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Strategies to Manage or Mitigate Impact of Risks During Project Development & Delivery

Written by: *Philius Angelides, PE, F.SAME, FACEC – President, The Angelides Group, LLC*

Risk is defined as a situation, event, or condition that, when it occurs, brings exposure to danger, harm, loss, or inability to achieve one's objectives. When applied in the context of delivering construction programs or projects, risks have the potential to negatively impact a variety of performance metrics associated with the successful execution of such programs or projects, namely: safety, quality, schedule, cost, environmental compliance, sustainability, resiliency, security, scope of work adherence, and functionality.



In assessing the types of risks and potential impact on projects, it is important to recognize that the seeds for risk exposure are planted at various stages of and throughout the project delivery process. Therefore, the strategy related to risk management needs to encompass actions through the entire lifecycle of the process, i.e. planning, design, procurement, construction, closeout, and asset management. In parallel, the process requires the appropriate engagement of key project stakeholders in a streamlined and collaborative manner to fulfill important roles in the execution of critical project delivery milestones. This collaboration enhances the ability to achieve strong performance metrics, avoid risks, and/or mitigate their impacts. The following list summarizes the key project stakeholders and their primary roles in the execution of the project delivery:

- The Owner – has primary contracting authority to develop, procure, and deliver the project; on most occasions the agency owns and maintains the completed project asset or serves as the agent on behalf of another agency that ultimately will own and maintain the asset.
- The A/E – the prime consultant along with its subconsultants responsible for the multi-disciplined design and construction consultations to deliver the project.
- The General Contractor – responsible for construction of the project based on a set of fully-developed contract plans and specifications for DBB-procured projects; or bridging documents for DB-procured projects; or engaging as Construction Manager at Risk (CMAR) for Early Contractor Involvement (ECI)-procured projects.
- The PM/CM – serves as the management advisor to the Owner providing third-party support throughout the development and construction of the project, primarily on cost, schedule, design, and construction quality management and coordination.

- Specialty Advisors and Consultants – professionals providing support with planning and acquisition strategies and actions, studies, assessments, and other consultations that form the basis for project scoping and execution strategy.
- Third Parties – government and private entities, facility users, facility maintenance staff, or other internal agency stakeholders who interface with the project at some stage. Their opinions and input are valuable to ensure all factors related to their interests and roles regarding the project are vetted.

Effectively integrating the skills and knowledge of the above stakeholders from the very early stage of project planning, through project development, and into execution allows for informed decisions that improve project delivery metrics and reduce exposure to risks. Equally important is the need to maintain continuity of the above stakeholders throughout the lifecycle of project delivery; this continuity preserves the institutional knowledge developed on the project and promotes efficient and effective decision making as the project evolves. The following sections present various management strategies and best practices to minimize and mitigate risk in order to achieve successful project delivery:

Project Delivery Stakeholders Are Qualified in Their Proposed Role: The foundation for successfully executing any project, especially those with a higher level of risk, is for the Owner to select the parties delivering the various services based on those parties' appropriate and demonstrated experience and qualifications to execute similar type of work. This consideration is especially important when selecting the A/E and PM/CM firms, as their expertise is relied upon for critical decisions related to the design and management of the project. Qualifications-based selection is a must - professional services should not be acquired based on the best value or lowest price technically acceptable (LPTA) qualifications. Best-qualified professional firms will work collaboratively with the Owner to develop reasonable consultant services budgets for execution of the work and will ensure that all necessary professional services are enlisted to deliver reliable and credible consulting. Similarly, for certain types of construction projects (e.g., complex or specialized), prequalification of contractors is a prudent practice; this ensures the most qualified potential bidders are invited to propose and excludes contractors who are not qualified and could introduce additional risk.

Planning Charettes/Confirm Project Scope: Each project involves multiple stakeholders who have varying interests regarding the purpose and execution of the project, and in one way or another, are affected by how the project is executed. These stakeholders, in addition to the A/E, PM, and Contractor(s), include agency contracting and management staff, facility users or managers, third-party agencies related to permits and other regulatory compliance matters, utility companies, and adjacent communities. It is important that project charrettes be held early in the planning stage to thoroughly and accurately define the requirement, understand the constraints and considerations, and ensure all limitations and preferences are understood and reflected in the project scope, schedule, and budget. This early involvement minimizes risk by avoiding surprises, miscommunication, and disagreement during design development or even into construction. The outcome of decisions made during the charrettes should be documented in the Project Management Plan and be adhered to throughout the design development process to avoid delays or cost escalation resulting from lack of coordination.

