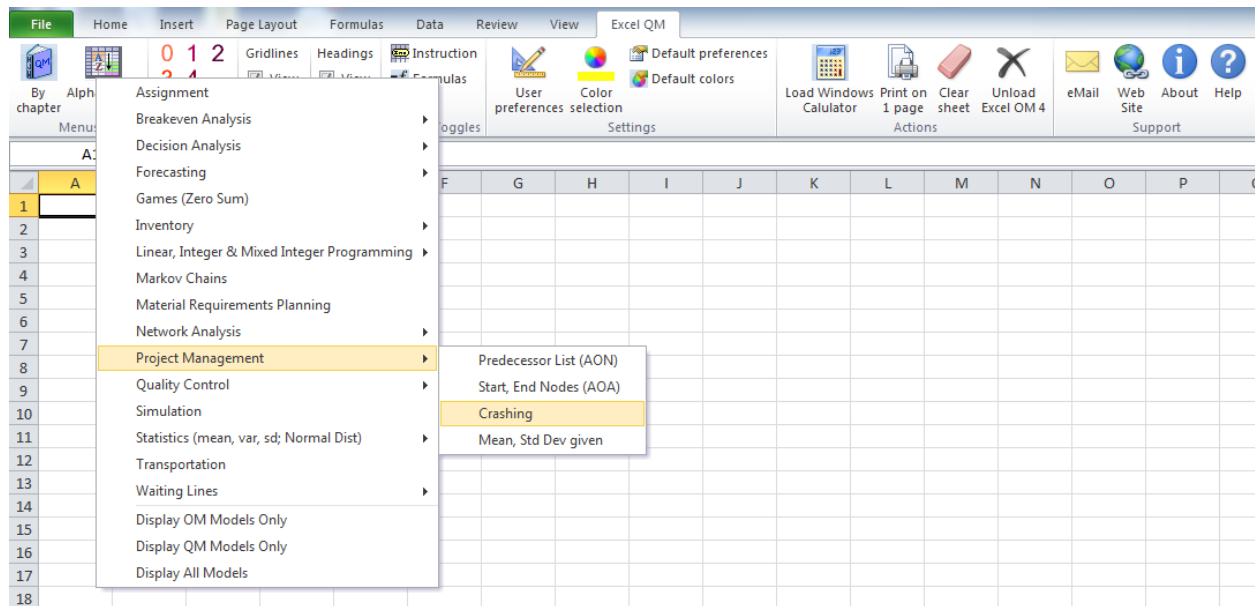
In this tutorial, we will cover the concept of project crashing using QM.

An electrical contractor is trying to determine the amount of money it will take to get his project from the normal 15-week completion to a 13-week completion. In other words, he wants to crash this project. The data is shown in the table below.

