AL DANA RESIDENTIAL TOWER

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CE 8283 RISK ANALYSIS
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1. INTRODUCTION

1.1. Project Description

AL Dana 1 is a proposed luxury residential tower consisting of 10 stories and in located International City, Dubai. The tower will occupy 33,000 square feet of area. The tower will be made up of fifty-six luxury apartments consisting of one to three bedrooms.

The residential apartments will be in the market for short and long term rentals.

Al Dana 1 will have common amenities that include an outdoor swimming pool, sauna, steam room, hi-tech gymnasium, parking garage located in basement, and two elevators.

The scope of work performed will require excavation and shoring, pouring of a concrete foundation, installation all MEP infrastructure and equipment, Reinforcement Concrete, exterior thermal block façade, and Finish paint.

1.2. Estimate and Schedule

The stipulated cost for the project is $15 Million. The stipulated costs includes entire construction and installation of the equipment.

The preliminary schedule is given below. The estimated time is 18 months. The Schedule can be seen in Figures 1

1.3. Purpose of Risk Management Plan

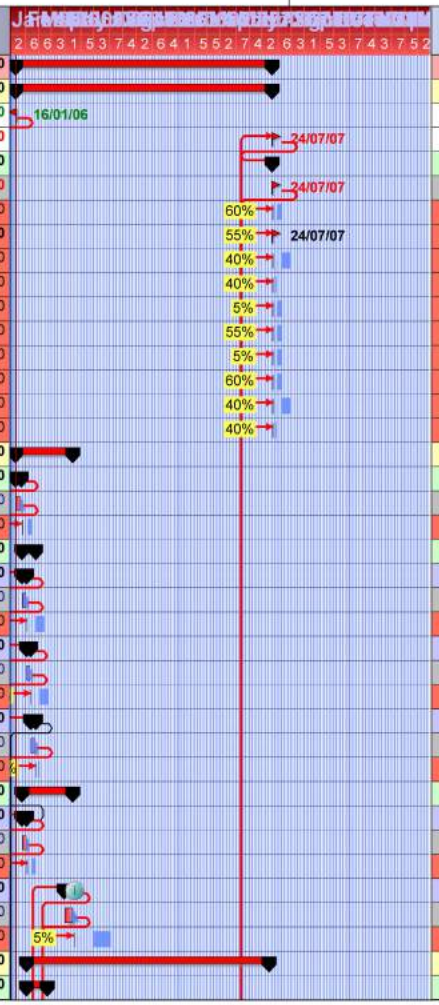
A Risk Management Plan will be implemented for this project to measure and prepare to foresee any risks, impacts on cost estimate, and define any other issues that may arise during the construction.

Risks are uncertain event or conditions that may occur that can have a significant impact either both positive or negative on the project's objectives. The purpose of this plan is to identify potential problems before they occur so that risk-handling activities may be planned and invoked as needed across the life of the product or project to mitigate adverse impacts on achieving objectives.

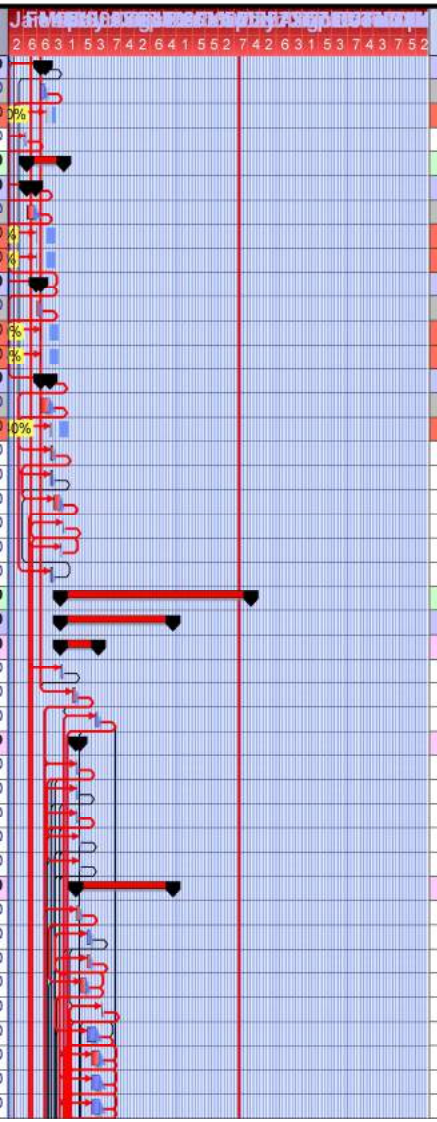
AL DANA 1 TOWER (Post-mitigated)

Gantt Chart

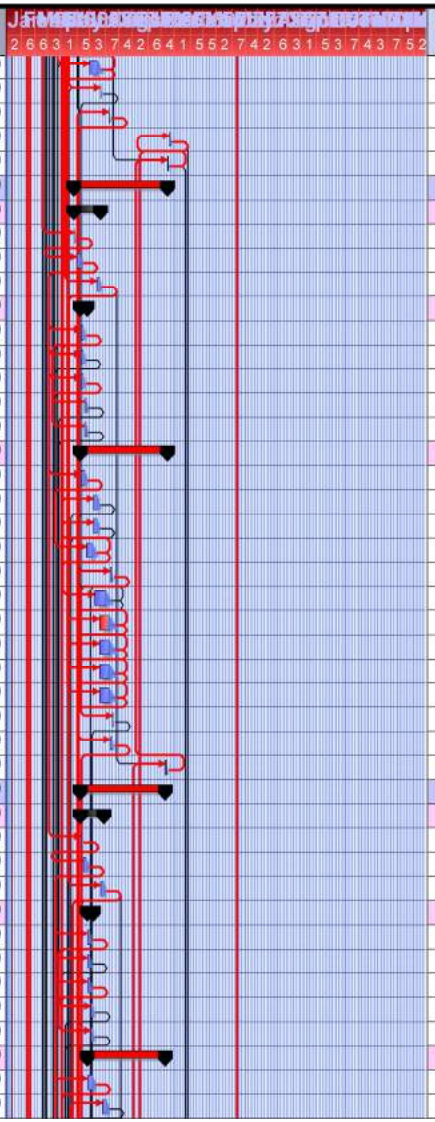
ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
0010	**AI DANA I RESIDENTIAL TOWER**	**397**	**16/01/06**	**24/07/07**	**$15,334,360**				
0020	**MILESTONES**	**397**	**16/01/06**	**24/07/07**	**$0**				
0030	**start project**	**0**	**16/01/06**		**$0**				
0040	**substantial completion**	**0**		**24/07/07**	**$0**				
0050	**final completion**	**0**	**25/07/07**	**24/07/07**	**$0**				
0050	**final completion**	**0**		**24/07/07**	**$0**				
0050	Lack of specialized staff and lack of adequate am...	0	25/07/07	24/07/07	$0	10		20	60%
0050	**Insurance problems**	**0**		**24/07/07**	**$0**				**55%**
0050	Technology changes	0	25/07/07	24/07/07	$0	20		40	40%
0050	Construction Cost Overruns	0	25/07/07	24/07/07	$0	5		10	40%
0050	Facilities delays	0	25/07/07	24/07/07	$0	10		20	5%
0050	Vendor Delays	0	25/07/07	24/07/07	$0	10		20	55%
0050	Lack of protection in construciton site	0	25/07/07	24/07/07	$0	10		20	5%
0050	Permits and Licenes	0	25/07/07	24/07/07	$0	10		20	070:010[60%]
0050	MEP Design and Descripencies	0	25/07/07	24/07/07	$0	20		40	090:011[40%]
0050	Delay Delieveries	0	25/07/07	24/07/07	$0	5		10	40%
0060	**PRE-CONSTRUCTION**	**90**	**16/01/06**	**19/05/06**	**$6,189,860**				
0070	**permits**	**10**	**16/01/06**	**27/01/06**	**$22,000**				
0070	permits	10	16/01/06	27/01/06	$0	5	10	20	
0070	Permits and Licenes	0	30/01/06	27/01/06	$0	10		20	60%
0080	**Procurement**	**21**	**30/01/06**	**27/02/06**	**$6,013,860**				
0090	**materials/shop dwg. prepare & submission**	**7**	**30/01/06**	**07/02/06**	**$6,930**				
009	materials/shop dwg. prepare & submission	7	30/01/06	07/02/06	$0	4	7	14	
009	MEP Design and Descripencies	0	08/02/06	07/02/06	$0	20		40	40%
0100	**materials/shop dwg. review & approval**	**7**	**08/02/06**	**16/02/06**	**$6,930**				
010	materials/shop dwg. review & approval	7	08/02/06	16/02/06	$0	4	7	14	
010	MEP Design and Descripencies	0	17/02/06	16/02/06	$0	20		40	090:011[40%]
0110	**materials/shop dwg. purchase & deliver**	**7**	**17/02/06**	**27/02/06**	**$6,000,000**				
011	materials/shop dwg. purchase & deliver	7	17/02/06	27/02/06	$0	4	7	14	
011	Delay Delieveries	0	28/02/06	27/02/06	$0	5		10	050:012[40%]
0120	**Mobilization**	**80**	**30/01/06**	**19/05/06**	**$154,000**				
0130	**general mobilization**	**8**	**30/01/06**	**08/02/06**	**$64,000**				
013	general mobilization	8	30/01/06	08/02/06	$0	4	8	16	
013	Lack of protection in construciton site	0	09/02/06	08/02/06	$0	10		20	050:009[5%]
0140	**crane mobilization**	**15**	**01/05/06**	**19/05/06**	**$90,000**				
014	crane mobilization	15	01/05/06	19/05/06	$0	8	15	30	
014	Lack of protection in construciton site	0	22/05/06	19/05/06	$0	40		80	050:009[5%]
0150	**CONSTRUCTION**	**374**	**09/02/06**	**17/07/07**	**$9,065,600**				
0160	**Initial Site Work**	**32**	**09/02/06**	**24/03/06**	**$78,000**				



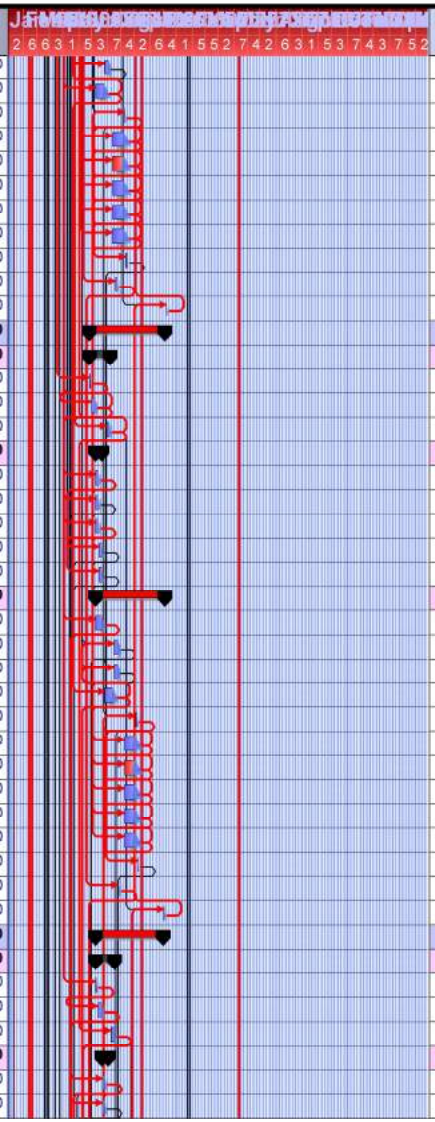
ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
0170	**utility installation**	**8**	**15/03/06**	**24/03/06**	**$18,000**				
017	utility installation	8	15/03/06	24/03/06	$0	4	8	16	
017	Late, Incomplete or Wrong Survey	0	27/03/06	24/03/06	$0	10		20	40%
0180	de-watering	2	09/02/06	10/02/06	$60,000	1	2	4	
0190	**Foundation Construction (Sub-Structure)**	**58**	**13/02/06**	**03/05/06**	**$491,600**				
0200	**shoring**	**15**	**13/02/06**	**03/03/06**	**$90,000**				
020	shoring	15	13/02/06	03/03/06	$0	8	15	30	
020	Late, Incomplete or Wrong Survey	0	06/03/06	03/03/06	$0	20		40	170:001[40%]
020	Lack of protection in construciton site	0	06/03/06	03/03/06	$0	20		40	0050:009[5%]
0210	**excavation**	**7**	**06/03/06**	**14/03/06**	**$70,000**				
021	excavation	7	06/03/06	14/03/06	$0	4	7	14	
021	Late, Incomplete or Wrong Survey	0	15/03/06	14/03/06	$0	20		40	170:001[40%]
021	Lack of protection in construciton site	0	15/03/06	14/03/06	$0	20		40	0050:009[5%]
0220	**construct RCC raft foundation**	**15**	**15/03/06**	**04/04/06**	**$170,000**				
022	construct RCC raft foundation	15	15/03/06	04/04/06	$0	8	15	30	
022	Late, Incomplete or Wrong Survey	0	05/04/06	04/04/06	$0	20		40	170:001[40%]
0230	construct RCC foundation wall & columns	6	05/04/06	12/04/06	$32,400	3	6	12	
0240	construct RCC elevator/stair pit	4	05/04/06	10/04/06	$14,400	2	4	8	
0250	construct RCC basement slab	10	13/04/06	26/04/06	$65,000	5	10	20	
0260	construct slab on grade	3	01/05/06	03/05/06	$18,000	2	3	6	
1020	backfill & compaction	2	27/04/06	28/04/06	$15,000	1	2	4	
3540	construct water tank RCC walls	4	05/04/06	10/04/06	$16,800	2	4	8	
0270	**Building Construction**	**295**	**27/04/06**	**13/06/07**	**$8,464,500**				
0280	**Ground Floor**	**174**	**27/04/06**	**26/12/06**	**$525,400**				
029	**Super Structure**	**59**	**27/04/06**	**18/07/06**	**$135,000**				
03	construct RCC cloumns/elevator/stair	3	27/04/06	01/05/06	$50,000	2	3	6	
03	construct RCC ground floor slab	7	22/05/06	30/05/06	$65,000	4	7	14	
03	exterior thermal block	5	12/07/06	18/07/06	$20,000	3	5	10	
033	**Rough-in Work**	**6**	**31/05/06**	**07/06/06**	**$73,200**				
03	plumbing work	3	31/05/06	02/06/06	$15,000	2	3	6	
03	HVAC work	3	31/05/06	02/06/06	$18,000	2	3	6	
03	electrical work	3	31/05/06	02/06/06	$15,000	2	3	6	
03	sprinkler system work	3	05/06/06	07/06/06	$13,200	2	3	6	
03	fire alarm work	3	05/06/06	07/06/06	$12,000	2	3	6	
039	**Finish Work**	**150**	**31/05/06**	**26/12/06**	**$317,200**				
04	construct interior partition wall	7	31/05/06	08/06/06	$12,600	4	7	14	
04	interior doors	6	23/06/06	30/06/06	$15,300	3	6	12	
04	ceiling work	6	23/06/06	30/06/06	$16,200	3	6	12	
04	flooring work	10	09/06/06	22/06/06	$25,000	5	10	20	
04	painting work	3	24/07/06	26/07/06	$8,000	2	3	6	
04	plumbing fixtures	15	23/06/06	13/07/06	$48,000	8	15	30	
04	HVAC fixtures	15	03/07/06	21/07/06	$60,000	8	15	30	
04	electrical fixtures	15	03/07/06	21/07/06	$36,000	8	15	30	
04	sprinkler system fixtures	15	03/07/06	21/07/06	$30,000	8	15	30	



ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
04	fire alarm fixtures	15	03/07/06	21/07/06	$27,600	8	15	30	
05	signage	2	27/07/06	28/07/06	$4,000	1	2	4	
05	exterior windows	3	14/08/06	16/08/06	$18,000	2	3	6	
05	exterior doors	3	22/12/06	26/12/06	$4,500	2	3	6	
15	exterior final finish	3	19/12/06	21/12/06	$12,000	2	3	6	
0530	**First Floor**	**144**	**31/05/06**	**18/12/06**	**$650,840**				
054	**Super Structure**	**41**	**31/05/06**	**26/07/06**	**$135,000**				
05	construct RCC columns/elevator/stair	3	31/05/06	02/06/06	$50,000	2	3	6	
05	construct RCC 1st. floor slab	7	05/06/06	13/06/06	$65,000	4	7	14	
05	exterior thermal block	6	19/07/06	26/07/06	$20,000	3	6	12	
058	**Rough-in Work**	**10**	**14/06/06**	**27/06/06**	**$86,000**				
05	plumbing work	5	14/06/06	20/06/06	$18,000	3	5	10	
06	HVAC work	5	14/06/06	20/06/06	$20,000	3	5	10	
06	electrical work	5	14/06/06	20/06/06	$17,000	3	5	10	
06	sprinkler system work	5	21/06/06	27/06/06	$16,000	3	5	10	
06	fire alarm work	5	21/06/06	27/06/06	$15,000	3	5	10	
064	**Finish Work**	**134**	**14/06/06**	**18/12/06**	**$429,840**				
06	construct interior partition wall	8	14/06/06	23/06/06	$18,000	4	8	16	
06	interior doors	8	12/07/06	21/07/06	$15,000	4	8	16	
06	ceiling work	7	12/07/06	20/07/06	$18,000	4	7	14	
06	flooring work	12	26/06/06	11/07/06	$25,000	6	12	24	
06	painting work	3	17/08/06	21/08/06	$8,000	2	3	6	
07	plumbing fixtures	18	14/07/06	08/08/06	$69,120	9	18	36	
07	HVAC fixtures	18	24/07/06	16/08/06	$80,000	9	18	36	
07	electrical fixtures	18	24/07/06	16/08/06	$57,600	9	18	36	
07	sprinkler system fixtures	18	24/07/06	16/08/06	$54,720	9	18	36	
07	fire alarm fixtures	18	24/07/06	16/08/06	$50,400	9	18	36	
07	signage	2	22/08/06	23/08/06	$4,000	1	2	4	
07	exterior windows	4	17/08/06	22/08/06	$18,000	2	4	8	
15	exterior final finish	3	14/12/06	18/12/06	$12,000	2	3	6	
0770	**Second Floor**	**131**	**14/06/06**	**13/12/06**	**$650,840**				
078	**Super Structure**	**37**	**14/06/06**	**03/08/06**	**$135,000**				
07	construct RCC columns/elevator/stair	3	14/06/06	16/06/06	$50,000	2	3	6	
08	construct RCC 2nd. floor slab	7	19/06/06	27/06/06	$65,000	4	7	14	
08	exterior thermal block	6	27/07/06	03/08/06	$20,000	3	6	12	
082	**Rough-in Work**	**10**	**28/06/06**	**11/07/06**	**$86,000**				
08	plumbing work	5	28/06/06	04/07/06	$18,000	3	5	10	
08	HVAC work	5	28/06/06	04/07/06	$20,000	3	5	10	
08	electrical work	5	28/06/06	04/07/06	$17,000	3	5	10	
08	sprinkler work	5	05/07/06	11/07/06	$16,000	3	5	10	
08	fire alarm work	5	05/07/06	11/07/06	$15,000	3	5	10	
088	**Finish Work**	**121**	**28/06/06**	**13/12/06**	**$429,840**				
08	construct interior partition wall	10	28/06/06	11/07/06	$18,000	5	10	20	
09	interior doors	8	01/08/06	10/08/06	$15,000	4	8	16	



ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
09	ceiling work	7	01/08/06	09/08/06	$18,000	4	7	14	
09	flooring work	14	12/07/06	31/07/06	$25,000	7	14	28	
09	painting work	3	12/09/06	14/09/06	$8,000	2	3	6	
09	plumbing fixtures	18	17/08/06	11/09/06	$69,120	9	18	36	
09	HVAC fixtures	18	17/08/06	11/09/06	$80,000	9	18	36	
09	electrical fixtures	18	17/08/06	11/09/06	$57,600	9	18	36	
09	sprinkler fixtures	18	17/08/06	11/09/06	$54,720	9	18	36	
09	fire alarm fixtures	18	17/08/06	11/09/06	$50,400	9	18	36	
09	signage	2	15/09/06	18/09/06	$4,000	1	2	4	
10	exterior windows	4	23/08/06	28/08/06	$18,000	2	4	8	
15	exterior final finish	3	11/12/06	13/12/06	$12,000	2	3	6	
1010	**Third Floor**	**118**	**28/06/06**	**08/12/06**	**$650,840**				
103	**Super Structure**	**33**	**28/06/06**	**11/08/06**	**$135,000**				
10	construct RCC columns/elevator/stair	3	28/06/06	30/06/06	$50,000	2	3	6	
10	construct RCC 3rd. floor slab	7	03/07/06	11/07/06	$65,000	4	7	14	
10	exterior thermal block	6	04/08/06	11/08/06	$20,000	3	6	12	
107	**Rough-in Work**	**10**	**12/07/06**	**25/07/06**	**$86,000**				
10	plumbing work	5	12/07/06	18/07/06	$18,000	3	5	10	
10	HVAC work	5	12/07/06	18/07/06	$20,000	3	5	10	
11	electrical work	5	12/07/06	18/07/06	$17,000	3	5	10	
11	sprinkler system work	5	19/07/06	25/07/06	$16,000	3	5	10	
11	fire alarm work	5	19/07/06	25/07/06	$15,000	3	5	10	
113	**Finish Work**	**108**	**12/07/06**	**08/12/06**	**$429,840**				
11	construct interior partition wall	10	12/07/06	25/07/06	$18,000	5	10	20	
11	interior doors	8	21/08/06	30/08/06	$15,000	4	8	16	
11	ceiling work	7	21/08/06	29/08/06	$18,000	4	7	14	
11	flooring work	14	01/08/06	18/08/06	$25,000	7	14	28	
11	painting work	3	06/10/06	10/10/06	$8,000	2	3	6	
11	plumbing fixtures	18	12/09/06	05/10/06	$69,120	9	18	36	
12	HVAC fixtures	18	12/09/06	05/10/06	$80,000	9	18	36	
12	electrical fixtures	18	12/09/06	05/10/06	$57,600	9	18	36	
12	sprinkler system fixtures	18	12/09/06	05/10/06	$54,720	9	18	36	
12	fire alarm fixtures	18	12/09/06	05/10/06	$50,400	9	18	36	
12	signage	2	11/10/06	12/10/06	$4,000	1	2	4	
12	exterior windows	4	29/08/06	01/09/06	$18,000	2	4	8	
15	exterior final finish	3	06/12/06	08/12/06	$12,000	2	3	6	
1260	**Fourth Floor**	**105**	**12/07/06**	**05/12/06**	**$650,840**				
127	**Super Structure**	**29**	**12/07/06**	**21/08/06**	**$135,000**				
12	construct RCC columns/elevator/stair	3	12/07/06	14/07/06	$50,000	2	3	6	
12	construct RCC 4th. floor slab	7	17/07/06	25/07/06	$65,000	4	7	14	
13	exterior thermal block	6	14/08/06	21/08/06	$20,000	3	6	12	
131	**Rough-in Work**	**10**	**26/07/06**	**08/08/06**	**$86,000**				
13	plumbing work	5	26/07/06	01/08/06	$18,000	3	5	10	
13	HVAC work	5	26/07/06	01/08/06	$20,000	3	5	10	



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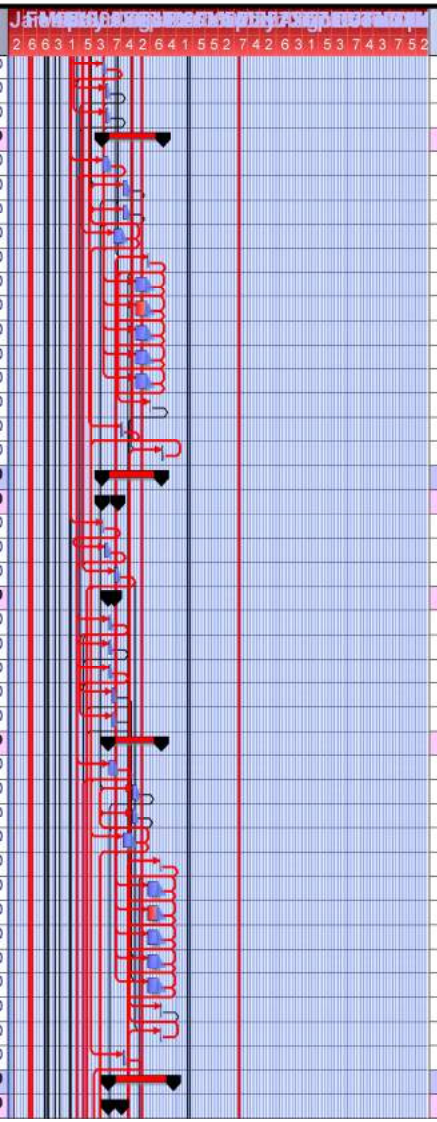
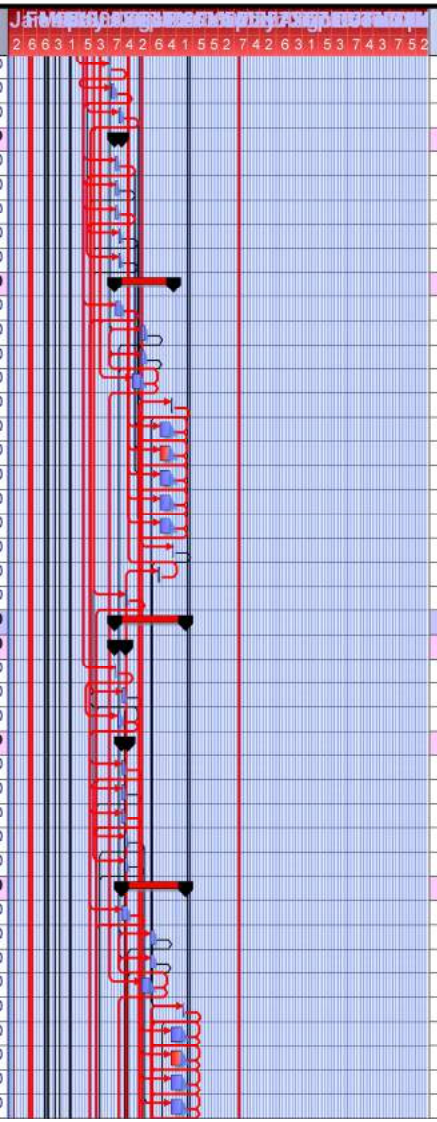
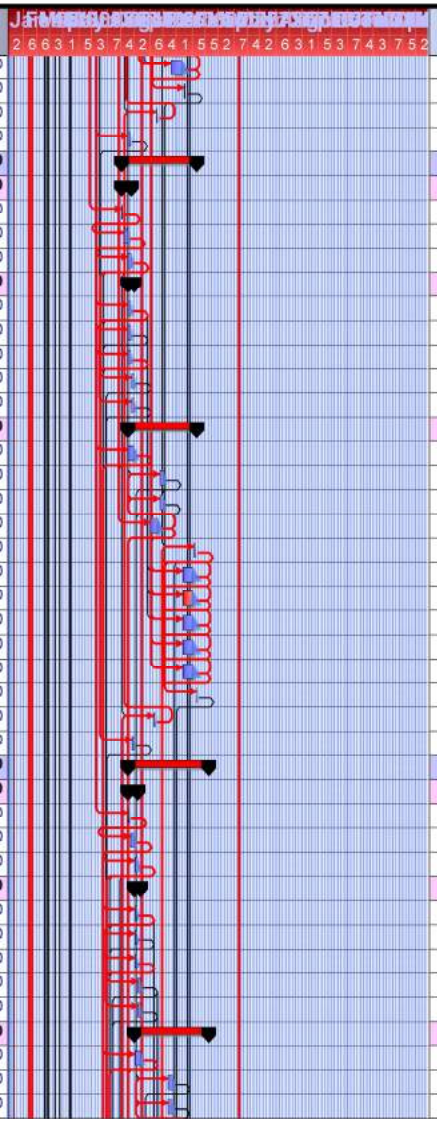
13	electrical work	5	26/07/06	01/08/06	$17,000	3	5	10	
13	sprinkler system work	5	02/08/06	08/08/06	$16,000	3	5	10	
13	fire alarm work	5	02/08/06	08/08/06	$15,000	3	5	10	
137	**Finish Work**	**95**	**26/07/06**	**05/12/06**	**$429,840**				
13	construct interior partition wall	10	26/07/06	08/08/06	$18,000	5	10	20	
13	interior doors	8	08/09/06	19/09/06	$15,000	4	8	16	
14	ceiling work	7	08/09/06	18/09/06	$18,000	4	7	14	
14	flooring work	14	21/08/06	07/09/06	$25,000	7	14	28	
14	painting work	3	01/11/06	03/11/06	$8,000	2	3	6	
14	plumbing fixtures	18	06/10/06	31/10/06	$69,120	9	18	36	
14	HVAC fixtures	18	06/10/06	31/10/06	$80,000	9	18	36	
14	electrical fixtures	18	06/10/06	31/10/06	$57,600	9	18	36	
14	sprinkler system fixtures	18	06/10/06	31/10/06	$54,720	9	18	36	
14	fire alarm fixtures	18	06/10/06	31/10/06	$50,400	9	18	36	
14	signage	2	06/11/06	07/11/06	$4,000	1	2	4	
14	exterior windows	4	04/09/06	07/09/06	$18,000	2	4	8	
15	exterior final finish	3	01/12/06	05/12/06	$12,000	2	3	6	
1550	**Fifth Floor**	**93**	**26/07/06**	**01/12/06**	**$650,840**				
156	**Super Structure**	**25**	**26/07/06**	**29/08/06**	**$135,000**				
15	construct RCC columns/elevator/stair	3	26/07/06	28/07/06	$50,000	2	3	6	
15	construct RCC 5th. floor slab	7	31/07/06	08/08/06	$65,000	4	7	14	
15	exterior thermal block	6	22/08/06	29/08/06	$20,000	3	6	12	
160	**Rough-in Work**	**10**	**09/08/06**	**22/08/06**	**$86,000**				
16	plumbing work	5	09/08/06	15/08/06	$18,000	3	5	10	
16	HVAC work	5	09/08/06	15/08/06	$20,000	3	5	10	
16	electrical work	5	09/08/06	15/08/06	$17,000	3	5	10	
16	sprinkler system work	5	16/08/06	22/08/06	$16,000	3	5	10	
16	fire alarm work	5	16/08/06	22/08/06	$15,000	3	5	10	
166	**Finish Work**	**83**	**09/08/06**	**01/12/06**	**$429,840**				
16	construct interior partition wall	10	09/08/06	22/08/06	$18,000	5	10	20	
16	interior doors	8	28/09/06	09/10/06	$15,000	4	8	16	
16	ceiling work	7	28/09/06	06/10/06	$18,000	4	7	14	
17	flooring work	14	08/09/06	27/09/06	$25,000	7	14	28	
17	painting work	3	27/11/06	29/11/06	$8,000	2	3	6	
17	plumbing fixtures	18	01/11/06	24/11/06	$69,120	9	18	36	
17	HVAC fixtures	18	01/11/06	24/11/06	$80,000	9	18	36	
17	electrical fixtures	18	01/11/06	24/11/06	$57,600	9	18	36	
17	sprinkler system fixtures	18	01/11/06	24/11/06	$54,720	9	18	36	
17	fire alarm fixtures	18	01/11/06	24/11/06	$50,400	9	18	36	
17	signage	2	30/11/06	01/12/06	$4,000	1	2	4	
17	exterior final finish	3	28/11/06	30/11/06	$12,000	2	3	6	
17	exterior windows	4	08/09/06	13/09/06	$18,000	2	4	8	
1800	**Sixth Floor**	**101**	**09/08/06**	**27/12/06**	**$650,840**				
181	**Super Structure**	**21**	**09/08/06**	**06/09/06**	**$135,000**				



