CM 4221 Construction Project Management

Fall 2017—Christofer Harper

Case Study #2—LSU Engineering Library

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POTENTIAL RISK IDENTIFICATION

1. If the survey is inaccurate/incomplete happens, then the project's design may have to be revised, which will affect the schedule, which causes a delay in the project's start date.
2. If the nature of the construction site is too complex happens, then additional right of way or construction easements may be required to complete the work as anticipated, which will impact the budget, causing an increase to the overall cost of the project.
3. If a worker encounters hazardous materials during construction happens, then it required to have an on-site storage area, which will affect the site layout, causing a decrease in the safety of those on site.
4. If an increase in structural steel happens, then an increase in the anticipated price for the joists, beams, columns, and decks will occur, which will affect the material budget, which will impact the total cost of the project.
5. If there are no plans for the on campus job site parking for employees happens, then tickets will be distributed, which will impact indirect cost.
6. If any design changes occur, then it would require additional environmental analysis, which will impact the cost and delay job site activities, which will delay the start of construction.
7. If electrical power lines not seen and in conflict with construction happens, then the site work activities will be delayed, which will increase the duration of the project.

8. If the project is completed on an active college campus then additional safety and site security must be utilized to keep students and faculty away from danger, which will increase cost.
9. If utility companies are unable to relocate their utilities when scheduled, then the site work activities will be delayed, which will increase the duration of the project.
10. If contractors do not anticipate delays due to school and sporting activities happens, then the contractor will have an unrealistic budget and schedule, which will delay construction and run the risk of the project not being completed.
11. If contractors do not have quality control plans, then work will have issues, which could lead to injury, or unacceptable quality issues.
12. If a structure fire happens, then an increase in material and labor, which will affect the contractor, causing a schedule impact and will impact the budget
13. If there is a shortage in labor for a subcontractor, then the delayed work will affect everyone that is relying on them, causing an impact to the work schedule.
14. If a contractor/owner dispute arises, then the potential for delayed payment can happen, which will affect the contractor, causing decrease in cash flow which will impact the completion of assigned tasks.
15. Payment terms are not met, then the schedule will be affected because no materials will be bought which will affect the whole entire entity that is in with the project, causing an impact to the schedule.

PROBABILITY AND IMPACT SCALE

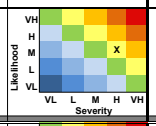
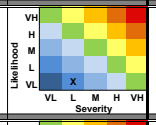
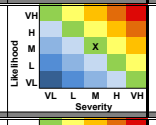
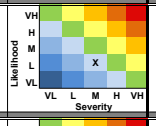
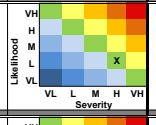
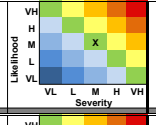
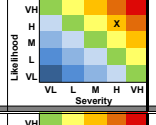
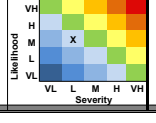
Probability	Description	Cost	Schedule
5 Severe >50%	If risk event should occur, the impact will be so severe that one or more desired outcomes will not be met and the project end item will be effectively useless.	Severe cost increase of greater than 50% deeming the project's end item to be effectively useless.	Severe schedule delay of key milestones by half a year's time.
4 High 30-50%	If risk event occurs, the project will have a major impact on reaching completion goals where the scope may be unacceptable.	Major cost increase. Will increase the budget by 30% but no more than 50%.	Major delay in the project schedule of a few months.
3 Moderate 15-30%	If risk event occurs, the project will have a major impact on reaching completion goals where some will fall below levels of acceptance.	The budget will be impacted by an increase of more than 15% but less than 30%	The schedule will have an impact of a couple of months behind.

Probability	Description	Cost	Schedule
2 Low 5-15%	If risk event should occur, it will have a minor impact on achieving desired goals where only very demanding applications are affected.	Minor cost increase. Will increase the budget less than 15%.	Minor schedule change of no more than a few weeks.
1 Minimal <5%	If risk event should occur, it will have little to no impact on the scope of the project.	Insignificant cost increase. Does not affect budget.	Insignificant time increase. Milestones of project will be met without adjustments.

