



## ENHANCING SAFETY RISK MANAGEMENT IN CM/GC CONTRACTS: A COMPARATIVE ANALYSIS OF AIA A133-2019 AND CONSENSUSDOCS 500 WITH A STRUCTURED CHECKLIST FRAMEWORK

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**ABSTRACT:** Contractual frameworks are critical in project management and safety risk mitigation. This study aims to (1) evaluate the effectiveness of CM/GC contractual provisions in mitigating safety-related risks, (2) identify the advantages and limitations of existing safety and temporary structure clauses, and (3) develop a practical tool for improving contract enforceability and safety risk management. A comparative analysis is conducted on two standard contract agreements for the construction manager/general contractor (CM/GC) delivery method—the A133-2019 standard agreement by the American Institute of Architects (AIA) and the ConsensusDocs 500 standard agreement by ConsensusDocs. The evaluation focuses on six key contractual sections: safety programs, safety representative, unsafe worksite provisions, emergency management, constructability, and temporary structures. Each contract is assessed based on (1) clarity, (2) specificity, (3) applicability, (4) enforceability, and (5) risk allocation. Findings indicate that while AIA A133-2019 prioritizes collaboration and flexibility, it lacks detailed procedural requirements, particularly in safety programs and emergency management, leading to ambiguities in enforcement. In contrast, ConsensusDocs 500 provides more explicit and enforceable provisions, particularly regarding safety programs, corrective actions for unsafe work conditions, and constructability reviews. While all six sections exhibit limitations, gaps in temporary structure oversight and emergency management are particularly significant, posing heightened challenges for safety risk mitigation. To address these gaps, this study introduces a structured checklist to assist contract administrators in refining CM/GC contracts, ensuring enhanced enforceability and operational efficiency. Academically, this research advances contract administration literature by offering a replicable framework for evaluating CM/GC contracts and strengthening safety risk allocation mechanisms.

### 1. INTRODUCTION

The construction manager/general contractor (CM/GC) project delivery method—also known as construction manager-at-risk (CMAR)—is a collaborative contracting approach that integrates contractor expertise early in the design phase to enhance constructability, risk management, and cost control (Gransberg and Shane 2015). Under this model, the project team consists of the owner, designer, and at-risk construction manager, who provides preconstruction services (e.g., cost estimation, scheduling, and risk analysis) before committing to a guaranteed maximum price (GMP) for the construction phase. This method enables concurrent execution of design and construction while preserving the owner's control over design details. In contrast to the traditional design-bid-build (DBB) model, which emphasizes low-cost selection and rigid contract structures, CM/GC fosters early contractor involvement and risk-sharing mechanisms that improve project outcomes. However, the success of CM/GC projects depends on well-defined contractual provisions that establish clear roles, responsibilities, and enforceable safety measures. While standard CM/GC contract models—such as AIA A133-2019 and ConsensusDocs 500—provide

governance structures, their effectiveness in managing safety-related risks, including emergency preparedness and temporary structures, remains uncertain. This study addresses these gaps by conducting a comparative analysis of AIA A133-2019 and ConsensusDocs 500 contracts to evaluate their adequacy in defining key contractual provisions. Additionally, this study introduces a structured contract evaluation checklist to assist contract administrators in improving contract enforceability, safety compliance, and risk allocation. By refining CM/GC contract provisions, this research contributes to both academic literature, by proposing a replicable contract assessment methodology, and practical contract administration, by offering actionable tools for contract refinement.

## **2. LITERATURE REVIEW**

### **2.1 Comparative Analyses of Standard Construction Contracts**

Prior research has investigated distinctions among standard contract models, with particular emphasis on the allocation of safety responsibilities and the mechanisms governing enforceability. For instance, Abdul Nabi et al. (2020) compared safety-related provisions under AIA, ConsensusDocs, and EJCDC contracts within the design-build (DB) delivery method, highlighting inconsistencies in assigning tort liability and safety duties. Their study also introduced a checklist to help contract administrators improve safety-related clauses, though it did not specifically focus on CM/GC contracts. Meanwhile, Choi and Kim (2016) used FIDIC contracts to analyze key dispute factors in overseas construction projects, emphasizing the importance of clearly defined roles and enforceable provisions to minimize conflicts. Despite these contributions, limited research exists that systematically compares CM/GC-specific contractual provisions, particularly those addressing safety programs, emergency response, and temporary structure oversight, across different standard forms of agreement. This gap underscores the need for structured evaluations that assess clarity, specificity, enforceability, and risk allocation in CM/GC contexts. While limited research directly evaluates CM/GC contract enforceability in the context of safety risk management, several studies offer foundational insights into broader aspects of contract administration, risk allocation, and safety-related obligations. These prior contributions help contextualize the present study by highlighting persistent gaps in the enforceability, specificity, and clarity of safety provisions within standardized contract models.