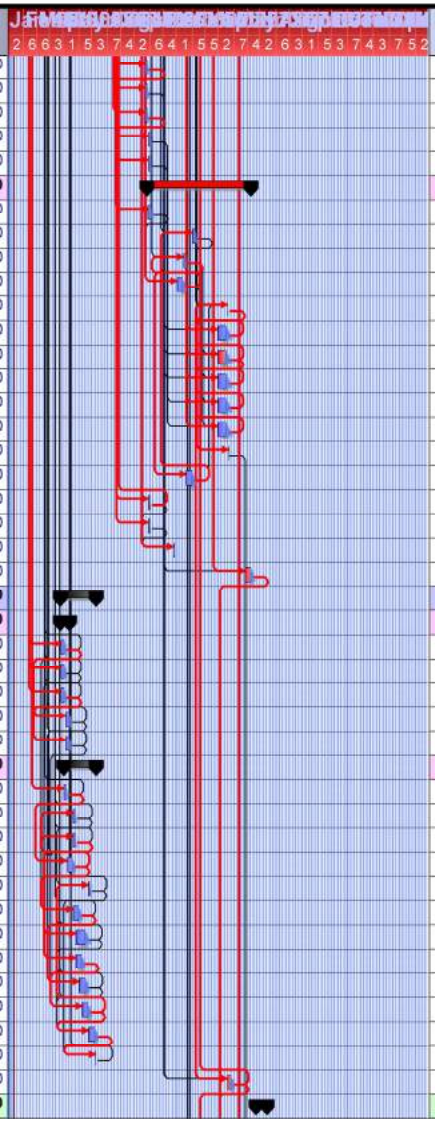
ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
18	construct RCC columns/elevator/stair	3	09/08/06	11/08/06	$50,000	2	3	6	
18	construct RCC 6th. floor slab	7	14/08/06	22/08/06	$65,000	4	7	14	
18	exterior thermal block	6	30/08/06	06/09/06	$20,000	3	6	12	
185	**Rough-in Work**	**10**	**23/08/06**	**05/09/06**	**$86,000**				
18	plumbing work	5	23/08/06	29/08/06	$18,000	3	5	10	
18	HVAC work	5	23/08/06	29/08/06	$20,000	3	5	10	
18	electrical work	5	23/08/06	29/08/06	$17,000	3	5	10	
18	sprinkler system work	5	30/08/06	05/09/06	$16,000	3	5	10	
19	fire alarm work	5	30/08/06	05/09/06	$15,000	3	5	10	
191	**Finish Work**	**91**	**23/08/06**	**27/12/06**	**$429,840**				
19	construct interior partition wall	10	23/08/06	05/09/06	$18,000	5	10	20	
19	interior doors	8	18/10/06	27/10/06	$15,000	4	8	16	
19	ceiling work	7	18/10/06	26/10/06	$18,000	4	7	14	
19	flooring work	14	28/09/06	17/10/06	$25,000	7	14	28	
19	painting work	3	21/12/06	25/12/06	$8,000	2	3	6	
19	plumbing fixtures	18	27/11/06	20/12/06	$69,120	9	18	36	
19	HVAC fixtures	18	27/11/06	20/12/06	$80,000	9	18	36	
19	electrical fixtures	18	27/11/06	20/12/06	$57,600	9	18	36	
20	sprinkler system fixtures	18	27/11/06	20/12/06	$54,720	9	18	36	
20	fire alarm fixtures	18	27/11/06	20/12/06	$50,400	9	18	36	
20	signage	2	26/12/06	27/12/06	$4,000	1	2	4	
20	exterior final finish	3	23/11/06	27/11/06	$12,000	2	3	6	
20	exterior windows	4	14/09/06	19/09/06	$18,000	2	4	8	
2050	**Seventh Floor**	**109**	**23/08/06**	**22/01/07**	**$650,840**				
206	**Super Structure**	**17**	**23/08/06**	**14/09/06**	**$135,000**				
20	construct RCC columns/elevator/stair	3	23/08/06	25/08/06	$50,000	2	3	6	
20	exterior thermal block	6	07/09/06	14/09/06	$20,000	3	6	12	
23	construct RCC 7th. floor slab	7	28/08/06	05/09/06	$65,000	4	7	14	
209	**Rough-in Work**	**10**	**06/09/06**	**19/09/06**	**$86,000**				
21	plumbing work	5	06/09/06	12/09/06	$18,000	3	5	10	
21	HVAC work	5	06/09/06	12/09/06	$20,000	3	5	10	
21	electrical work	5	06/09/06	12/09/06	$17,000	3	5	10	
21	sprinkler system work	5	13/09/06	19/09/06	$16,000	3	5	10	
21	fire alarm work	5	13/09/06	19/09/06	$15,000	3	5	10	
215	**Finish Work**	**99**	**06/09/06**	**22/01/07**	**$429,840**				
21	construct interior partition wall	10	06/09/06	19/09/06	$18,000	5	10	20	
21	interior doors	8	07/11/06	16/11/06	$15,000	4	8	16	
21	ceiling work	7	07/11/06	15/11/06	$18,000	4	7	14	
21	flooring work	14	18/10/06	06/11/06	$25,000	7	14	28	
22	painting work	3	16/01/07	18/01/07	$8,000	2	3	6	
22	plumbing fixtures	18	21/12/06	15/01/07	$69,120	9	18	36	
22	HVAC fixtures	18	21/12/06	15/01/07	$80,000	9	18	36	
22	electrical fixtures	18	21/12/06	15/01/07	$57,600	9	18	36	
22	sprinkler system fixtures	18	21/12/06	15/01/07	$54,720	9	18	36	



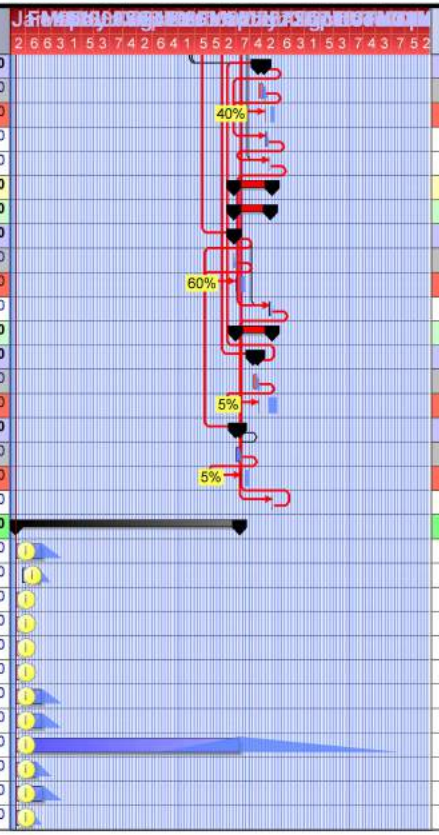
ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
22	fire alarm fixtures	18	21/12/06	15/01/07	$50,400	9	18	36	
22	signage	2	19/01/07	22/01/07	$4,000	1	2	4	
22	exterior final finish	3	20/11/06	22/11/06	$12,000	2	3	6	
22	exterior windows	4	20/09/06	25/09/06	$18,000	2	4	8	
2290	**Eighth Floor**	**117**	**06/09/06**	**15/02/07**	**$650,840**				
230	**Super Structure**	**16**	**06/09/06**	**27/09/06**	**$135,000**				
23	construct RCC columns/elevator/stair	3	06/09/06	08/09/06	$50,000	2	3	6	
23	construct RCC 8th. floor slab	7	11/09/06	19/09/06	$65,000	4	7	14	
23	exterior thermal block	6	20/09/06	27/09/06	$20,000	3	6	12	
235	**Rough-in Work**	**10**	**20/09/06**	**03/10/06**	**$86,000**				
23	plumbing work	5	20/09/06	26/09/06	$18,000	3	5	10	
23	HVAC work	5	20/09/06	26/09/06	$20,000	3	5	10	
23	electrical work	5	20/09/06	26/09/06	$17,000	3	5	10	
23	sprinkler system work	5	27/09/06	03/10/06	$16,000	3	5	10	
24	fire alarm work	5	27/09/06	03/10/06	$15,000	3	5	10	
241	**Finish Work**	**107**	**20/09/06**	**15/02/07**	**$429,840**				
24	construct interior partition wall	10	20/09/06	03/10/06	$18,000	5	10	20	
24	interior doors	8	27/11/06	06/12/06	$15,000	4	8	16	
24	ceiling work	7	27/11/06	05/12/06	$18,000	4	7	14	
24	flooring work	14	07/11/06	24/11/06	$25,000	7	14	28	
24	painting work	3	09/02/07	13/02/07	$8,000	2	3	6	
24	plumbing fixtures	18	16/01/07	08/02/07	$69,120	9	18	36	
24	HVAC fixtures	18	16/01/07	08/02/07	$80,000	9	18	36	
24	electrical fixtures	18	16/01/07	08/02/07	$57,600	9	18	36	
25	sprinkler system fixtures	18	16/01/07	08/02/07	$54,720	9	18	36	
25	fire alarm fixtures	18	16/01/07	08/02/07	$50,400	9	18	36	
25	signage	2	14/02/07	15/02/07	$4,000	1	2	4	
25	exterior final finish	3	15/11/06	17/11/06	$12,000	2	3	6	
25	exterior windows	4	28/09/06	03/10/06	$18,000	2	4	8	
2550	**Ninth Floor**	**125**	**20/09/06**	**13/03/07**	**$650,840**				
256	**Super Structure**	**16**	**20/09/06**	**11/10/06**	**$135,000**				
25	construct RCC columns/elevator/stair	3	20/09/06	22/09/06	$50,000	2	3	6	
25	construct RCC 9th. floor slab	7	25/09/06	03/10/06	$65,000	4	7	14	
25	exterior thermal block	6	04/10/06	11/10/06	$20,000	3	6	12	
260	**Rough-in Work**	**10**	**04/10/06**	**17/10/06**	**$86,000**				
26	plumbing work	5	04/10/06	10/10/06	$18,000	3	5	10	
26	HVAC work	5	04/10/06	10/10/06	$20,000	3	5	10	
26	electrical work	5	04/10/06	10/10/06	$17,000	3	5	10	
26	sprinkler system work	5	11/10/06	17/10/06	$16,000	3	5	10	
26	fire alarm work	5	11/10/06	17/10/06	$15,000	3	5	10	
266	**Finish Work**	**115**	**04/10/06**	**13/03/07**	**$429,840**				
26	construct interior partition wall	10	04/10/06	17/10/06	$18,000	5	10	20	
26	interior doors	8	15/12/06	26/12/06	$15,000	4	8	16	
26	ceiling work	7	15/12/06	25/12/06	$18,000	4	7	14	



ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
31	plumbing work	4	27/10/06	01/11/06	$8,000	2	4	8	
31	HVAC work	4	27/10/06	01/11/06	$12,000	2	4	8	
31	electrical work	4	27/10/06	01/11/06	$6,400	2	4	8	
31	sprinkler system work	4	02/11/06	07/11/06	$4,800	2	4	8	
31	fire alarm work	4	02/11/06	07/11/06	$4,000	2	4	8	
317	**Finish Work**	**161**	**01/11/06**	**13/06/07**	**$377,100**				
31	construct interior partition wall	7	01/11/06	09/11/06	$12,600	4	7	14	
31	interior doors	5	07/02/07	13/02/07	$7,500	3	5	10	
32	ceiling work	4	18/01/07	23/01/07	$10,800	2	4	8	
32	flooring work	10	04/01/07	17/01/07	$12,500	5	10	20	
32	painting work	2	23/04/07	24/04/07	$3,200	1	2	4	
32	plumbing fixtures	15	02/04/07	20/04/07	$48,000	8	15	30	
32	HVAC fixtures	15	02/04/07	20/04/07	$48,000	8	15	30	
32	electrical fixtures	15	02/04/07	20/04/07	$36,000	8	15	30	
32	sprinkler system fixtures	15	02/04/07	20/04/07	$30,000	8	15	30	
32	fire alarm fixtures	15	02/04/07	20/04/07	$24,000	8	15	30	
32	signage	1	25/04/07	25/04/07	$4,000	1	1	2	
32	install souna/steam system	10	24/01/07	06/02/07	$60,000	5	10	20	
33	exterior final finish	3	02/11/06	06/11/06	$9,000	2	3	6	
33	exterior windows	3	02/11/06	06/11/06	$13,500	2	3	6	
33	exterior doors	2	27/12/06	28/12/06	$3,000	1	2	4	
36	top roof work	10	31/05/07	13/06/07	$55,000	5	10	20	
3330	**Basement Floor**	**55**	**27/04/06**	**12/07/06**	**$403,400**				
334	**Rough-in & High Level Work**	**14**	**27/04/06**	**16/05/06**	**$70,000**				
33	plumbing work	7	27/04/06	05/05/06	$16,800	4	7	14	
33	HVAC work	7	27/04/06	05/05/06	$18,200	4	7	14	
33	electrical work	7	27/04/06	05/05/06	$14,000	4	7	14	
33	sprinkler system work	7	08/05/06	16/05/06	$11,200	4	7	14	
33	fire alarm work	7	08/05/06	16/05/06	$9,800	4	7	14	
340	**Finish Work**	**50**	**04/05/06**	**12/07/06**	**$333,400**				
34	construct interior partition wall	5	04/05/06	10/05/06	$9,000	3	5	10	
34	interior doors	4	24/05/06	29/05/06	$12,000	2	4	8	
34	ceiling work	4	24/05/06	29/05/06	$14,400	2	4	8	
34	flooring work	9	11/05/06	23/05/06	$9,000	5	9	18	
34	painting work	3	27/06/06	29/06/06	$8,000	2	3	6	
34	plumbing fixtures	10	24/05/06	06/06/06	$56,000	5	10	20	
34	Vent. fixtures	15	30/05/06	19/06/06	$72,000	8	15	30	
34	electrical fixtures	10	30/05/06	12/06/06	$48,000	5	10	20	
34	sprinkler system fixtures	10	07/06/06	20/06/06	$44,000	5	10	20	
35	fire alarm fixtures	10	13/06/06	26/06/06	$40,000	5	10	20	
35	parking lot final finish	10	27/06/06	10/07/06	$17,000	5	10	20	
35	signage	2	11/07/06	12/07/06	$4,000	1	2	4	
3700	mechanical equipment	8	23/04/07	02/05/07	$400,000	4	8	16	
3550	**Final Site Work**	**17**	**25/06/07**	**17/07/07**	**$31,500**				



ID	Description	Remaining Duration	Start	Finish	Remaining Cost	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
3560	**complete curbs/sidewalk/landscaping/parking**	**10**	**25/06/07**	**06/07/07**	**$25,000**				
356	complete curbs/sidewalk/landscaping/parking	10	25/06/07	06/07/07	$0	5	10	20	
356	Envriomental Risk	0	09/07/07	06/07/07	$0	10		20	40%
3570	site lighting	5	09/07/07	13/07/07	$2,500	3	5	10	
3580	exterior signage	2	16/07/07	17/07/07	$4,000	1	2	4	
3590	**POST CONSTRUCTION (JOB COMPLETION & C...**	**59**	**03/05/07**	**24/07/07**	**$78,900**				
3600	**Inspection & Punchlist**	**57**	**03/05/07**	**20/07/07**	**$23,100**				
3610	**inspection & testing**	**2**	**03/05/07**	**04/05/07**	**$13,200**				
361	inspection & testing	2	03/05/07	04/05/07	$0	1	2	4	
361	Lack of specialized staff and lack of adequate am...	0	07/05/07	04/05/07	$0	10		20	050:002[60%]
3620	punchlist & close out	3	18/07/07	20/07/07	$9,900	2	3	6	
3630	**De-mobilization**	**57**	**07/05/07**	**24/07/07**	**$55,800**				
3640	**crane dismantling**	**7**	**14/06/07**	**22/06/07**	**$33,600**				
364	crane dismantling	7	14/06/07	22/06/07	$0	4	7	14	
364	Lack of protection in construciton site	0	25/06/07	22/06/07	$0	20		40	3050:009[5%]
3650	**general demobilization**	**7**	**07/05/07**	**15/05/07**	**$11,200**				
365	general demobilization	7	07/05/07	15/05/07	$0	4	7	14	
365	Lack of protection in construciton site	0	16/05/07	15/05/07	$0	10		20	3050:009[5%]
3660	clean up - touch up	2	23/07/07	24/07/07	$11,000	1	2	4	
MITIGAT	**All Mitigation Actions (except rejected)**	**347**	**16/01/06**	**15/05/07**	**$0**				
001:MI	Use advancement technology tools and experien...	42	*16/01/06	14/03/06	$0	21	42	84	
002:MI	Calculate the manpower arrangement correctly fo...	26	*30/01/06	06/03/06	$0	13	26	52	
003:MI	Improve the Enviroment by hiring speciliest people	11	*16/01/06	30/01/06	$0	6	11	22	
004:MI	Using the right coverage of insurance to avoid an...	11	*16/01/06	30/01/06	$0	6	11	22	
005:MI	Using advancement tools to improve the Technol...	11	*16/01/06	30/01/06	$0	6	11	22	
006:MI	Follow the Construction Budget by hiring experie...	11	*16/01/06	30/01/06	$0	6	11	22	
007:MI	Designate a Facility Manager to avoid any delays	42	*16/01/06	14/03/06	$0	21	42	84	
008:MI	Oversight, communication, and hire new vendors ...	42	*16/01/06	14/03/06	$0	21	42	84	
009:MI	Hire safety consultant and 24 hours security	347	*16/01/06	15/05/07	$0	174	347	694	
010:MI	Hire experienced expeditors to follow up & compl...	33	*16/01/06	01/03/06	$0	17	33	66	
011:MI	Provide MEP coordination drawings in the beginn...	43	*16/01/06	15/03/06	$0	22	43	86	
012:MI	Provide back up plan for deliveries to avoid any d...	25	*16/01/06	17/02/06	$0	13	25	50	



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ID	Description	Remaining Duration	Start	Finish	Remaining Cost	[illegible] 2 6 6 3 1 5 3 7 4 2 6 4 1 5 5 2 7 4 2 6 3 1 5 3 7 4 3 7 5 2	Minimum Duration	Most Likely	Maximum Duration	Task Existence %
TOTALS					$15,334,360					

2. RISK MANAGEMENT PROCEDURE

2.1. Process

The risk management was performed according to the following steps:

1) 40 risks were initially identified as a result of brainstorming sessions.
2) 12 risks were selected as seen below:
    1. Late Incomplete or wrong survey
    2. Lack of specialized staff and lack of adequate amount of workers
    3. Environmental Risks
    4. Insurance problems
    5. Technology Changes
    6. Construction Cost Overruns
    7. Facility Delays
    8. Vendor doesn’t meet project needs
    9. Lack of protection on Job site
    10. Permits and Licenses
    11. MEP Design and Discrepancies
    12. Delivery Delays
3) The Precision Tree software was used to produce influence diagrams for each of the 12 risks to identify the potential causes and effects.
4) A Qualitative Risk Analysis was performed using the causes and effects identified and Primavera Risk Analyzer through the elaboration of the Risk Register for the project.
5) Linking each risk in the Risk Register and the affected activities in the schedule, it was possible to determine the Quantitative Risk Analysis for the pre-mitigation scenario.

2.2. Risk Identification

Table 1. (pg.16) shows how the 40 identified risks. The 40 risk were split into seven categories: Design, Construction Documents, External, Environmental, Management, Safety, External, Organizational, Project Management, Site Safety, and Construction.

2.3. Risk Analysis

The project is currently ongoing and it is anticipated to be completed within an 18 month span at a budget of $15 million. The Risks that have the highest potential on impacting the cost and schedule are Site Safety, Environmental issues, permits and licenses, delayed deliveries, MEP, and Insurances problems.

2.4. Qualitative Risk Analysis

Primavera Risk Analysis Software has been used to rank the risks that were identified for this project. The risk scores listed in this section are based on the probability of occurring and their impacts on the schedule, cost and performance of the final product. These risks are then scored between 0 to 100, where 0 means this is a negligible risk to consider and 100 means it is a significant risk.

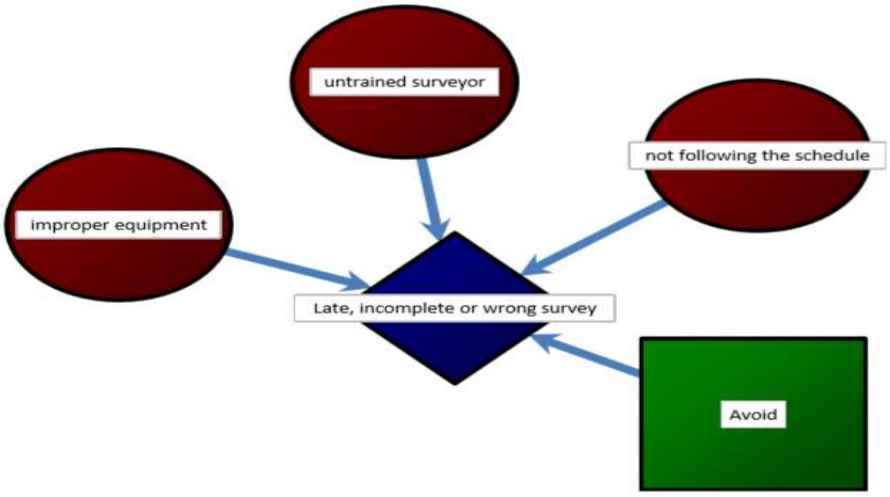
Table 1. Categorization of the Risks

40 Risks Identified for this project:							
Design	**Construction Documents**	**External**	**Environmental**	**Organizational**	**Project Management**	**Site Safety**	**Construction**
Late, incomplete or wrong survey	Failure to carry out the works in accordance with the contract	Permits and licenses	Environmental Impact Statement required	Wrong selection of material or equipment	Lack of specialized staff & Lack of adequate amount of workers	New alternatives required to avoid, mitigate or minimize environmental impact	Inadequate training for workers on project
Miscommunication in scope of project	Poor scoping	Noise and vibration due to construction impacts nearby business or residential area	Water quality issues	Stakeholders request late changes	Lack of proper management or oversight	Lack of protection on a construction site	inexperienced work force
Design errors & omission	Poor estimation & Budget based on incomplete data	Vendor Delays	Level of groundwater table	New stakeholders emerge and request changes			Broken equipment
MEP Design Discrepancies	Failure to complete with contractual quality requirements	Facilities delays	Change in environmental regulation can impact project	Project team conflicts			Lack of backup equipment
	Scheduling errors, contract delays	Vendors does not meet project needs	Environmental analysis incomplete				Improper testing

	Contradictions in the construction documents	Delays in permit acquisitions					
	Construction cost overruns	Laws and local standards change					
		Insurance problems					
		Delayed deliveries					
		Expired temporary construction permits					
		Technology changes					

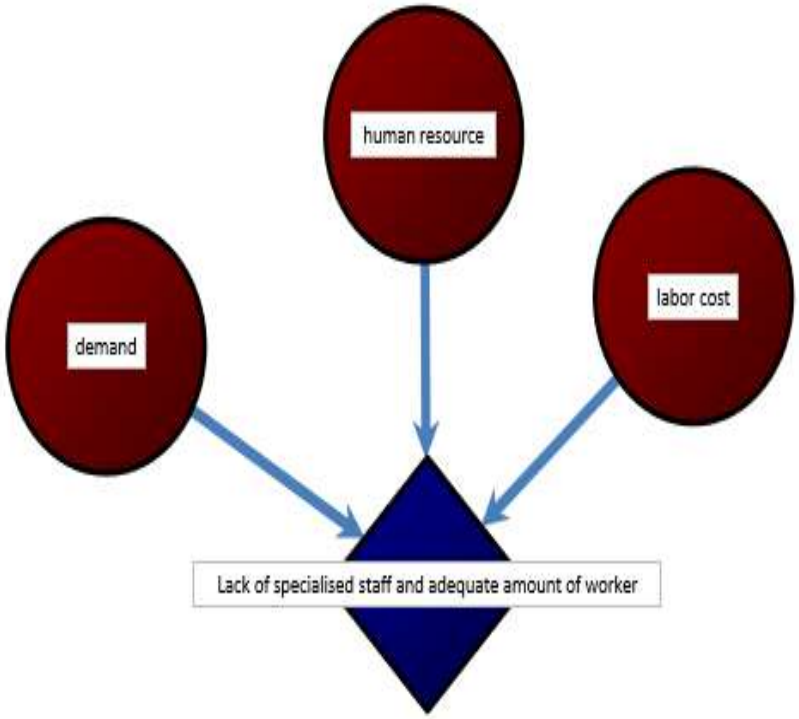
2.4.1-Late Incomplete or wrong survey

The factors like topography, existing buildings and infrastructure, underground infrastructure, are surveyed. Now from this influence diagram, we can say that improper surveying equipment can lead to wrong survey. Untrained surveyor can make mistake while surveying if he doesn't have adequate knowledge. Sometimes delay in following the schedule and as a result rushing through the surveying procedure may lead to incomplete or inaccurate survey. All of these can influence the cost of the project. This risk can be avoided by following proper schedule and using the appropriate surveying technique and equipment, otherwise it can cause delay in the project and can even affect the building structure adversely. This risk got score of 12 out of 100.