PROJECT RISK REGISTER

Project Title	LSU ENGINEERING LIBRARY	**Project Manager**	Christofer Harper
Project No.	4221	**Telephone**	(225) 578-4221
Date	11/28/17	**Email**	PROJECTMANAGEMENT@CM4221.EDU

PROJECT RISK MANAGEMENT PLAN

Priority	Risk Identification							Qualitative Analysis				Quantitative Analysis			Response Strategy			Monitoring and Control		
	Status	ID #	Date Identified	Functional Assignment	Threat/ Opportunity Event	Risk Statement	Risk Trigger	Type	Probability	Impact	Risk Matrix	Probability	Impact	Expected Value	Strategy	Response Actions including advantages and disadvantages	Affected Project Activity (by CSI Division)	Responsibilty (Task Manager)	Status Interval or Milestone Check	Date, Status and Review Comments
	Retired	1	7/9/16	Geotechnical	Soil Conditions	If the soil found on site are expansive clay which is normal for this region, then a deep foundation will need to be designated and implemented, which could lead to cost and schedule implications	A testing agency will be utilized to take soil bores for testing. This will provide the team an idea of the depth needed for the caissons. The results of the test will determine the actions to take.	Cost Schedule	Moderate	High		20%	$250,000	$50,000	Acceptance	Use a deep, special foundation due to the expansive clays found in the region. This will cost more money, but will allow for a safer and longer lasting facility	31 - Earthwork	Structural Engineer & Geotechnical Engineer	Weekly	Schematic design: Structural engineer designed a deep foundation consisting of drilled piers and grade beams. An additonal cost was realized. Costs were covered by allowance
1	Dormant	1	11/28/17	Geotechnical	Survey	If the survey is inaccurate/incomplete happens, then the project's design may have to be revised, which will affect the schedule, which causes a delay in the project's start date.	Resurveying the field to test for accuracy. This will prevent the project's design from having to be revised and keeping the start date at December 15, 2018.	Cost Schedule	Very Low	Low		5%	50,000	$2,500	Avoidance	Resurveying the land will cost an extra days worth of work, but if completed before hand the start of the project will for sure stay on schedule.	01 - General Conditions	Surveyor	Before start of project	Once reviewed one time before the project is projected to start, then the task will be complete and no longer necessary.
2	Active	2	11/28/17	Geotechnical	Access to Site	If the nature of the construction site is too complex happens, then additional right of way or construction easements may be required to complete the work as anticipated, which will impact the budget, causing an increase to the overall cost of the project.	Realizing how many people walk or drive in that area and being able to coordinate inbetween the breaks of traffic will reduce the amount of complexity with access to the job site.	Cost Schedule	Moderate	Moderate		15%	30,000	$4,500	Mitigation	Knowing when materials should be dilivered to the site in relations to the common traffic around the site will benefit from disrupting the flow and slowing down the time to unload trucks.	02 - Exisiting Conditions	Project Manager	Weekly	Continual check up on proper delivery and entrance/exit on the site will prevent backflow and further congestion of construction progress and pedestrians