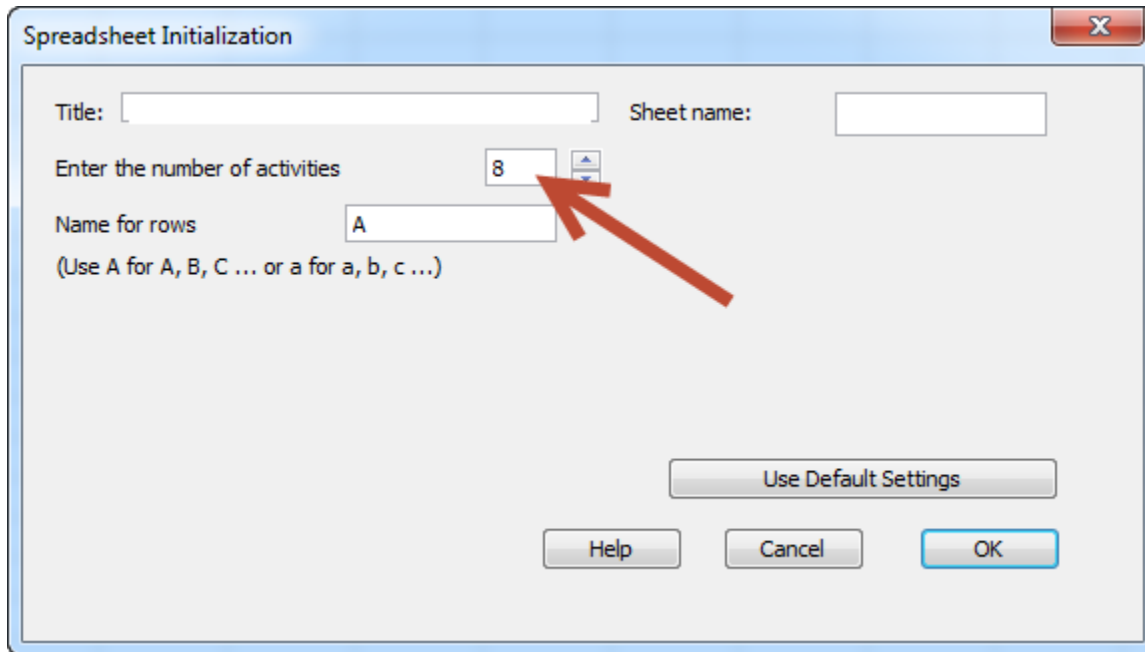
Activity	Predecessors	Normal Time (weeks)	Crash Time (weeks)	Cost \$ Normal	Cost \$ Crash	Crash Cost per week	Critical Path Activity?
A		2	1	\$22,000	\$23,000	\$1,000	Yes
B		3	1	\$30,000	\$34,000	\$2,000	No
C	A	2	1	\$26,000	\$27,000	\$1,000	Yes
D	B	4	3	\$48,000	\$49,000	\$1,000	No
E	C	4	2	\$56,000	\$58,000	\$1,000	Yes
F	C	3	2	\$30,000	\$30,500	\$500	No
G	D, E	5	2	\$80,000	\$86,000	\$2,000	Yes
H	F, G	2	1	\$16,000	\$19,000	\$3,000	Yes

The crash cost per week is the additional cost it will take to shorten each activity from its normal completion time to its crash time.

1. To solve this problem, open Excel QM, select the **Excel QM** tab → **Alphabetical** → **Project Management** → **Crashing**.



2. A Spreadsheet Initialization window will appear. Enter 8 for the number of activities.



The image shows a dialog box titled "Spreadsheet Initialization". It contains several input fields and buttons. The "Title:" field is empty. The "Sheet name:" field is empty. The "Enter the number of activities" field contains the number "8". The "Name for rows" field contains the letter "A". Below the "Name for rows" field, there is a note: "(Use