### **2.2 Gaps in the Literature and Research Focus**

While prior research has addressed contract administration, risk allocation, and safety compliance, CM/GC contract evaluations remain limited, particularly in how contractual provisions address key safety-related risk areas. Existing research does not fully examine how CM/GC contracts handle temporary structures, emergency management, and safety program enforcement, leaving ambiguity in contractual risk allocation (Lee et al., 2020; El-Adaway et al., 2016; El-Adaway et al., 2014). Although some studies explore safety-related contract provisions, the previous work lacks a structured evaluation framework that systematically assesses clarity, specificity, applicability, enforceability, and risk allocation of such provisions in CM/GC agreements (Fawzy and El-Adaway, 2013). To address these gaps, this study develops a comparative methodology to evaluate CM/GC contractual provisions using six key contract components: safety programs, safety representative, unsafe worksite provisions, emergency management, constructability, and temporary structures.

Each contract provision is assessed using five evaluation criteria to ensure a structured and replicable contract assessment framework. Clarity refers to the extent to which the contract explicitly defines roles, responsibilities, and obligations, reducing ambiguity and improving enforceability. Specificity measures the level of detail in procedural requirements, compliance mechanisms, and enforcement. Applicability examines the relevance and practicality of provisions across real-world CM/GC projects of varying complexity. Enforceability evaluates the degree to which contract language establishes binding obligations supported by legal or regulatory mechanisms. Finally, risk allocation assesses how well the contract distributes responsibilities and liabilities among stakeholders, minimizing disputes in the event of failure or non-compliance. This structured approach identifies contractual deficiencies and areas for improvement while providing a replicable framework for CM/GC contract evaluation. Additionally, the study introduces a checklist tool to assist contract administrators in enhancing enforceability, safety compliance, and risk management. By proposing this methodology, the research contributes to both academic literature and

practical contract administration by offering tools for improving CM/GC safety-related provisions.

### 3. RESEARCH METHODOLOGY

This study adopts a structured comparative analysis approach to evaluate two standardized contract models—AIA A133-2019 and ConsensusDocs 500—commonly used in CM/GC project delivery. The methodology follows a systematic process similar to that of Abdul Nabi et al. (2020), ensuring a rigorous and replicable evaluation framework. The process, summarized in Figure 1, includes four main steps: (1) literature review and problem definition, (2) contract evaluation using five criteria, (3) pilot testing and consensus validation, and (4) checklist development and interpretation of findings. The detailed steps are explained in the following subsections.