3	Active	3	11/28/17	Hazardous	Site Layout	If a worker encounters hazardous materials during construction happens, then it required to have an on-site storage area, which will affect the site layout, causing a decrease in the safety of those on site.	Ensuring that no hazardous materials are on the site,nor will be found on the site will prevent from having to purchase additional disposal containers as well as having a place on site to store these containers.	Cost Schedule	Low	Moderate		15%	60,000	9,000	Transference	Knowing that no hazardous materials will be found on the site will eliminate the space and money needed for the appropriate containers for disposal of said materials.	02 - Exisiting Conditions	Superintendent	Monthly	Regularly checking to ensure that no hazardous disposal containers are necessary will allow more space on the site while preventing the cost of the project to increase.
4	Active	4	11/28/17	Financial	Materials	If an increase in structural steel happens, then an increase in the anticipated price for the joists, beams, columns, and decks will occur, which will affect the material budget, which will impact the total cost of the project.	The estimator should double check that the price of steel has not gone up and will not through out the length of the project and budgeting as such.	Cost Schedule	Low	High		10%	220,000	22,000	Acceptance	Knowing the price of structural steel will decrease the likelihood that the materials budget will increase as the project progresses.	05 - Metals	Estimator	Before ordering	Ensuring the price of structural steel is as expected before submitting a bid and before ordering said steel will help keep the cost of the project on budget.
5	Active	5	11/28/17	Hazardous	structure	If a structure fire happens, Then an increase in material and labor, which will affect the contractor, causing a schedule impact and will impact the monetary side.	All workers just watch for potential hazards that may cause fires, and for everything to be done to code standards to prevent any potential for fires	Cost Schedule	Moderate	Moderate		5%	100,000	5,000	Avoidance	Knowing the potential risks for fires on certain structures and making sure to avoid them at all costs.	21 - Fire Suppression	All workers	Before end of task	Check regulary to ensure safe working conditions and to prevent any potential for fires.
6	Active	6	11/28/17	Financial	Dispute	If a contractor/owner dispute arises, then the potential for delayed payment can happen, which will affect the contractor, causing decrease in cash flow which will impact the completion of assigned tasks.	Insure you are going directly off of the scope of work and insure that anytime something needs to be changed the contractor and owner sign a change order.	Cost Schedule	High	High		30%	250,000	75,000	Transference	Checking the scope of work and the change orders constantly throughout the day.	01 - General Conditions	Supervisor	3 times daily	check before work begins in the morning, at lunch time, and before end of working day to ensure proper measures were taken.
7	Active	7	11/28/17	Financial	Payment	If payment terms are not met, then the schedule will be affected because no materials will be bought which will affect the whole entire entity that is in with the project, causing an impact to the schedule.	Insure that you keep the owner up to date on all progress and show them exactly what is getting done with high quality work.	Cost Schedule	Moderate	Low		2%	20,000	400	Avoidance	Showing the owner everything that you are doing will cause for more time on the job for the project manager that will cost the company money, but in turn will cut down on potential for payment withholds.	01 - General Conditions	Superintendent	3 times a week	Show owner three times a week what has been done to ensure that he is kept up to date on the progress so that there is no delay in payments

