

A Risk-Based Approach to Construction Management

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Abstract : Risk management plays a fundamental role in project planning and delivery. The purpose of incorporating risk management into project management practices is to identify and address uncertainties related to key project-related activities. The uncertainties, known as risk events, can relate to project deliverables that are quantifiable and are often measured by impact to project schedule, cost, or environmental impact. Risk management should be incorporated as an iterative practice throughout the planning, execution, and commissioning phases of a project. This paper specifically examines how risk management contributes to effective project planning and delivery through a case study of a transportation project. This case study focused solely on impacts to project schedule regarding three milestones: readiness for delivery, readiness for testing and commissioning, and completion of the facility. The case study followed the ISO 31000: Risk Management - Guidelines. The key factors that are outlined by these guidelines include understanding the scope and context of the project, conducting a risk assessment including identification, analysis, and evaluation, and lastly, risk treatment through mitigation measures. This process requires continuous consultation with subject matter experts and monitoring to iteratively update the risks accordingly. The risk identification process led to a total of fourteen risks related to design, permitting, construction, and commissioning. The analysis involved running 1,000 Monte Carlo simulations through @RISK 8.0 Industrial software to determine potential milestone completion dates based on the project baseline schedule. These dates include the best case, most likely case, and worst case to provide an estimated delay for each milestone. Evaluation of these results provided insight into which risks were the highest contributors to the projected milestone completion dates. Based on the analysis results, the risk management team was able to provide recommendations for mitigation measures to reduce the likelihood of risks occurring. The risk management team also provided recommendations for managing the identified risks and project activities moving forward to meet the most likely or best-case milestone completion dates.

Keywords : construction management, monte carlo simulation, project delivery, risk assessment, transportation engineering

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