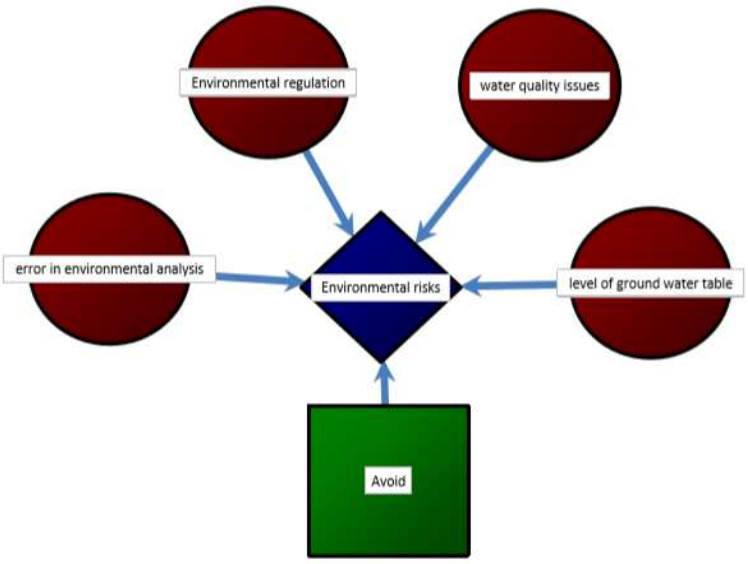
2.4.2-Lack of specialized staff and lack of adequate amount of workers

Skilled and adequate amount of staff is one of the most important requirement to accomplish any task successfully. As the real estate market is fluctuating, lot of laborers are switching to various other industries and this had led to a shortage of human resource. Lack of workers can highly affect the performance and cost of the project. This can be avoided by proper human resource management. This risk received score of 40 out of 100.



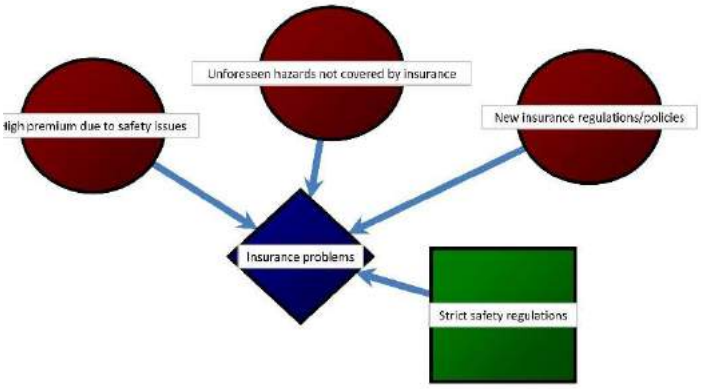
2.4.3-Environemtal Risks

During the scoping of the project, all the impacts of the proposed projects on the environment are analyzed and studied accurately. And the proposed project is approved once it is proved that it doesn't have any adverse impact on environment. Environmental risks can be due to various factors. Water quality of the nearby reservoir can be effected due to construction activities. Level of groundwater table not accurately measured can affect the foundation of the building. Sometimes changes in the environmental regulation during the project tenure can impact the project. Incomplete environmental analysis can also create the risk. Also, not following the procedure and inadequate resources can again contribute to environmental risks. These risks can create design errors, can cause delay, can increase cost of the project, and has high potential to impact humans and surrounding environment. And it is mandatory to avoid this risk for the project to go on. This risk received an average score of 23 out of 100.



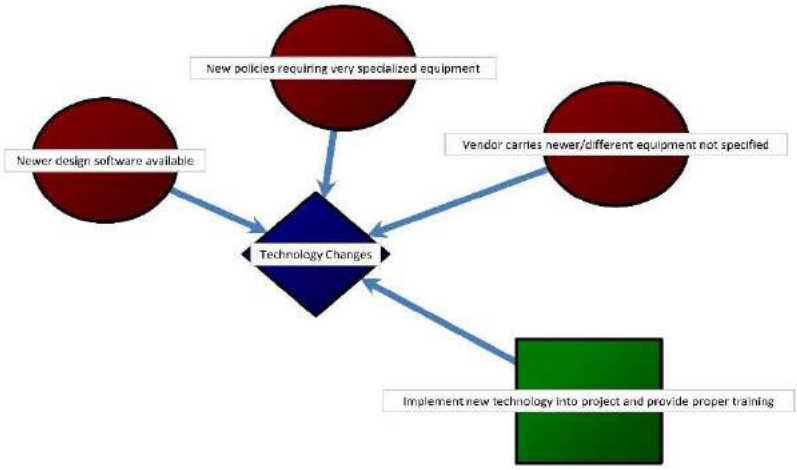
2.4.4- Insurance problems

To get proper funding or to even for the project bid to be considered, proper insurance backing is required. Proper insurance coverage is required to ensure the project is funded properly and there is a financial cushion in case of accidents, natural disasters, property damage and other unforeseen circumstances. Insurance provides coverage for employees, materials, and specialized equipment. Insurance problems can be caused by multiple accidents during construction. The higher the number of accidents, the higher the insurance premiums. Another cause for insurance problems can be facing unforeseen hazards not covered by the insurance. You might believe you are covered by the insurance, but the insurance company might disagree. Changes in the insurance company's policies can also cause insurance issues. Changes in regulations might require stricter safety protocols to be insured or might increase premiums. This risk can be mitigated by adopting strict safety regulations and providing safety training. This risk had a score of 40.



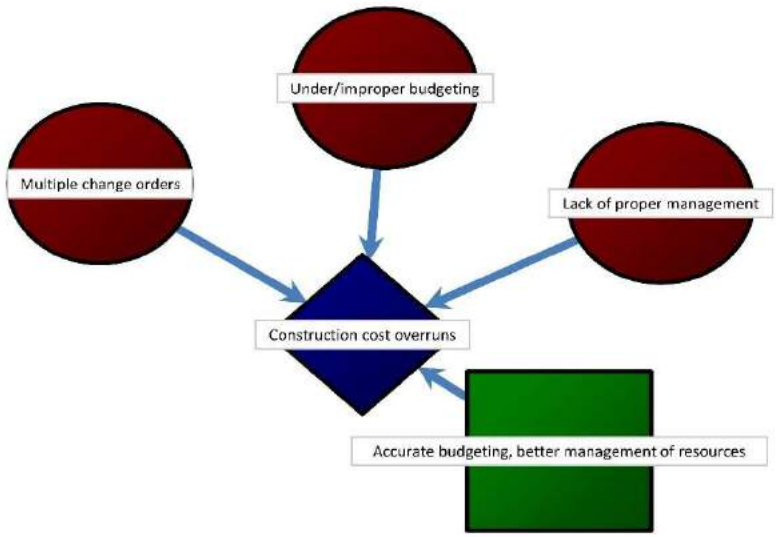
2.4.5 -Technology changes

Technology is developing and changing at a very fast pace. Some of these changes can affect the execution and consequently the schedule and cost of the project. Technology changes can occur in software used to design a project, material, or specialized equipment. The project owner might request the design to be updated or designed using a newer version of a software. This would require additional training for the design staff. If the materials or equipment need to be updated, a plan needs to be in place to implement these changes into the project. This risk had a score of 20.



2.4.6.-Construction Cost Overruns

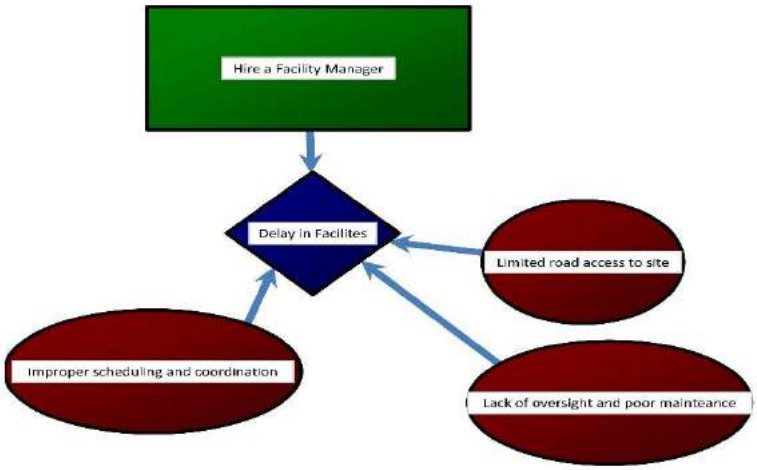
Cost overruns are caused when the costs of the project exceed the budget for the project. Without the proper funds to do the project, the project might come to a halt or not meet the required quality specifications. Cost overruns can be caused by multiple change orders in the project. With multiple change orders, the scope of the work exceeds the allotted budget. Another cause of cost overruns is underestimating the budget. This might be due to under-trained staff or an overzealous project team that overestimates their capabilities. Another cause of cost overruns is lack of proper management. Effective management is required in every stage the project to carefully monitor resources. This risk can be mitigated with better budgeting and better fiscal and resource management training for all staff. This risk had a score of 20.



2.4.7- Facility Delays

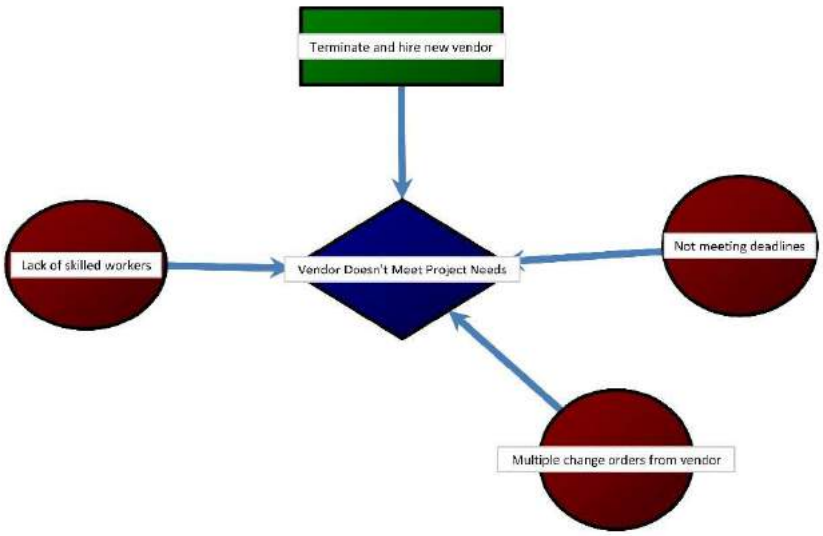
Rest rooms and wash areas have not been installed properly nor maintained daily can result into health and safety hazard on the job site. Workers are not able to clean any disaffect any cuts they may occur during the job which occur common on the jobsite. Not having the proper facilities can also lead to illnesses contracted from one person to another. If facilities are not maintained, A stop

work order can be issued followed by a fine. This will have a negative impact on the schedule and cost for the project. A facility manager should be hired to manage the facilities on the site to insure the area is being kept to normal standards and mitigate any potential health risk. The Risk received a score 2 out of 100.



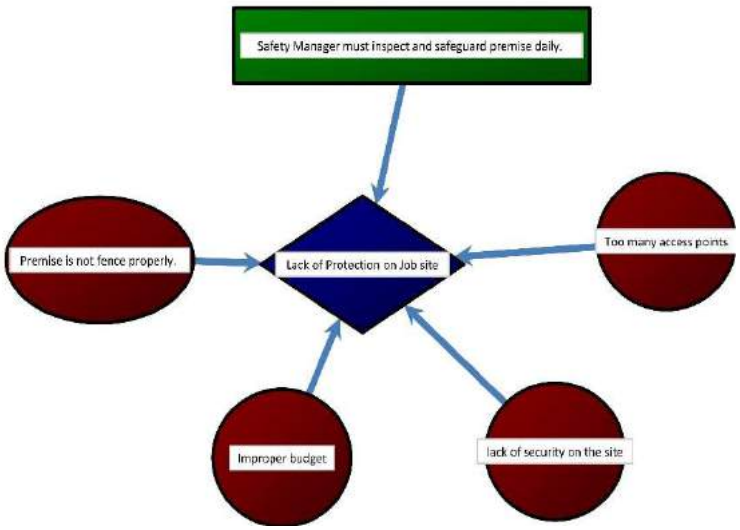
2.4.8 Vendor doesn’t meet project needs

The vendors are not able to meet the deadlines for the project nor perform the work properly. This is because the vendor has failed to have the right personal to perform the task they were hired to do. If the vendor is unable to complete the job they were originally hired to do, then the next vendor in the order of sequence will not be able to begin their task and they would likely not perform the task on when this current sequence is completed because of schedule conflicts commit jobs .The overall solution is to have experience management handle this by terminating the current contractor and hiring a more qualified contractor for the job which may cost a bit more, but can help get the schedule back on track to mitigate the delays. The Risk received a score of 20 out of 100



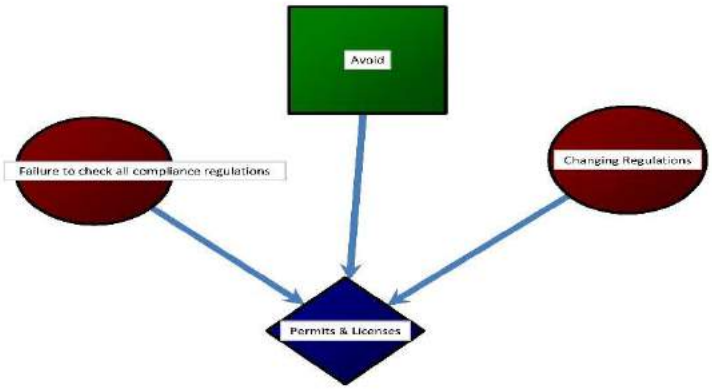
2.4.9- Lack of protection on Job site

The Job site is not be secured nor watched. There has been theft of both material and equipment. The theft of the various equipment includes (PPE) which increase the safety risks on the job site. The premise is not properly fenced off and there are too many point of entries. This will increase the cost of the project in addition delay the project. A safety manager needs to be hired and inspect and safeguard the premise on a daily basis. This Risk received a score of 20 out of 100.



