managing design and construction risk

A PROCESS FOR IDENTIFYING AND MITIGATING RISKS

by Steve Kimball

introduction

As in all other phases of a design project, an integrated process as you enter the construction phase is crucial to the project's success, beginning with early involvement from the entire project team (client/owner, designer, construction contractor, and major construction subcontractors). One of the design team's highest priorities is to mitigate risks for the client and all parties involved. The best way to mitigate risk is to build an experienced team dedicated to identifying, communicating, and potentially eliminating those risks.

COMMON PROJECT RISKS

While each project is unique in scope, complexity, location, and team make up, it is important to identify and understand some of the risks common to any project:

- Unforeseen Conditions
- Long Lead Items
- Client/Owner Operations
- Utility Disruption
- Cost Escalation
- Hazardous Materials
- Safety
- Site Ingress / Egress
- Timely Decisions
- Permit Process
- Commissioning

the process

Risk management requires an active process throughout the design and construction life of the project. While initial identification and assessment of risk is required, the process should include flexibility to identify, manage, add, and close identified risks on an ongoing basis. Key elements from project inception through close-out include the following:

TEAM STRUCTURE

The project delivery methodology should include a team structure that engages all major parties in the design and construction process as early as possible. Regardless of contractual relationships, it is advisable to engage the Contractor with the Design Team and Client/Owner during the concept and/or the schematic design process.

COMMUNICATION PROTOCOL

Project scope development, contract negotiations, award, and kickoff should include the development of a clear and concise team communication protocol.

Communication should include risk identification and mitigation as a standard team meeting agenda topic for discussion and resolution. Prioritization of risks is critical to ensure timely review and resolution to mitigate potential impact on schedule, quality, and cost.

Allocation of responsibility for adverse impact is a secondary consideration to timely resolution. Allocation of responsibility as part of the risk mitigation process will often exacerbate adverse impact to project delivery, quality, and cost. It is important for communication protocol to create a clear separate path for discussion and resolution of risk impact responsibility.

IDENTIFICATION

Risk identification begins with the development of the project scope and schedule. A list of known or perceived risks should be included as part of the project kickoff agenda and updated at each project meeting and milestone. Once identified, the utility and use of risk management tools will be important to track and resolve each issue in a timely prioritized manner.

ASSESS

Risks have the potential to be exploited for the betterment of the project. Understanding the potential negative impact should include evaluation of strategies that can minimize, neutralize, or convert a potential negative into a positive.

Once the risk is understood and potential impact evaluated, the team will be in a better position to assign lead responsibility to expand the assessment, identify team member responsibility, and develop a next steps strategy.

RESPONSIBILITY

Part of the overall team structure requires responsibility to be assigned for each identified risk. The nature of the risk should drive discussion of assignment to the most informed and capable team member. For example, resolution of a technical electrical utility issue may require the assignment of responsibility to the senior project electrical engineer.

PRIORITIZE

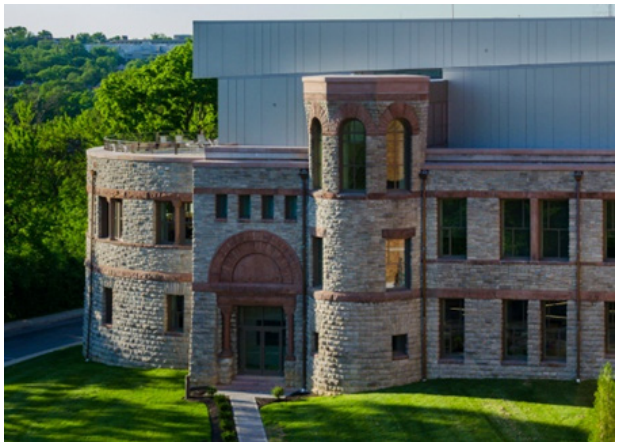
A major responsibility of the individual assigned to address each risk is to work with the project team to prioritize based on project status, potential impact, and relative importance given other project risks.

A simple effective prioritization tool is to assign each risk based on a scale of "high," "medium," and "low" risk. The use of this methodology will allow the project team to assign the resources necessary for resolution through an informed and targeted process.

MITIGATION

After the risk has been identified, prioritized, assessed, and resolution responsibility assigned, a mitigation strategy should be implemented. The purpose of the mitigation strategy is to eliminate or minimize risk. The strategy should include exploration of options to convert a negative risk into a positive.