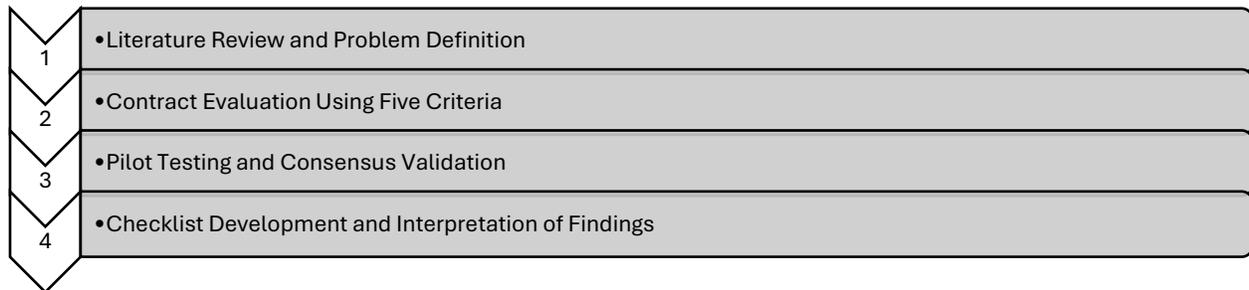


Figure 1. Overview of the research methodology process

#### 3.1 Comparative Analysis Approach

The research methodology follows the structured approach illustrated in Figure 1. The process begins with a comprehensive literature review to establish the foundation of contract administration research. Knowledge gaps are identified, leading to the development of a problem statement that highlights deficiencies in CM/GC contract enforceability, especially in provisions related to safety risk management and risk allocation. Based on these gaps, the study defines its research aim and objectives to guide comparative analysis. AIA A133-2019 and ConsensusDocs 500 are then evaluated as standardized contract models, given their industry significance and distinct approaches to construction risk management. A comparative framework is developed to systematically assess their provisions using five key evaluation criteria: clarity, specificity, applicability, enforceability, and risk allocation. As described above, five researchers independently reviewed both contracts and identified key safety-related contractual sections. This process is refined through a consensus discussion to ensure a structured and unbiased selection. A systematic comparative analysis is conducted, evaluating the strengths and weaknesses of each contract model. Contractual loopholes are identified, such as ambiguous language and missing enforceability provisions. To validate the findings, a pilot test was conducted, in which five researchers independently rated contract provisions using a Likert scale, and any discrepancies in the researchers' evaluations were systematically discussed and resolved through a consensus process to ensure consistency and accuracy. Based on this analysis, a contractual evaluation checklist is developed to provide contract administrators with a structured tool for improving CM/GC safety-related contract provisions and risk management strategies.

#### 3.2 Criteria Selection and Pilot Study

To address inconsistencies in how prior studies evaluated contract provisions, this study developed a structured comparative framework centered on five criteria: clarity, specificity, applicability, enforceability, and risk allocation. These criteria were drawn from insights into the literature and refined through a pilot test involving five academic researchers with construction management training, knowledge of CM/GC contracts, and one year of industry experience in construction. The assessments were guided by a structured rubric and validated through a consensus-based process to minimize subjectivity and ensure consistency across evaluations. Each researcher independently assessed the AIA A133-2019 and

ConsensusDocs 500 agreements, identifying six key safety-related contract sections for evaluation: safety programs, safety representative, unsafe worksite provisions, emergency management, constructability, and temporary structures. The temporary structures section was added to the review due to its notable absence in both contracts. Contract provisions were evaluated using a 5-point Likert scale across the five criteria, followed by structured consensus discussions to resolve discrepancies and establish consistent interpretations. The pilot testing and consensus validation served a dual purpose: to assess individual contract provisions and to support the development of the contract evaluation checklist. The researchers' comparative ratings, particularly in the areas of clarity, enforceability, and risk allocation, were synthesized to shape the checklist components. As a result, the checklist reflects both the empirical findings of the comparative analysis, and the areas of agreement established through researcher consensus. The analysis revealed that ConsensusDocs 500 consistently outperformed AIA A133-2019 in clarity, enforceability, and risk allocation, particularly in areas such as unsafe worksite provisions and constructability. AIA A133-2019 lacked specificity and enforceability in emergency management and completely omitted provisions addressing temporary structures. Standard deviations across raters confirmed stronger inter-rater consistency for ConsensusDocs 500, reinforcing its clarity and applicability. These findings guided the checklist development and highlighted critical deficiencies in CM/GC safety-related contract language, precisely where enforceability and liability assignment remain ambiguous.

### **3.3 Development of a Checklist for CM/GC Contract Administration and Justification for Criteria Selection**

Building on the comparative analysis, this study introduces a structured checklist designed to assist contract administrators in evaluating and refining CM/GC agreements. Drawing on the work of Abdul Nabi et al. (2020), the checklist addresses key challenges related to risk allocation, safety provisions, temporary structures, and emergency management. It provides a systematic tool for assessing contractual clarity, enforceability, and risk allocation, thereby reducing ambiguities and strengthening accountability in CM/GC contracts. The six evaluation sections were selected for their critical role in contract administration, safety risk management, and project oversight. These focus areas align with recognized industry practices and are reinforced by existing research on risk allocation mechanisms and the enforceability of liability provisions in construction contracts (Khalef et al., 2021; El-Adaway et al., 2016). The checklist prioritizes provisions that directly affect project safety, accountability, and regulatory compliance, supporting a more comprehensive and proactive approach to contractual safety risk mitigation.