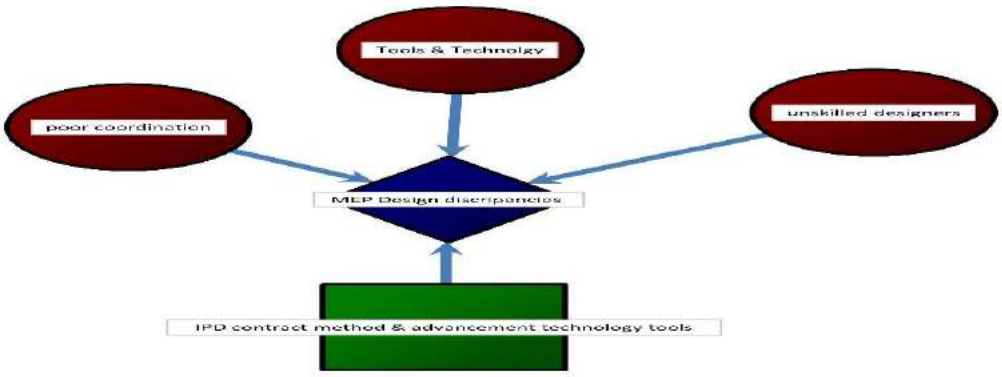
2.4.10-Permits & Licenses

Not obtaining a proper licenses & permits is one of the most common risk that effect the project completion. Failure to check all compliance regulations during the design stage, and changing regulations that will cause stop work orders with violations during construction stage then it will impact the project time and also the cost of the project. Using experienced staff & following all the required regulations has helped us to avoid such delay in the project. This risk received a score of 72 out of 100.



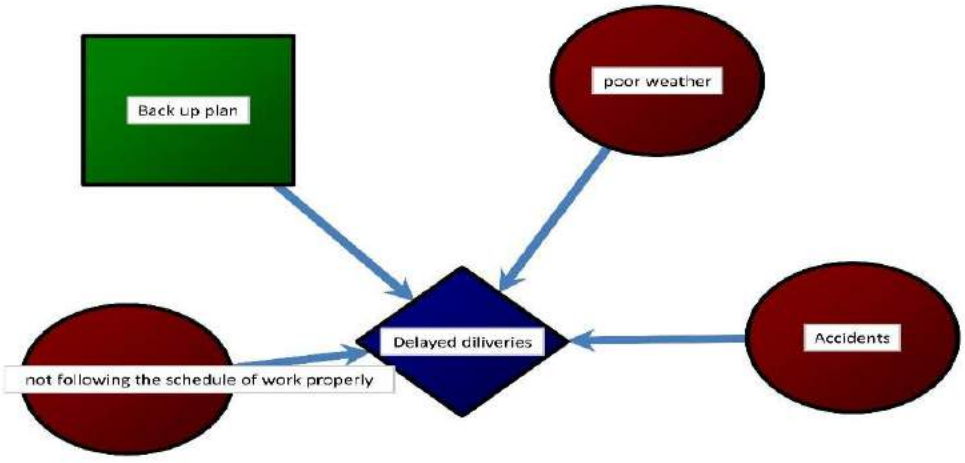
2.4.11-MEP Design Discrepancies

Incoordination of Deign drawing was extremely common risk in this project, Poor coordination of MEP Disciplines due to having poor coordination of MEP designers that will cause failure of sequencing of MEP installation according to regulation & requirements. Having discrepancies in Design drawings will impact the project schedule and also the cost of the project due to many changes will be required during construction stage to be able to meet the specification & regulations. Advancement in Technology by using proper tools along with experience staff has helped us to minimize the Design discrepancies. On the scale of 18 months, $15MM project, this has a high impact on the project schedule and budget, therefore receiving a score of 72 out of 100.



2.4.12-Delayed deliveries

Unforeseen delayed deliveries are extremely common on the construction sites, which could happen due to the responsible party did not follow the project schedule properly, and in addition to that, accidents and bad weather will effect the deliveries to be on time and according to the schedule as well. Advancement in technology has helped us to plan ahead of time all our deliveries and to avoid any disruptions. If there are any delays or disruptions in the deliveries, it will impact the schedule and also the cost of the project. This risk received a score of 20 out of 100.



Risk Register created in Primavera Risk Register

Risk			Pre-Mitigation (Data Date = 26/03/16)				
ID	T/O	Title	Probability	Schedule	Cost	Performance	Score
001	T	Late, Incomplete or Wrong Sur...	L	H	H	M	12
002	T	Lack of specialized staff and la...	M	VH	M	H	40
003	T	Envriomental Analysis incompl...	H	VH	VH	VH	56
004	T	Insurance problems	M	M	M	M	10
005	T	Technology changes	M	H	M	H	20
006	T	Construction Cost Overruns	M	M	M	H	20
007	T	Facilities delays	VL	M	L	L	2
008	T	Vendor Delays	M	H	L	M	20
009	T	Lack of protection in construci...	M	H	H	M	20
010	T	Permits and Licenes	VH	VH	M	H	72
011	T	MEP Design and Descripencies	VH	VH	H	VH	72
012	T	Delay Delieveries	M	H	M	H	20

2.5. Quantitative Risk Analysis

A quantitative risk analysis is a further analysis of the highest priority risks during which a numerical or quantitative rating is assigned in order to develop a probabilistic analysis of the project. This analysis allows the project manager to determine how much risk a project has and where in the project it is located. The project manager must determine this in order to decrease the risk, make more informed judgments, determine which risks require a response or a contingency, deal earlier with the high-risk aspects of the project, and document the low risks. This process also requires the use of educated guesses on probabilities of occurrences and impacts.

Quantitative Risk Analysis helps the project manager identify the most important risks and the greatest threats to the project. But that is not the most important step—good risk response planning is. Quantitative Risk Analysis does provide insight on possible alternatives and options and a sense of the overall risk and opportunity of the project. It also helps justify setting up

contingencies in both the schedule and the budget. The goal of risk quantification is to assess the impact of key risks and to assign a quantitative value for risks that have been ranked by the Qualitative Risk Analysis process. This process analyzes the assumptions made in the Qualitative Risk Analysis process by accumulating estimates and making calculations to determine the cost of risks in our Risk Register.

During Quantitative Risk Analysis we were able to determine the following below:

- Quantify the possible outcomes for the project and their probabilities
- Assess the probability of achieving specific project objectives
- Identify risks requiring the most attention by quantifying their relative contribution to overall project risk
- Identify realistic and achievable cost, schedule, or scope targets, given the project risks
- Determine the best project management decision when some conditions or outcomes are uncertain

2.6. Risk Response Planning

There are four strategies to risk response planning available to use at his or her discretion.

Avoid-Risk can be avoided by removing the cause of the risk or executing the project in a different way while still aiming to achieve project objectives. Not all risks can be avoided or eliminated, and for others, this approach may be too expensive or time-consuming. However, this should be the first strategy considered

Transfer-Transferring risk involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. The aim is to ensure that the risk is owned and managed by the party best able to deal with it effectively. Risk transfer usually involves payment of a premium, and the cost-effectiveness of this must be considered when deciding whether to adopt a transfer strategy.

Mitigate-Risk mitigation reduces the probability and/or impact of an adverse risk event to an acceptable threshold. Taking early action to reduce the probability and/or impact of a risk is often more effective than trying to repair the damage after the risk has occurred. Risk

mitigation may require resources or time and thus presents a tradeoff between doing nothing versus the cost of mitigating the risk.

Accept-This strategy is adopted when it is not possible or practical to respond to the risk by the other strategies, or a response is not warranted by the importance of the risk. When the project manager and the project team decide to accept a risk, they are agreeing to address the risk if and when it occurs. A contingency plan, workaround plan and/or contingency reserve may be developed for that eventuality.

Risk			Pre-Mitigation (Data Date = 26/03/16)					Mitigation			Post-mitigation				
ID	T/O	Title	Probability	Schedule	Cost	Performance	Score	Response	Title	Total Cost	Probability	Schedule	Cost	Performance	Score
001	T	Late, Incomplete or Wrong Sur...	L	H	H	M	12	Avoid	Avoid Wrong ...	$5,000	M	L	VL	L	5
002	T	Lack of specialized staff and la...	M	VH	M	H	40	Reduce	Reducing Lak...	$50,000	H	H	H	H	28
003	T	Envriomental Risk	H	H	H	H	28	Avoid	Avoid Enviro...	$10,000	M	M	VL	M	10
004	T	Insurance problems	M	M	M	M	10	Reduce	Reducing Ins...	$20,000	L	N	M	VL	6
005	T	Technology changes	M	H	M	H	20	Accept	Improve Tech...	$15,000	M	H	M	H	20
006	T	Construction Cost Overruns	M	M	M	H	20	Reduce	Improve & Re...	$0	M	L	L	M	10
007	T	Facilities delays	VL	M	L	L	2	Accept	Avoid Facilitie...	$0	VL	M	L	L	2
008	T	Vendor Delays	M	H	L	M	20	Reduce	Avoid & Redu...	$0	L	M	M	M	6
009	T	Lack of protection in construci...	M	H	H	M	20	Avoid	Improve the p...	$0	VL	M	H	N	4
010	T	Permits and Licenes	VH	VH	M	H	72	Avoid	Follow up per...	$3,000	H	H	L	N	28
011	T	MEP Design and Descripencies	VH	VH	H	VH	72	Reduce	Avoid any De...	$0	M	H	H	M	20
012	T	Delay Delieveries	M	H	M	H	20	Reduce	Avoid Deliveri...	$0	M	M	L	L	10

2.7. Risk Monitoring, Controlling, and reporting

Late, Incomplete or Wrong Survey:

Faulty survey will result into faulty and inappropriate project. It can highly affect the cost and schedule of the project. In order to control and avoid it, appropriate equipment used by skilled professional is required. Inaccurate survey affects all the succeeding tasks of the project. Thus, this risk has to be avoided in any cost.

Lack of specialized staff and lack of adequate amount of workers:

In order to accomplish any task efficiently, specialized staff and adequate amount of workers are the must. Lack of proper estimation can also result in the scarcity of the resources. Thus, sometimes during the high demand period due to inaccuracy in estimation, there can be the case where labor demand is not fulfill. This can directly affect the cost and schedule of the project. So as to reduce this risk, following schedule with accurate estimation is required. This risk can also be mitigated by adopting adequate use of technology in place of labor.

Environmental risk:

Monitoring of Environmental risks should start right from the scoping stage. Presence of one adverse impact of project on environment can hinder the progress of whole project. In order to identify what all risks are involved, risk assessment process should be followed in the beginning stage of project. Identification of risks at right time will not affect the scope, cost and schedule of the project. Presence of Environmental risks can even cause the penalties and can be hazardous to the surrounding environment and human health. This risk has a potential to shut down the project, and thus it has to be avoided**.**

Delayed Deliveries is one of the major and most common issue on any construction site. It can highly affect the cost, can decrease the productivity, and can create issues between owners and contractors. Sometimes contract is even terminated due to delay

occurrences. In order to avoid this risks, resources should be planned, ordered and stored well in advance. Proper provisions should be made for storage and handling of resources. Thus, this situation has to be reduced unto large extent.

Facility Delays

This can result in stop work order and be issued several costly health violations which will both cost time and money. This risk can simply be handled and avoided if someone is designated as the facility manager to oversee and maintain the facilities such as restrooms and wash areas on the job site on a daily basis. The Risk can overall be avoided.

Lack of protection on Job site

In order to prevent any theft on the jobsite and reduce worker injury, a security company and safety consultant should be hired. The security company will need to be on site 24 hours a day to prevent theft and guard the premise. The site should be fenced off completely with one entrance and one exit in and out of the premise. A safety consultant should come to inspect, and recommend on remediating any safety defiance's on the site on a daily basis. This Risk has the potential to delay the project and thus these safeguards must be implemented in order to avoid the risk.

Vendor doesn't meet project needs

Monitoring the progress of each of the vendors should begin when they start and finish and overall rate their progress. If the vendor is not performing the tasks as to the standards they promise, then it is important to communicate directly to the vendor to see if they are able to perform the work properly and provide an alternative in completing the tasks. If the vendor cannot under any circumstance complete the work they were hired to do, you may need to terminate them and hire a new vendor that can perform the task which can result in a small delay. This would be a last resort if there is nothing than can be done by the current vendor. This situation can be mitigate any delays with the schedule.

MEP Design Discrepancies

Monitoring this risks should start right from the design stage. All the parties from the engineers, contractors, project managers, and owners should meet frequently and develop a plan for MEP Design. Once a plan has been agreed upon by all parties, make sure that the project manager creates a schedule and all parties must review and approve before beginning the installation of the MEP. This this will overall reduce the costs and delays for this project. This Risks can only be reduced.

Insurance Problems

Insurance problems can be prevented by carefully setting up the insurance contracts in the beginning of the project. By clearly allocating costs and responsibility and coverage for insurance between the insurance company and other parties, many insurance problems can be mitigated before they occur. Introducing proper insurance clauses and coverage can reduce and even avoid insurance problems. If an insurance problem does occur, it is important to have extra funds on hand in case of an emergency.