A for A, B, C ... or a for a, b, c ...)". At the bottom of the dialog, there are four buttons: "Use Default Settings", "Help", "Cancel", and "OK". A red arrow points to the number "8" in the "Enter the number of activities" field.

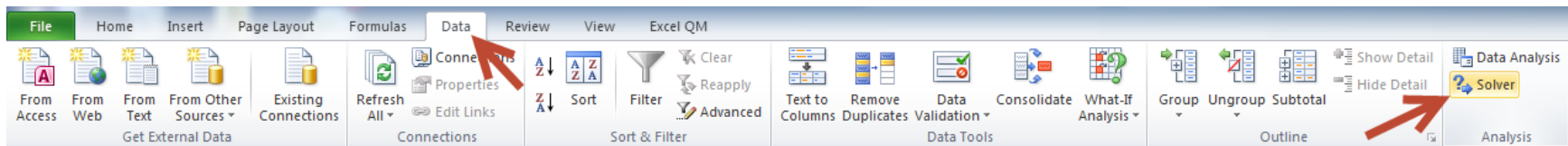
3. Click **OK**. A table will display.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Project Management			Crashing										
2	Enter the data in the shaded area. Then go to the DATA Tab on the ribbon, click on Solver in the Data Analysis Group and then click SOLVE.													
3	If SOLVER is not on the Data Tab then please see the Help file (Solver) for instructions.													
4														
5	Data			Normal time	0			Minimum crash cost to meet project goal	\$	-				
6	Project goal			Minimum time	0						Project time	0		
7														
8				Immediate Predecessors (1 per column)					Intermediate Computations					
9	Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)	Pred 2	Pred 3	Pred 4	Crash days	Crash cost/day	Crash limit		
10	A									0	0	0		
11	B									0	0	0		
12	C									0	0	0		
13	D									0	0	0		
14	E									0	0	0		
15	F									0	0	0		
16	G									0	0	0		
17	H									0	0	0		