### **3.4 Alignment with Industry Best Practices**

The methodology employed in this study reflects recognized best practices in construction contract administration research by implementing a structured, criteria-based comparative analysis. Comparative evaluation of standard contracts is a widely accepted approach for assessing enforceability and performance in construction agreements (Abdul Nabi et al., 2020; Gunduz and ElSherbeny, 2020). The selection of the AIA A133-2019 and ConsensusDocs 500 contracts reflects their prominence in CM/GC delivery and their relevance to industry-wide safety and risk considerations. The resulting checklist offers an applied, practitioner-oriented outcome, ensuring that contract language is clearer, more enforceable, and better aligned with the safety and accountability expectations found in current industry practice.

## **4. COMPARATIVE ANALYSIS**

### **4.1 Safety Programs**

The AIA A133-2019 contract does not define a contractual requirement for safety programs, leaving uncertainty regarding the construction manager's (CM) responsibilities for site safety. This omission can result in inconsistent enforcement of safety measures across subcontractors and unclear liability in the event of safety violations. Conversely, ConsensusDocs 500 (Subsection 3.13.1) explicitly assigns overall responsibility for safety programs to the CM while ensuring subcontractors remain accountable for their compliance. It also requires the CM to take reasonable steps to prevent injury, loss, or damage to workers,

materials, and adjacent properties, establishing a structured framework for site-wide safety management. From an applicability standpoint, the ConsensusDocs 500 contract is better suited for projects requiring well-defined safety programs, whereas the AIA A133-2019 contract's lack of explicit provisions may create enforcement challenges, particularly in high-risk environments. Regarding risk allocation, AIA A133-2019 does not clearly assign safety liability, which could lead to disputes over responsibility. In contrast, ConsensusDocs 500 clearly allocates safety obligations between the CM and subcontractors. Enforceability remains a key distinction between the two frameworks. The ConsensusDocs 500 contract includes legally binding obligations for safety programs, thereby strengthening compliance mechanisms. In contrast, the AIA A133-2019 contract's absence of a dedicated provision weakens enforcement, increasing the likelihood of safety management inconsistencies.

## **4.2 Safety Representative**

AIA A133-2019 does not require the designation of a safety representative, leading to uncertainty in site safety enforcement and reporting obligations. This omission may result in inconsistent oversight, particularly in projects requiring stringent safety performance. In contrast, ConsensusDocs 500 (Subsection 3.13.2) mandates the appointment of a designated safety representative, defaulting on this role to the project superintendent unless stated otherwise. The contract also requires the CM to report all recordable accidents and injuries in writing and provide copies of filed accident reports to the owner. This structured approach ensures a clear chain of responsibility for safety enforcement and standardized reporting. From an applicability standpoint, ConsensusDocs 500 provides a more structured approach to safety oversight, making it better suited for projects with high regulatory safety requirements. In contrast, the absence of a designated safety role in AIA A133-2019 may lead to fragmented or inconsistent safety oversight. Regarding risk allocation, ConsensusDocs 500 explicitly assigns responsibility for safety supervision and reporting to the CM, ensuring proactive risk management. The A133-2019 contract's omission leaves responsibility unclear, which could lead to disputes if safety violations occur. While both contracts differ in specificity, enforceability remains a distinguishing factor. ConsensusDocs 500 provides a binding requirement for a safety representative, ensuring clear oversight, whereas the AIA A133-2019 contract's lack of such a provision increases the potential for safety management and accountability gaps.