Technology changes

Technology changes should be accepted if they affect the project or are required by the project owner. Software changes can be easily implemented. Older software easily updates to the newer version. Also, most new technology is usually more efficient in terms of production and time savings. If technology changes are to be implemented, it is important to have a clear plan to transition the technology into the project timeline. If training is needed, it should be provided.

Construction Cost Overruns

Careful planning, proper financial and resource management is necessary to reduce any construction costs overruns. Proper budgeting should be implemented throughout the project life. Proper planning and budgeting in the early stages of the project can be the key to not having construction costs overruns. Proper resource management training should be implemented. Proper budgeting and resource assignment is needed to make sure the project remains funded and all the tasks are completed.

Permits and Licenses

Proper permits and licenses must be issued in time for the project to take place. If a permit or license expires, this can cause the project to immediately come to a stop. Therefore, this risk should be avoided. Enough time should be allocated to do the paperwork and for the permits/licenses to be processed. The expiration dates of licenses and permits must be known and dealt with in a timely fashion. Proper permits and licenses are crucial for the project to take place and be completed in a timely fashion. If an issue does occur with getting a permit/license, it should be dealt with immediately.

3. CONCLUSIONS AND RECOMMENDATIONS

The Schedule provides overall the duration and cost of the total project. In order to have the most accurate schedule we implemented float times to determine the overall duration.

A Risk Analysis is critical before the final pricing and deadlines that are put into place. Any discrepancy in the finish date and budget of the project, the project for all parties involved will significantly earn less profit.

The project was originally budgeted at $15 Million Dollars. After a more detailed cost estimation of the project, the cost was initially higher by $1.5 Million Dollars which totals to $16,523,915. After analyzing various risks and performing the cost simulations post mitigation, we were able to reduce that additional cost by $500,000.00 which totals to $15,990,248. The duration will take slightly take longer than anticipated on proposed 18month duration. After analyzing the risks associated with this project, we have determine it will take an additional 5 months (705 days) to complete this project post mitigation. With the pre-mitigation we were able to calculate the duration to 807 days.

Overall A risks plan must be put into action and all risks must be analyze to determine the total duration and cost of the project.

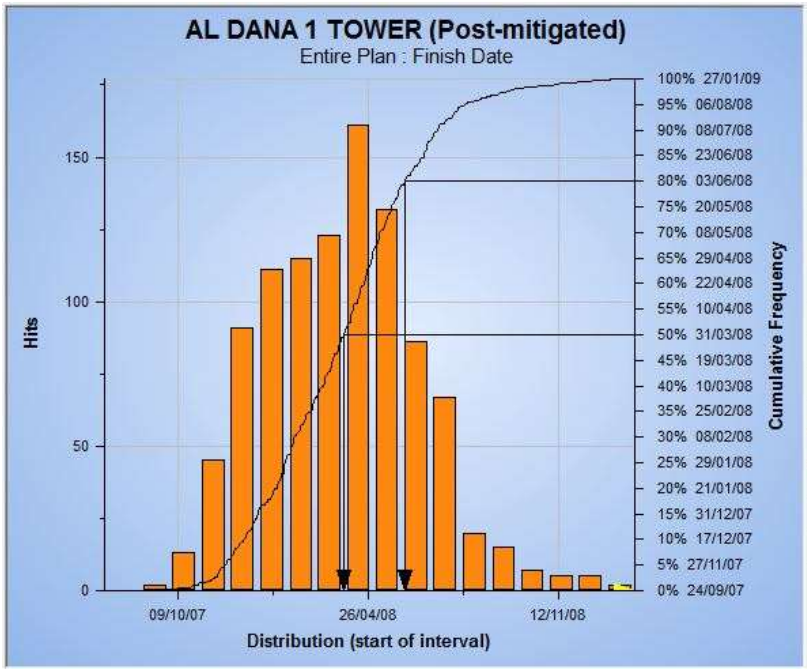
4. APPENDICES

4.1. Description of Tools and Practices

The Precision Tree software was used to produce diagrams of the events of the specific risks. The diagrams gave clear guidance during the qualitative risks analysis portion. The Primavera Risk Analyzer software was used to aid in the process of ranking the potential risks that could be encountered during the course of this project. The software was also was also used for the quantitative risk analysis. Based on each risk, we were able to plan a strategy and program to help mitigate or reduce the negative impact of the risk and generate simulations of possible scenarios based on the risks and mitigations that we have imposed. The simulations help produce results on how much the project would overall costs.

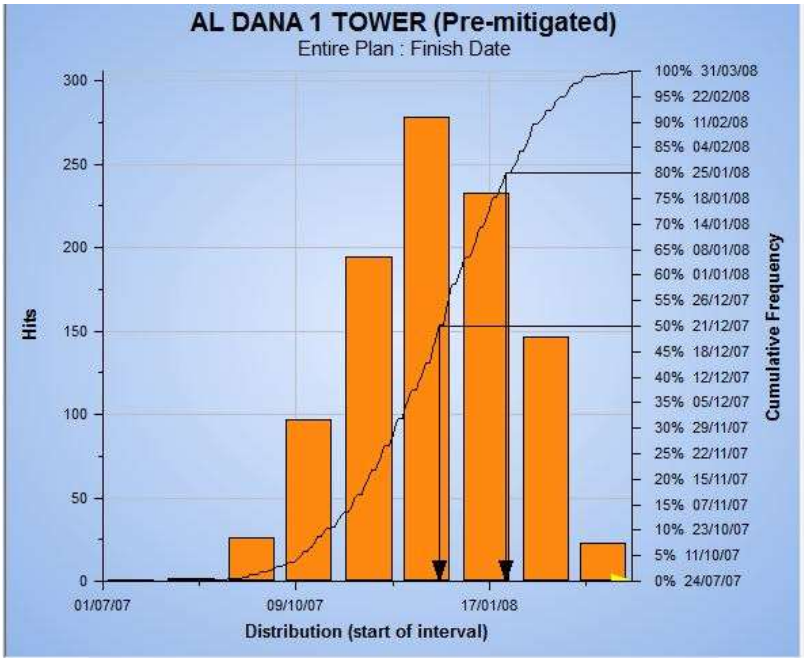
4.2 Simulation Reports

Figure 1. Finish Date Post-Mitigated



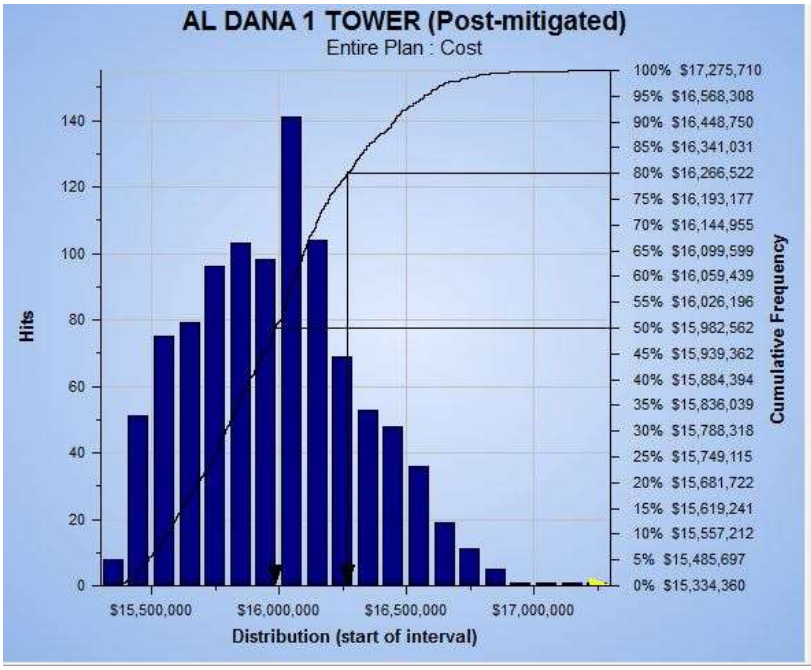
Data	
Finish Date of:	
Entire Plan	
Analysis	
Iterations:	1000
Statistics	
Minimum:	24/09/07
Maximum:	27/01/09
Mean:	30/03/08
Bar Width:	month
Highlighters	
Deterministic (24/07/07)	<1%
50%	31/03/08
80%	03/06/08

Figure 20. Finish Date Pre-Mitigated



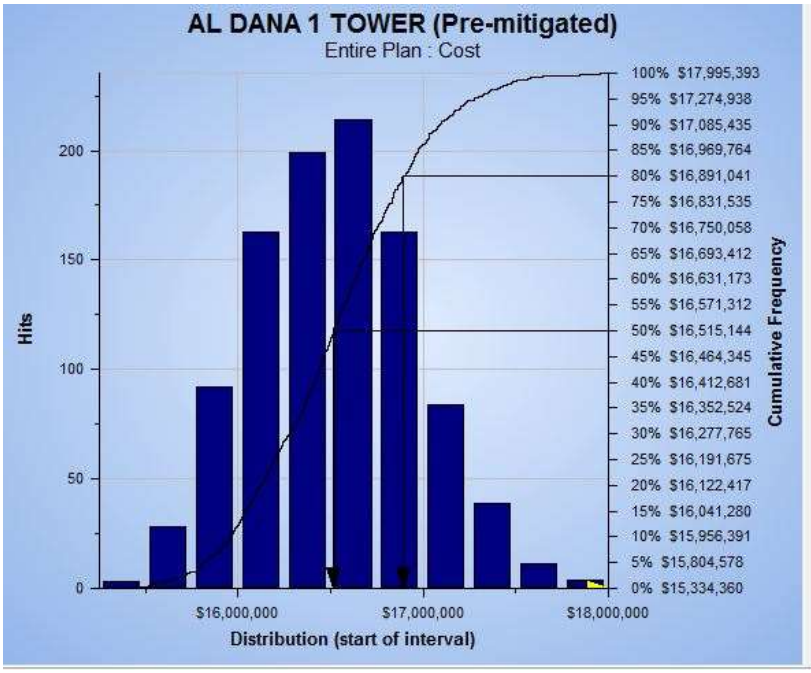
Data	
Finish Date of:	
Entire Plan	
Analysis	
Iterations:	1000
Statistics	
Minimum:	24/07/07
Maximum:	31/03/08
Mean:	20/12/07
Bar Width:	month
Highlighters	
Deterministic (24/07/07)	<1%
50%	21/12/07
80%	25/01/08

Post Mitigated Cost



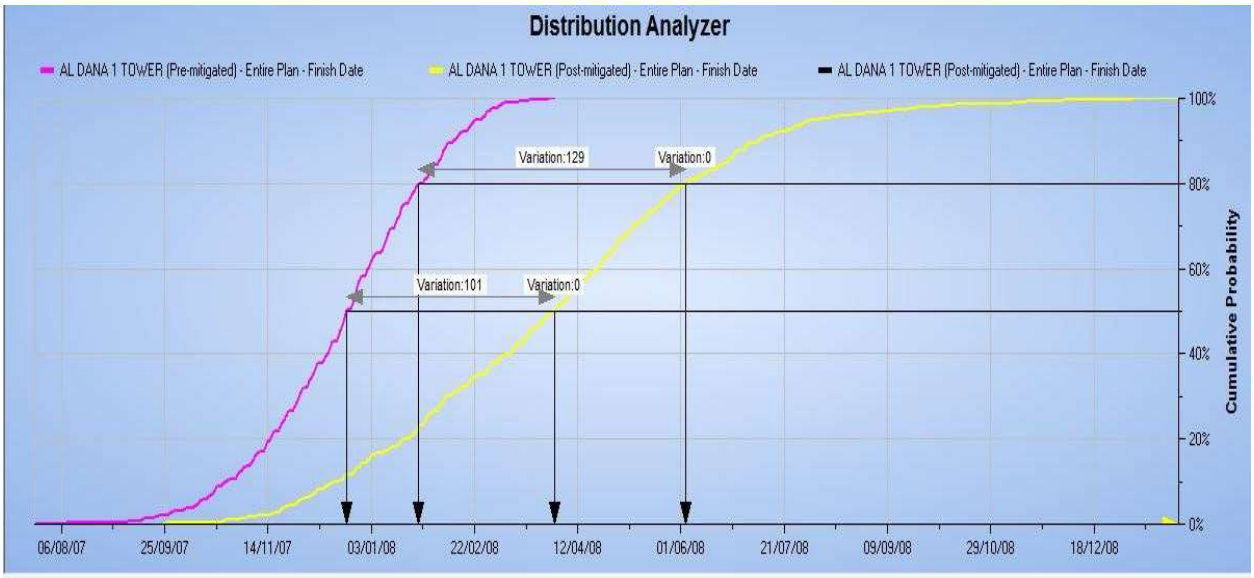
Data	
Cost of:	
Entire Plan	
Analysis	
Iterations:	1000
Statistics	
Minimum:	$15,334,360
Maximum:	$17,275,710
Mean:	$15,990,248
Bar Width:	$100,000
Highlighters	
Deterministic ($15,334,...	<1%
50%	$15,982,562
80%	$16,266,522

Pre-Mitigated Cost



Data	
Cost of:	
Entire Plan	
Analysis	
Iterations:	1000
Statistics	
Minimum:	$15,334,360
Maximum:	$17,995,393
Mean:	$16,523,915
Bar Width:	$250,000
Highlighters	
Deterministic ($15,334,...	<1%
50%	$16,515,144
80%	$16,891,041

Distribution Analyzer



	Show	Deterministic Value	Deterministic probability	Minimum	Maximum	Mean	Selected: 50%
AL DANA 1 TOWER (Pre-mitigated) - Entire Plan - Finish Date	☑	24/07/07	<1%	24/07/07	31/03/08	20/12/07	21/12/07
AL DANA 1 TOWER (Post-mitigated) - Entire Plan - Finish Date	☑	24/07/07	<1%	24/09/07	27/01/09	30/03/08	01/04/08
AL DANA 1 TOWER (Post-mitigated) - Entire Plan - Finish Date	☑	24/07/07	<1%	24/09/07	27/01/09	30/03/08	01/04/08