Thorough Pre-Design Investigations and Surveys: A primary source of construction change orders and claims, which results in cost escalation and delays, are differing site condition issues. These issues may arise from inaccurate or outdated information, for example: topography surveys, undetected utilities, presence of undetected rock or unsuitable soils, inadequate geotechnical and environmental testing, presence of hazardous materials, and poor existing facility condition information due to limited as-built or current Facility Condition Assessment (FCA) data. Allocating enough budget to perform a thorough

and comprehensive assessment of the proposed site and associated facilities and infrastructure is an invaluable investment that sets the stage for developing reliable documents to serve as the basis of design. The risk of relying on older or outdated existing data in the Owner's archives, or performing limited investigations, is that the design will proceed with incorrect data, which in turn leads to errors, deficiencies, conflicts, poor work quality, extra work orders, delays and claims during construction. Investing in comprehensive and up-to-date surveys, investigations, and testing limits the exposure to risks due to unknown conditions and improves design quality and construction efficiency.

Design Phase Third Party Reviews: Every work product benefits from an independent peer review. The multi-disciplinary design effort also benefits from a third-party review of the design to assess basis of design and related assumptions, code compliance, interdisciplinary coordination, and constructability among other areas. Engaging construction subject matter expertise during design development allows for scrutinizing the proposed materials used, phasing and construction methodology, staging of work, temporary works requirements, project interfaces, and specifications. It also allows resolution of conflicts between various design elements and physical or operational constraints. This review is typically performed by the Owner's PM/CM consultant or third-party peer reviewer, who we recommend be engaged from the start of the project to support the design phase; it could also be performed by a Contractor as part of ECI procurement method, however we recommend that the PM/CM is still engaged on behalf of the Owner to validate the recommendations offered and serve the interests of the Owner directly. The value of these design and constructability reviews is significant in that it eliminates ambiguities and conflicts in the contract documents which again could result in the risk of out-of-range bids or changed conditions in the field during construction, thus causing delays and cost escalations.

Third-party reviews also include the development of the preliminary project schedule to identify the critical path, validate project duration and define milestones to be included as part of the contract solicitation, as applicable. The PM/CM should review and validate cost estimates in a similar manner at each design stage. Any deviations from the A/E's estimate should be subject to a cost estimate reconciliation process to bring convergence on the probable cost and ensure a reliable and credible contingency is developed prior to bidding to mitigate the risk of out-of-range bids and potential reprogramming due to inadequate or inaccurate cost estimating.

Procurement Strategy Options: Owners have used a variety of procurement strategies to deliver projects, including most prominently DBB and DB and to a lesser extent CMAR or ECI. Each strategy has its merits for effectiveness depending on the specifics of the project being delivered and how much influence the Owner wants to have throughout the lifecycle of project development and delivery actions. There are risks associated with all delivery methods, which may impact the metrics discussed earlier. The Owner has maximum control and involvement in the project execution with a DBB approach and can provide prudent oversight and input to achieve the desired project outcome. As we transition into DB and CMAR, while the Owner allows for contractor innovation and ideas to deliver a project, it is essential that the basis of design and performance specifications be clearly delineated and detailed. In addition, any Owner-furnished materials shall be clearly delineated in the contract documents to further improve clarity and improve competitiveness. Doing so eliminates bid uncertainties, especially as they relate to site conditions, and project scope and requirements, and avoids risk of cost escalation and construction-phase changes. In addition, unit price bid schedules should be included for items where the Owner suspects estimated quantities may vary as the project progresses due to unexpected site conditions (e.g., additional repair work due to progressive deterioration, extent of unsuitable soils or other unsuitable materials encountered, and presence of additional rock). This inclusion allows for pricing control of change order work related to these situations arising during construction.

The ability to procure projects and receive bids within the Owner's budget allowance is a constant challenge – one that is hard to control given the variations in market conditions at time of bid and the complexity of projects going to bid. If there is a risk for escalated bids, the Owner could consider having a more competitive base bid with bid options added in the procurement package. This approach allows the Owner to proceed with construction for the portion that is within budget, while allowing additional time to evaluate the merit of executing the bid options.

Similarly to milestone peer reviews for DBB projects, we recommend third-party reviews be used to assess the risks related to alternative project delivery methods. These reviews would enable the Owner to make informed and strategic decisions on the merits and applicability or appropriateness of using such alternative methods. In addition, they will provide insights as to how to structure the bid package and what information to include in the solicitation contract documents to enable clarity in SOW, and competitive and responsive bidding by qualified contractors.