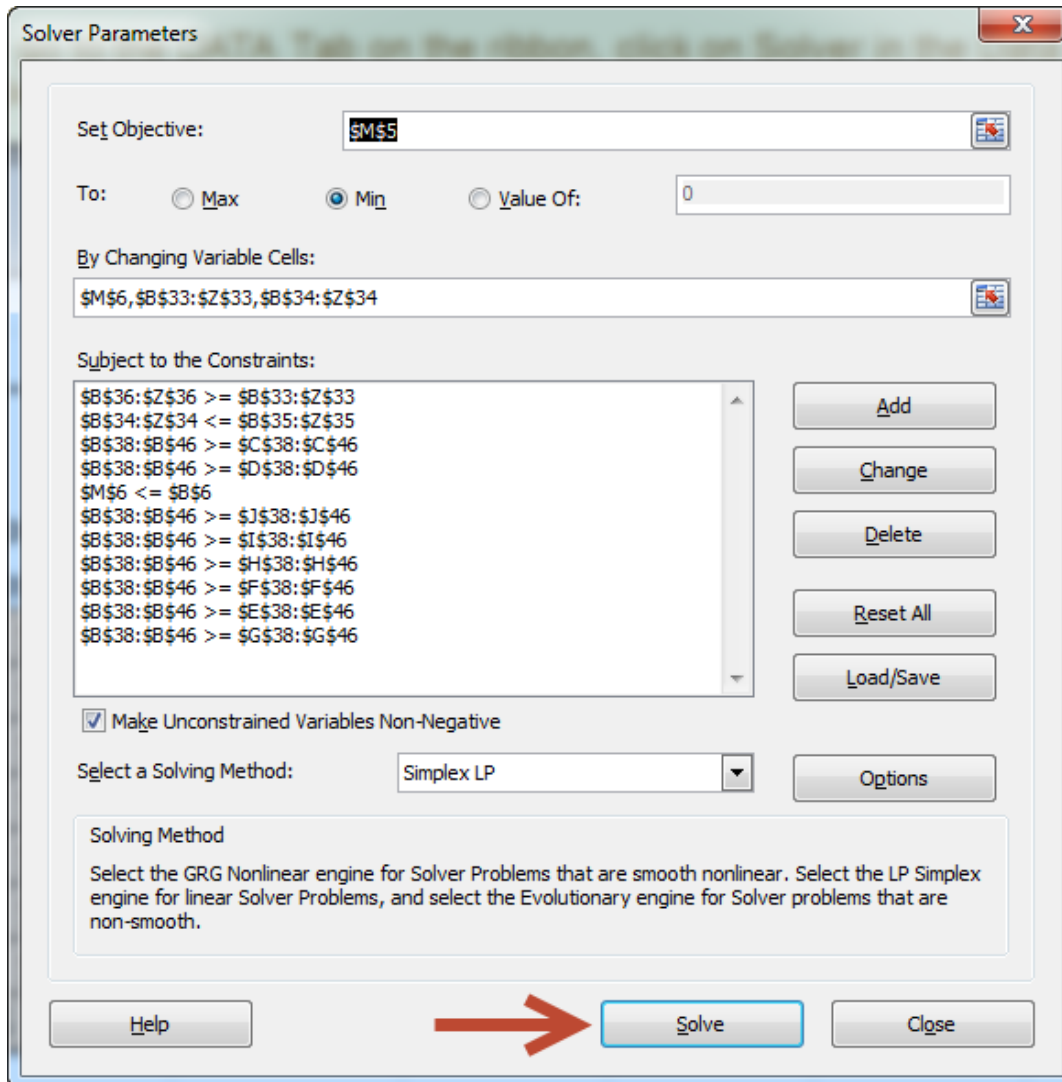
4. Enter the data from the table at the start of this tutorial into the table on your spreadsheet, and enter 13 as your project goal, as we want to know how much it will take to shorten the project to 13 weeks. For the predecessor list, be sure to enter each predecessor individually; e.g., for activity G, the immediate predecessor is D and Pred2 is E.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Project Management			Crashing										
2	<div style="border: 1px solid black; background-color: #ffffcc; padding: 5px;"> Enter the data in the shaded area. Then go to the DATA Tab on the ribbon, click on Solver in the Data Analysis Group and then click SOLVE. If SOLVER is not on the Data Tab then please see the Help file (Solver) for instructions. </div>													
3														
4														
5														
6	Project goal	13		Minimum time	7					Project time	0			
7														
8				Immediate Predecessors (1 per column)					Intermediate Computations					
9	Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)	Pred 2	Pred 3	Pred 4	Crash days	Crash cost/day	Crash limit		
10	A	2	1	\$22,000	\$23,000					0	1000	1		
11	B	3	1	\$30,000	\$34,000					0	2000	2		
12	C	2	1	\$26,000	\$27,000	A				0	1000	1		
13	D	4	3	\$48,000	\$49,000	B				0	1000	1		
14	E	4	2	\$56,000	\$58,000	C				0	1000	2		
15	F	3	2	\$30,000	\$30,500	C				0	500	1		
16	G	5	2	\$80,000	\$86,000	D	E			0	2000	3		
17	H	2	1	\$ 16,000	\$ 19,000	F	G			0	3000	1		
381														