## **4.3 Unsafe Worksite**

The AIA A133-2019 contract does not contain a provision addressing procedures for handling unsafe worksite conditions, leaving ambiguities in how safety violations should be identified, corrected, or enforced. This omission may limit the owner's ability to intervene in hazardous situations without modifying the contract terms. Conversely, ConsensusDocs 500 (Subsection 3.13.4) provides a structured and enforceable framework for addressing unsafe work conditions. It grants the owner the authority to issue an Interim Directive requiring the CM to stop work or take corrective measures without assuming responsibility for the CM's safety program. If the CM fails to rectify the unsafe condition within a reasonable timeframe, the owner has the right to perform corrective actions at the CM's expense. However, before proceeding with corrective measures, the owner must first notify the CM and provide an opportunity to address the issue. The ConsensusDocs 500 contract explicitly states that the CM cannot claim damages, guaranteed maximum price (GMP) increases, or time extensions to comply with the owner's reasonable safety directives. However, the CM may contest or appeal the owner's corrective action if they believe the directive is unjustified or beyond the contractual scope, though the contract does not specify a formal dispute resolution process for such cases. From an applicability standpoint, ConsensusDocs 500 is better suited for projects with strict safety requirements, as it formalizes corrective procedures and reinforces accountability. The lack of a provision in AIA A133-2019 may limit its applicability in safety-critical environments requiring immediate action. Regarding risk allocation, the AIA A133-2019 contract's omission leaves uncertainty about who is responsible for addressing unsafe conditions, whereas the ConsensusDocs 500 contract clearly assigns responsibility to the CM and allows the owner to enforce safety compliance without assuming additional liability. Enforceability is a key difference between the two contracts. ConsensusDocs 500 establishes a contractual mechanism for unsafe worksite corrections, while AIA A133-2019's lack of defined procedures weakens enforceability, potentially creating delays and disputes over safety responsibilities.

#### **4.4 Emergency Management**

AIA A133-2019 (Subsection 7.7.2) addresses only the financial implications of emergencies, stating that costs for preventing damage, injury, or loss may be included in the contract. However, it does not define emergency preparedness, response, mitigation, recovery actions, roles, or protocols, leaving ambiguities in crisis management. This lack of a structured response plan may cause delays or confusion in high-risk situations. Similarly, ConsensusDocs 500 (Section 3.14) requires the CM to act reasonably to prevent damage, injury, or loss, but lacks detailed procedural guidance on handling emergencies. However, it allows equitable adjustments to the GMP or project timeline if emergency actions impact costs or schedules. From an applicability perspective, neither contract provides a structured emergency response plan or requires the submission of a project-specific crisis management plan or an emergency program plan to establish clear response procedures. Without such provisions, these contracts lack adaptability for high-risk projects needing comprehensive emergency management. Regarding risk allocation, ConsensusDocs 500 shifts some responsibility to the CM, whereas AIA A133-2019 primarily focuses on financial recovery rather than proactive risk management. Enforceability remains a significant limitation, as both contracts fail to mandate clear emergency planning obligations, leaving responses reliant on external regulatory requirements rather than contractual enforcement mechanisms. Future contract revisions should mandate crisis management and emergency program plans to enhance clarity, contractual risk allocation, and contract enforceability. These additions would ensure that emergency preparedness is proactively addressed rather than reactively managed, strengthening compliance and project resilience in CM/GC contracts.

#### **4.5 Constructability**

AIA A133-2019 (Subsection 3.1.3.2) assigns the construction manager (CM) an advisory role in site use, material selection, and construction methods; however, it does not mandate formal constructability reviews or documentation. This flexibility may encourage collaboration, but it also increases the likelihood that constructability insights will be overlooked due to the absence of structured reporting requirements. In contrast, ConsensusDocs 500 (Subsection 3.3.5) requires the CM to conduct formal constructability reviews and submit written reports to both the design professional and the owner. It further mandates the prompt identification and communication of errors or omissions in design documents, thereby facilitating early resolution of potential conflicts. From an applicability standpoint, the AIA A133-2019 contract's flexible approach may be appropriate for projects that prioritize collaborative input, while the structured reporting requirements in ConsensusDocs 500 are better suited for projects requiring formalized oversight and documentation. Regarding risk allocation, AIA A133-2019 leaves responsibility for constructability issues ambiguous, whereas ConsensusDocs 500 clearly assigns these responsibilities to the CM, thereby reducing the liability exposure of the owner and design professional. Enforceability remains a key distinction between the two models. ConsensusDocs 500 ensures documented accountability through binding provisions, whereas the absence of formal reporting mechanisms in AIA A133-2019 weakens its enforceability. The inclusion of explicit constructability review requirements in AIA A133-2019 would strengthen its capacity to mitigate design-related risks and improve project oversight.