General Conditions and Construction Contract Administration Requirements: Division 1 of the specifications is an integral part of the contract documents, because it sets the operational parameters of the Owner-Contractor relationship. The more restrictive and onerous the performance requirements are, the higher the contractor's bid likely will be. Examples of these requirements include security and administrative requirements to work at a location, safety requirements, access restrictions, and reporting requirements. Owners should review and verify these requirements and streamline them where possible to avoid unnecessary duplication of efforts and to allow the contractor to work more expeditiously and efficiently. Additionally, to reduce contractor risk and potentially lower project costs, the Owner could consider providing logistical accommodations to support project execution, if feasible.

Another important consideration to reduce and manage risk is including in the specifications a clear delineation of the contractor requirement to provide monthly progress reports supported by CPM Schedules with narratives to demonstrate work status and support payment requisitions. Also, there needs to be a clear definition of how changes will be evaluated, measured, and reconciled, especially related to differing site condition issues. These contract administration processes, along with other important actions, will set the stage for timely decision-making during construction and avoidance of delays and disputes.

Project Controls Implementation: The implementation of a project controls platform on the Owner side, especially during construction, to document, monitor and evaluate performance, is critical for effective project execution and proactive management of issues. Project Controls includes all aspects of schedule, cost and documentation management and this effort could be a continuation of the PM/CM consultant's effort transitioning from the design phase to construction phase services. By having contemporaneous information on the project, especially approved baseline and progress schedules along with a cost management module, the Owner is in a great position to react and make informed decisions regarding unforeseen field issues, conflicts or other progress-impeding events. Project Controls should be a standard item on the progress meeting agenda. Its function is to offer strategic input on look ahead activities and work-around solutions to maintain project progress and mitigate risks associated with construction. In the event of delay claims, a well-structured and up-to-date project controls platform will become the Owner's most valuable asset in evaluating, analyzing and expeditiously resolving, at a much lower cost, all such claims.

Risk Register Development, Monitoring and Management: All complex projects benefit from the application of risk management processes and practices, starting from the earliest stage of project conception. By proactively identifying project risks and how they impact the delivery achievement

metrics discussed earlier in this paper, the Owner and its management team can make proactive and informed decisions on strategies to avoid or mitigate such risks. The development of the Risk Register is an important first step in this effort. This register is updated as the project evolves to add risks and to qualify and quantify the impact of these risks on various aspects of the project. The Risk Register becomes an indispensable tool during project progress discussions and, also, thru expert qualitative and quantitative analysis, provides additional input to inform cost estimating and schedule analysis functions on the project. This is another important service resource available to the Owner to proactively manage the impact of risks on project delivery.

Partnering and Other Alternative Disputes Resolution Practices: Proactive and on-going engagement of project stakeholders from the start of a project and thru its delivery lifecycle allows for timely resolution of issues and avoidance of disputes that could impact project progress. Partnering agreements, anchored on a charter of shared project goals and objectives by all project stakeholders, sets a strong foundation for managing risks and resolving issues on a contemporaneous basis as the project evolves. Depending on the complexity of projects, partnering sessions can be held monthly or quarterly, and moderated by an independent partnering facilitator with experience leading similar type engagements. An organized agenda of topics is used to ensure coverage of all main areas of the project. Issues are discussed and resolution is documented or tracked for follow-on action. All open items are tracked for resolution or reconciliation at planned meetings. The purpose of partnering is to foster a collaborative and solutions-centered relationship among all project stakeholders to avoid conflicts and claims and ensure project success. In addition to partnering, other alternative disputes resolution practices that promote claims avoidance are negotiation and mediation, leveraging the expertise of informed and qualified third-party experts.

The above suggestions and practices have been successfully applied on multiple projects of varying scopes and complexities throughout the United States. While, for various reasons, these practices have not been consistently applied across the board, their effect on positively impacting project metrics is undeniable. Understanding the complexities of each project and then aligning appropriate management, technical and other advisory resources, in a collaborative framework, will serve well in managing and mitigating the impact of risks in all phases of project development and delivery.

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CMAA Member and Paper Author:

Philios Angelides, PE, F.SAME, FACEC – President, The Angelides Group, LLC

For questions or follow-on actions, please contact: Philios Angelides, P.E., F.SAME, FACEC at angelidesp@gmail.com or 703-606-6740.