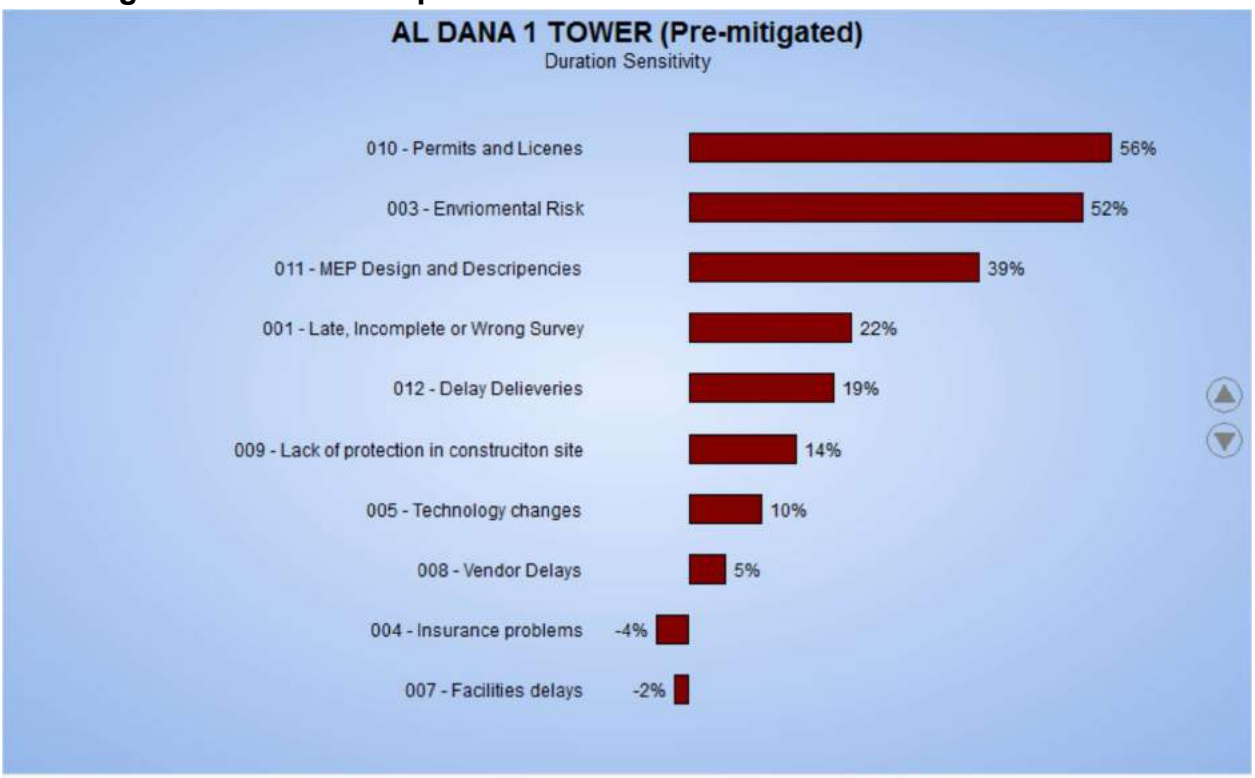
Pre-mitigation matrix:

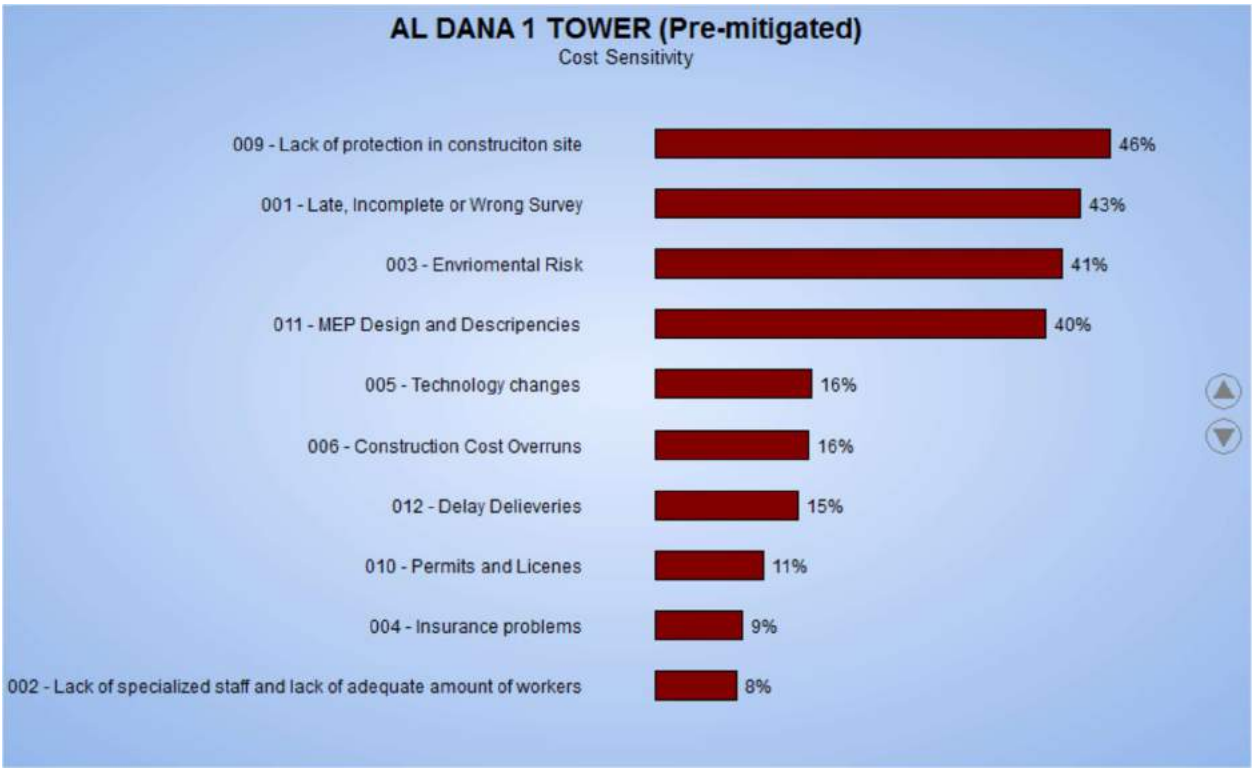
	Very Low	Low	Medium	High	Very High
Very High					010 - Permits and Licenes 011 - MEP Design and Deconpendes
High				003 - Enviromental Risk	
Medium			004 - Insurance problems	005 - Technology changes, 006 - Construction Cost Overruns, 008 - Vendor Delays, 009 - Lack of protection in construciton site, 012 - Delay Delieveries	002 - Lack of specialized staff and lack of adequate amount of workers
Low				001 - Late, Incomplete or Wrong Survey	
Very Low			007 - Facilities delays		

Post-mitigation matrix:

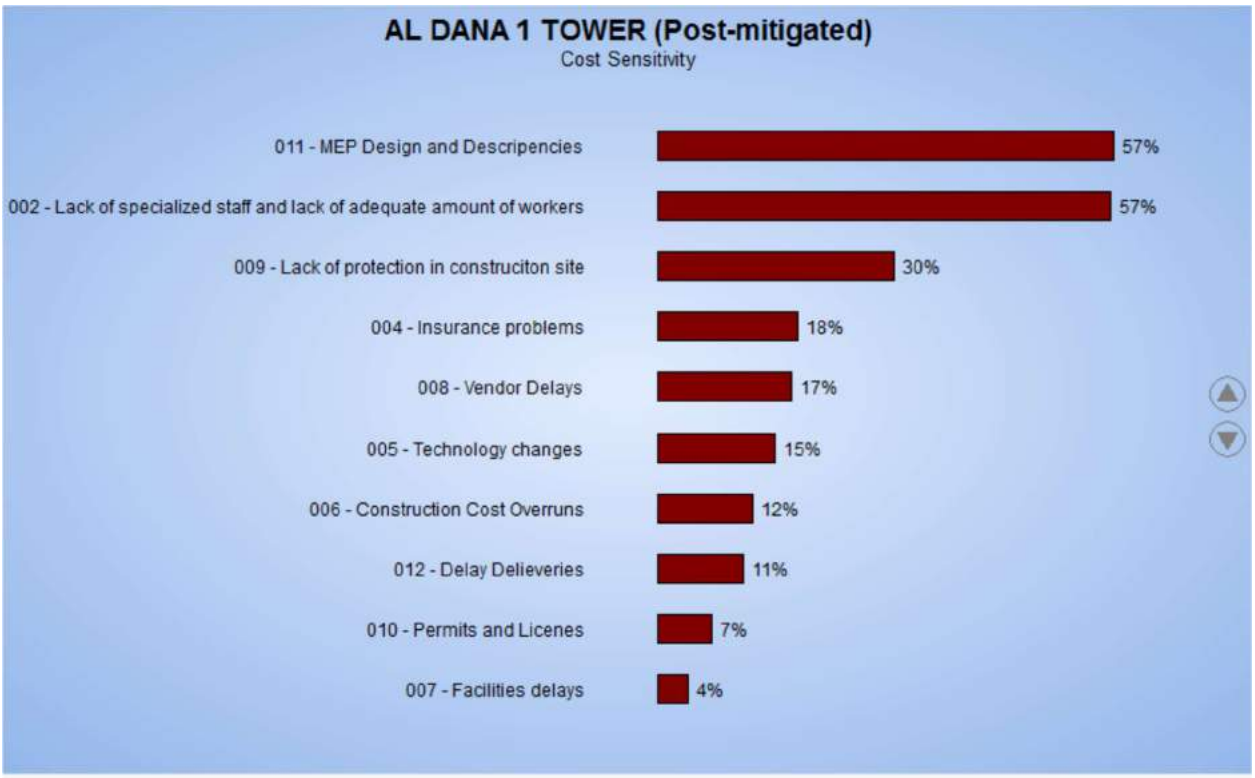
	Very Low	Low	Medium	High	Very High
Very High					
High				002 - Lack of specialized staff and lack of adequate amount of workers, 010 - Permits and Licenes	
Medium		001 - Late, Incomplete or Wrong Survey	003 - Enviromental Risk, 006 - Construction Cost Overruns, 012 - Delay Delieveries	005 - Technology changes, 011 - MEP Design and Descripencies	
Low			004 - Insurance problems, 008 - Vendor Delays		
Very Low			007 - Facilities delays	009 - Lack of protection in construciton site	

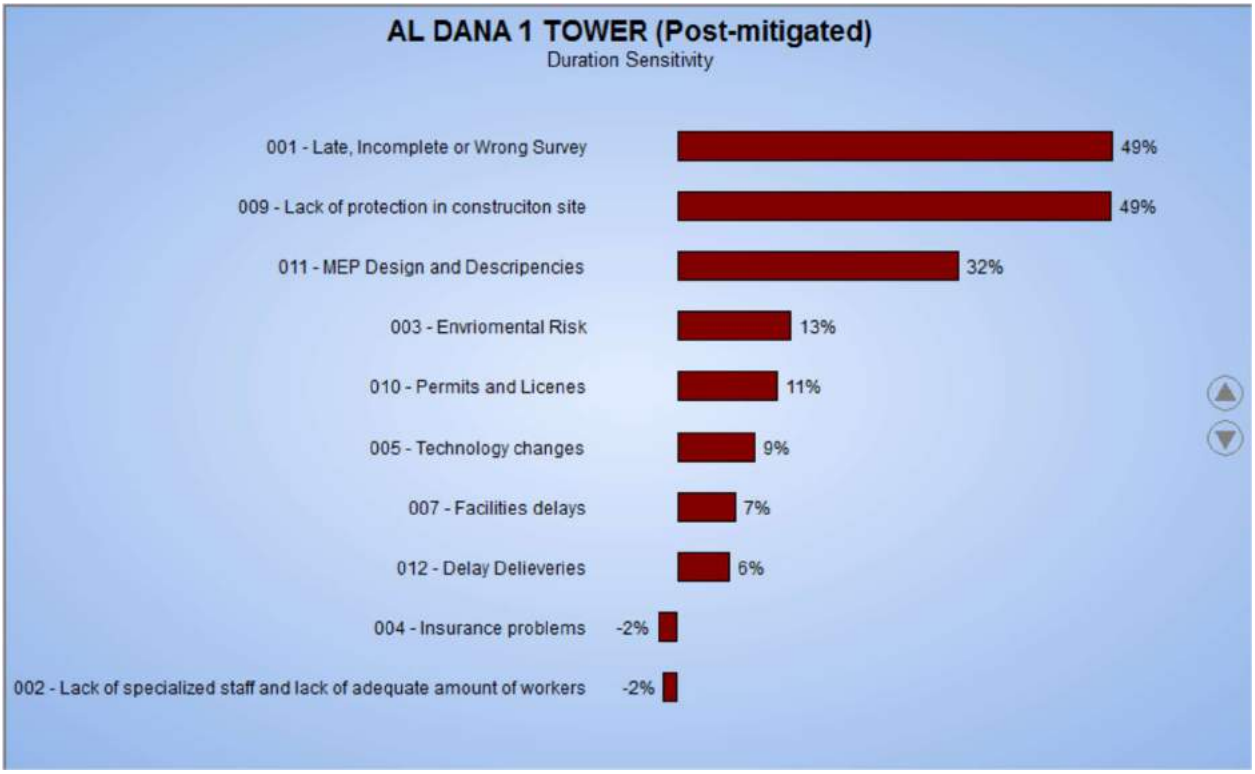
Pre Mitigation-Tornado Graph:





Posts Mitigation-Tornado Graph:




AL DANA 1 TOWER (Post-mitigated)
Duration Sensitivity
001 - Late, Incomplete or Wrong Survey
49%
009 - Lack of protection in construciton site
49%
011 - MEP Design and Descripencies
32%
003 - Envriomental Risk
13%
010 - Permits and Licenes
11%
005 - Technology changes
9%
007 - Facilities delays
7%
012 - Delay Delieveries
6%
004 - Insurance problems
-2%
002 - Lack of specialized staff and lack of adequate amount of workers
-2%