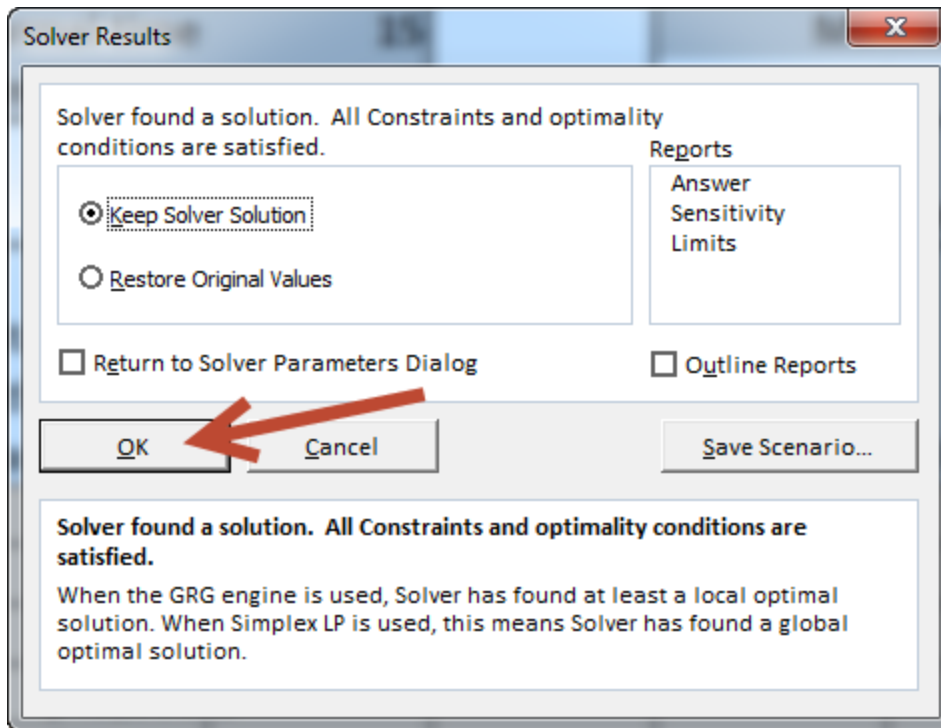
5. Then click on the Data tab → Solver



6. A **Solve Parameters** window will display.



7. Click **Solve**. A Solver Results window will display.



8. Click **OK**.

From the results below, we can see that the cost will be \$3,000 to shorten the project by two weeks by crashing activities A and G. We can see with additional money, the shortest possible completion time will be 7 weeks.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
1	Project Management			Crashing												
2	Enter the data in the shaded area. Then go to the DATA Tab on the ribbon, click on Solver in the Data Analysis Group and then click SOLVE.															
3	If SOLVER is not on the Data Tab then please see the Help file (Solver) for instructions.															
4																
5	Data				Normal time		15				Minimum crash cost to meet project goal		\$ 3,000.00			
6	Project goal	13				Minimum time		7				Project time		13		
7																
8	Immediate Predecessors (1 per column)										Intermediate Computations					
9	Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)	Pred 2	Pred 3	Pred 4	Crash days	Crash cost/day	Crash limit				
10	A	2	1	\$22,000	\$23,000					1	1000	1				
11	B	3	1	\$30,000	\$34,000					0	2000	2				
12	C	2	1	\$26,000	\$27,000	A				0	1000	1				
13	D	4	3	\$48,000	\$49,000	B				0	1000	1				
14	E	4	2	\$56,000	\$58,000	C				0	1000	2				
15	F	3	2	\$30,000	\$30,500	C				0	500	1				
16	G	5	2	\$80,000	\$86,000	D	E			1	2000	3				
17	H	2	1	\$ 16,000	\$ 19,000	F	G			0	3000	1				

[Click here](#) to download the completed spreadsheet table so you can compare it to yours.

If we shorten the goal to 7 weeks by simply entering 7 as our project goal and repeating steps 5-8. We will see that we crash almost every activity and it will cost us a total of an extra \$18,000 to get it shortened from 15 weeks to 7 weeks.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Project Management			Crashing										
2	Enter the data in the shaded area. Then go to the DATA Tab on the ribbon, click on Solver in the Data Analysis Group and then click SOLVE.													
3	If SOLVER is not on the Data Tab then please see the Help file (Solver) for instructions.													
4														
5	Data			Normal time	15		Minimum crash cost to meet project goal	\$ 18,000.00						
6	Project goal	7		Minimum time	7				Project time	7				
7														
8				Immediate Predecessors (1 per column)					Intermediate Computations					
9	Activity	Normal Time (weeks)	Crash Time (weeks)	Normal Cost	Total Cost with Crashing	Immediate Predecessor(s)	Pred 2	Pred 3	Pred 4	Crash days	Crash cost/day	Crash limit		
10	A	2	1	\$22,000	\$23,000					1	1000	1		
11	B	3	1	\$30,000	\$34,000					2	2000	2		
12	C	2	1	\$26,000	\$27,000	A				1	1000	1		
13	D	4	3	\$48,000	\$49,000	B				1	1000	1		
14	E	4	2	\$56,000	\$58,000	C				2	1000	2		
15	F	3	2	\$30,000	\$30,500	C				0	500	1		
16	G	5	2	\$80,000	\$86,000	D	E			3	2000	3		
17	H	2	1	\$ 16,000	\$ 19,000	F	G			1	3000	1		

[Click here](#) to download the completed spreadsheet table so you can compare it to yours.

This concludes the tutorial on project crashing using QM.