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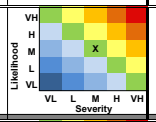
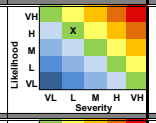
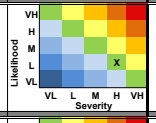
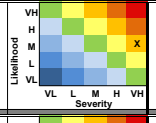
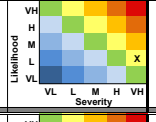
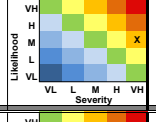
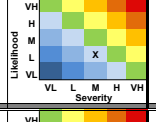
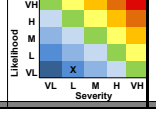
	Status	ID #	Date Identified	Functional Assignment	Threat/ Opportunity Event	Risk Statement	Risk Trigger	Type	Probability	Impact	Risk Matrix	Probability	Impact	Expected Value	Strategy	Response Actions including advantages and disadvantages	Affected Project Activity (by CSI Division)	Responsibilty (Task Manager)	Status Interval or Milestone Check	Date, Status and Review Comments
8	Active	8	11/28/17	Labor	understaffed	If there is a shortage in labor for a subcontractor, then the delayed work will affect everyone that is relying on them, casuing an impact to the work schedule.	Make sure that there is enough workers before bidding on a job, and to make sure that you have enough in the bid to pay the workers suffenctially so that they can continue to work.	Quality Schedule	Moderate	Moderate		3%	40,000	1200	Transference	making sure to have adequate people that you can rely on if something happens to your fulltime labor	01 - General Conditions	Sub-contractor	once a month	check with people/interview people to keep it out there that you might potential need workers in the future.
9	Active	9	11/28/17	Construction	Safety	If the project is completed on an active college campus then additional safety and site security must be utilized to keep students and faculty away from danger which may increase cost.	Failure to realize nature of the work site	Cost Quality	High	Low		5%	35000	1,750	Mitigation	Make sure there is ample fencing around the site and active security plan	01 - General Conditions	Safety manager	Daily	Discuss plan with Safety manager of contractor
10	Dormant	10	11/28/17	Site Services	Utilities	If utility companies are unable to relocate their utilities when scheduled, then the site work activities will be delated, which will increase the the dutation of the project	Utility company not being able to locate existing utilites	Schedule Cost	Low	High		10%	12,000	1,200	Transference	Have utility companies come locate existing utilites prior to the start of the project	33 - Utilities	Utility Inspector	Before The Start	Keep constant contact with the utility company
11	Active	11	11/28/17	Planning	Budget/ Schedule	If the contractors do not anticipate any delays due to school and sporting activities, the the contractor will have an unrealistic budget and schedule, which will effect the abilitiy of the contractor to complete the project withiin contract amount and within the schedule	Failure to anticipate events in a busy campus	Cost Schedule	Moderate	Very high		13%	15,000	1,950	Avoidance	Assure that each bidding contractor has included cost and schedule adjustments in their proposals	01 - General Conditions	Contractor	Prior to bid date	include in bid documents asnd scope of work
12	Active	12	11/28/17	Construction	Quality	If contractors do not have quality control plans, then work in place will have issues, which could lead to injury and unnacceptable quality of the project	Lack of sound QA/QC plans	Quality Scope	Low	Very high		5%	30,000	1,500	Avoidance	Have Contractors submit a QA/QC plan with bid documents	01 - General Conditions	Contractor	Prior to bid date	include in bid documents asnd scope of work
13	Active	13	11/28/17	Design	Budget/Schedule	If any design changes occur, then it would require additional environmental analysis, which will impact the cost and delay job site activities, which will delay the start of construction.	Design changes and additional analyses will increase overall cost and cause a delay in the start of the construction process	Cost Schedule	Moderate	Very High		15%	20,000	3000	Acceptance	Communicate and check the change orders and make the proper changes to the budget and schedule	None	Project Manager	Before the Start	Encure steady communication between all parties to make sure everyone is informed of any and all changes
14	Active	14	11/28/17	Construction	Schedule	If electrical power lines not seen and in conflict with construction happens, then the site work activities will be delayed, which will increase the duration of the project.	Unforeseen issues with electrical powerlines can put certain work activities on hold causing delays	Schedule Scope	Low	Moderate		5%	7,000	350	Avoidance	Resurvey the area and find where the issue persist and make the proper changes to have the issue fixed	33 - Utilities	Superintendent	Before the Construction	Inspect the site for any possible future issues above ground and underground
15	Active	15	11/28/17	Planning	Cost	If there are no plans for the on campus job site parking for employees happens, then tickets will be distributed, which will impact indirect cost.	No parking plans for the contractors/laborers on a campus that heavily regulates the parking policy will leave the workers open to receiving tickets	Cost Cost	Very Low	Low		10%	2,000	200	Avoidance	Create the necessary plans needed for on site and off site parking and be sure to note the changes to the overall cost	None	Supervisor	Before the Start	Contact the campus parking office to purchase and reserve parking

SUMMARY

Identifying risks was a critical first step. We had to thoroughly read through the plans and specs and evaluate all possible negative outcomes. If these risks occur they will have a negative impact on the project's ability to achieve performance or capability outcome goals. Project Managers should be able to review the program scope, cost estimates, schedule, performance challenges, internal and external dependencies, safety, security and map out any potential risk and how to prevent these risk.

Our team who evaluated the worst possible scenario to the best negative situation created the probability and impact scale. We used historical data and heavy research to properly interpolate in-between our best and worst risk effect. The majority of this section was completed from the knowledge we have obtained from Dr. Harper throughout the course CM 4221.

For our quantitative analysis of the LSU Engineering library project we sat down as a team to discuss the each risks. Then we assessed the probability and impact that each situation would have on the library project. In our qualitative analysis we used information from *Risk Management in Construction Projects* as well as class PowerPoints to determine the probability of each risk. Understanding the probabilities and being able to quantify them will help us to limit the effects of these risks on the project. After totaling up the expected value amounts, we arrived at a contingency amount of $179,550 for the project.

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