The team member assigned responsibility for the risk will lead the project team discussion to create the most effective mitigation strategy. It is important to note the "responsible team member" will lead a mitigation strategy that often requires participation by others. The "responsible team member" will serve as the Project Lead implementing the mitigation strategy.



MONITOR

Implementation of the mitigation strategy requires a process to monitor progress towards the mitigation goal. Mitigation activity and monitoring progress require focus to ensure the mitigation goal is achieved within the confines of the established risk closure date. Failure to meet the risk closure date may result in negative project consequences.

ARCHIVE

Complete documentation of the process, details, and resolutions should be archived as part of the project management process. The next step upon closure of risk mitigation is assessment of project impact and responsibility. A full and fair evaluation of project impact should include all relevant parties.

risk mitigation plan

The risk management strategy should include the development and use of a risk assessment & mitigation plan to organize and monitor progress. A variety of commercial risk management tools and software are available for purchase or subscription.

When commercially available tools do not meet the need or fit your particular circumstances, the following project management activities can provide the necessary focus to address risk mitigation throughout the project duration.

- Acquiring a complete understanding of contractual project responsibilities for all primary parties.
- Development of a strong professional relationship with each key project decision-maker.
- Development, use, and maintenance of an Action Item List. The Action Item List is an active, not static, document to be discussed and updated at each project management and milestone meeting. An example is provided.
- Development, use, and maintenance of a **Risk Mitigation Plan.** The Risk Mitigation Plan is an active, not static, document to be discussed and updated at each project management and milestone meeting. An example is provided.

ACTION ITEMS LIST EXAMPLE:

#	Item	Date Opened	Due Date	Date Closed	Responsible
1	Architect to review building addition layout and locate the tilt tables for Owner review and confirmation. **Resolution: Architect provided two options for tilt table locations. Owner to confirm which option is preferred. Location Confirmed. See (date) meeting minutes**	xx/xx/xx	xx/xx/xx	xx/xx/xx	Organization (Individual)
2	Exhaust Snorkel – Owner to note on equipment list which equipment is served by the Exhaust Snorkels. **Resolution: Equipment List updated and sent via email on (date)**	xx/xx/xx	xx/xx/xx	xx/xx/xx	Organization (Individual)
3	Chilled Water: Owner to provide pipe size, length of pipe, and pump pressure (in / out). **Resolution: Provided with Equipment plan update on (date).**	xx/xx/xx	xx/xx/xx	xx/xx/xx	Organization (Individual)
25	CE to review first floor conference area and advise if the open concept needs to be revised to provide more separation of the spaces. **Resolution: CE via (name/date) email provided a marked-up drawing indicating changes required.**	xx/xx/xx	xx/xx/xx	xx/xx/xx	Organization (Individual)
26	The second-floor office layout as presented will need to be revised to reduce the number of workstations to provide adequate circulation. Owner to consider changing the style of workstation to make the layout more efficient. **Resolution:**	xx/xx/xx	xx/xx/xx		Organization (Individual)
27	Owner to incorporate HVAC Air Volume calcs excel spreadsheet information on the equipment excel spreadsheet. **Resolution:**	xx/xx/xx	xx/xx/xx		Organization (Individual)

It is important to understand that development of "soft skills" is critical to project management and often instrumental in addressing and mitigating project risk factors.

RISK MITIGATION PLAN EXAMPLE:

RISK MITIGATION PLAN

	Date Opened	Risk	Priority	Risk Detail	Risk Mitigation	Strategy	Close Date	Status	Responsible Party
1	01/11/24	Unforeseen Conditions	Medium	Existing conditions not identified on existing drawings or information available.	Detailed on-site investigation to include visual observation & limited destructive investigation as needed and approved by Client	Develop an existing condition plan to begin with the Project Initiation Phase & repeated at successive phases and interim intervals as needed. Identify any MEP related equipment that may need to be replaced to facilitate the early stages of construction.		Open	D. Smith / Client
2	01/11/24	Long Lead Items	High	Current market conditions resulting from the pandemic have complicated logistics and extended delivery of many construction materials beyond the typical anticipated long lead items.	Prepare a detailed construction schedule identifying critical long lead items. Maintain an active updated construction schedule for use as a planning tool to address long lead items.	Prepare a list of long lead items, identify design strategies to provide opportunities for early release of construction packages needed to manage delivery risk. Where necessary identify pre-purchase opportunities to mitigate delivery and cost risk.		Open	A. Rogers / Contractor
3	01/11/24	Ongoing Client Operations	High	Extended utility or functional shut-downs would adversely affect Client operations.	Identify building operations that require limited or no interruption of operations and develop a plan to address.	Utilize identification of critical Client operations as a significant factor in development of the construction phasing plan. Consider off-hour construction operations to reduce or eliminate interruption to building operations. Identify opportunities to shift operations activities where appropriate to reduce or eliminate the risk of production interruption. Develop strategies for temporary connections of MEP systems to help limit the amount of downtime.		Open	D. Smith / Client
4	01/11/24	Utility Disruption	High	Unplanned utility interruptions could adversely affect Celanese operations.	Leverage Risk Mitigation items #1 & #3 to develop a plan to address required utility shut-downs or interruptions.	Utilize plans developed to address Risk Mitigation items #1 & #3 to incorporate a utility interruption plan.		Open	A. Rogers / Contractor
5	01/11/24	Cost Escalation	Medium	Market conditions create a risk of cost escalation.	Develop a detailed construction schedule to include a comprehensive phasing plan to establish a prudent approach to minimize schedule creep.	Develop a comprehensive design-build schedule identifying critical milestones and decisions required to facilitate phasing and maintain the schedule throughout the process. In addition to the Risk Mitigation Plan develop and maintain an Action Item list to track information, decisions and approvals required to maintain schedule and avoid schedule creep.		Open	A. Rogers / Contractor
6	01/11/24	Hazardous Materials	Low	Potential for discovery of hazardous materials to disrupt operations, impact schedule and drive cost increase.	Complete a facility hazardous materials survey as an early investigation activity to be performed during the Project Initiation Phase.	Utilize the complete hazardous materials survey to identify abatement strategies consistent with the construction schedule & phasing plan. Incorporate as an early design-build activity and expedite.		Open	S. Brown / Designer
7	01/11/24	Safety	High	Delays, costs, and potential litigation resulting from Impact of on-site construction injuries.	Contractor has a comprehensive construction safety policy and plan resulting in excellent on-site construction safety practices and procedures.	Contractor will implement its company safety policy and practices in the development of a Client specific plan tailored to the specific risks and requirements for this project. The plan will be ongoing and integrated in all design and construction activities. The plan will be administered to include all subcontractors and vendors involved in on-site construction activities.		Open	A. Rogers / Contractor
8	01/11/24	Operations Ingress / Egress	Medium	Potential to incur code, safety, and operations interruptions	Develop and maintain a life safety plan concurrent and consistent with the construction schedule and phasing plan.	At the Project Initiation Phase develop a life safety plan addressing egress requirements consistent with the phasing plan. Include operations requirements established by Client leadership to facilitate ingress & egress required for continued facility operations		Open	A. Rogers / Contractor
9	01/11/24	Timely Decisions	Medium	Potential to incur schedule delay, phasing complication, and cost increase.	Clear and consistent communication between the design-build team and Celanese project leadership.	Develop a detailed design/construction schedule and phasing plan that outlines the critical decisions required and their timing. Utilize this Risk Mitigation matrix and an Action Item list to collect and track activities and decisions required. Review Risk Mitigation Plan and Action Item list at each major milestone and at each interim project team meeting.		Open	A. Rogers / Contractor

summary

The risk mitigation process should include flexibility to identify, manage, add, and close identified risks on an ongoing basis. Key elements from project inception through close-out include the following:

- Team Organization
- Team Communication Protocol
- Identify the Risk
- Assess the Risk
- Identify the Responsible Party
- Mitigate the Risk
- Monitor the Risk
- Archive the Risk

about the author

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Steve is a co-founder of emersion DESIGN and the Science & Technology Client Leader. He has managed over $1 Billion in construction projects with expertise in specialized facilities including laboratories, research and development, highly secure buildings, advanced manufacturing, and innovation district master plans. Connect with Steve for your planning or design needs.

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Leadership, organization, team relationships, and the use of an appropriate process and tools will provide a clear, efficient path to risk mitigation and a successful project.