#### **4.6 Temporary Structures**

Both AIA A133-2019 and ConsensusDocs 500 fail to explicitly address temporary structures, leaving liability and enforcement unclear. Temporary structures, such as scaffolding, formwork, shoring, and trench protection systems, are critical to construction safety and site logistics. However, the absence of contractual provisions means that responsibility for design, approval, installation, inspection, maintenance, and removal is undefined, increasing the risk of liability disputes and inconsistent enforcement. Due to this omission, contract administrators must rely on supplemental agreements, project specifications, or external regulations to govern temporary structures, which can create inconsistencies in contractual risk management. Without a clear contractual mandate, compliance with safety and engineering standards depends on jurisdictional enforcement rather than binding contract terms, making oversight more challenging. Future contract revisions or supplemental agreements should explicitly define temporary structure responsibilities to mitigate enforcement and liability risks, ensuring contractual enforceability and reducing reliance on external regulatory mechanisms.

## 5. CM/GC CONTRACT EVALUATION CHECKLIST

This study introduces a structured evaluation checklist designed to address gaps in contract enforceability, risk allocation, and safety-related compliance. The checklist is informed by findings from the comparative analysis of AIA A133-2019 and ConsensusDocs 500 and reflects insights obtained through structured contract evaluation, pilot testing, and consensus-based review by five academic researchers. The checklist serves as a practical tool for contract administrators, owners, construction managers, and legal professionals to assess contractual provisions systematically, ensuring alignment with the industry’s best practices and regulatory requirements. By providing a standardized framework for evaluating contract clarity, specificity, enforceability, applicability, and risk allocation, the checklist enables stakeholders to identify deficiencies, improve contract language, and enhance risk management. The checklist focuses on six critical contractual elements: safety programs, unsafe worksites, safety representatives, emergency management, constructability, and temporary structures. As outlined in Table 1, the checklist ensures that contractual provisions are clear, specific, enforceable, and aligned with best practices for risk mitigation. Minimizing ambiguities through precise contractual language and compliance mechanisms strengthens risk allocation and enforceability. Additionally, it offers a structured approach for comparing contract provisions across different standardized agreements, such as AIA A133-2019 and ConsensusDocs 500, ensuring consistency in contract administration and construction risk management.

Table 1. CM/GC contract evaluation checklist

Contract Criterion	Key Considerations for Contract Development
Safety Programs & Unsafe Worksite	<i>Clarity and Specificity</i> <ul style="list-style-type: none"> <li>Define whether the CM is responsible for an overall site safety program.</li> <li>Specify requirements for subcontractor safety compliance.</li> <li>Outline owner intervention rights if the worksite is deemed unsafe.</li> <li>Establish corrective actions for unsafe work conditions.</li> </ul>
	<i>Applicability</i> <ul style="list-style-type: none"> <li>Ensure safety requirements align with recognized best practices and applicable regulatory standards.</li> <li>Define applicability across various project sizes and risk levels.</li> </ul>
	<i>Risk Allocation</i> <ul style="list-style-type: none"> <li>Clearly state if safety responsibilities are shared between CM and subcontractors.</li> <li>Address who bears financial liability for safety violations.</li> </ul>
	<i>Enforceability</i> <ul style="list-style-type: none"> <li>Define mandatory safety documentation, reporting, and compliance verification.</li> <li>Establish procedures for owner-directed corrective measures for unsafe conditions.</li> </ul>
Safety Representative	<i>Clarity and Specificity</i> <ul style="list-style-type: none"> <li>Require the designation of a qualified safety representative.</li> <li>Define the responsibilities and authority of this role.</li> </ul>
	<i>Applicability</i> <ul style="list-style-type: none"> <li>Ensure the provision applies to both small and large-scale projects.</li> </ul>
	<i>Risk Allocation</i> <ul style="list-style-type: none"> <li>Identify whether the CM must directly employ the safety representative or if subcontractors can fulfill this role.</li> <li>Address who bears financial liability for safety violations.</li> </ul>
	<i>Enforceability</i> <ul style="list-style-type: none"> <li>Specify how non-compliance with safety oversight will be handled and enforced.</li> </ul>
Emergency Management	<i>Clarity and Specificity</i> <ul style="list-style-type: none"> <li>Define CM’s responsibilities beyond financial considerations across all phases of emergency management (preparedness, response, mitigation, and recovery).</li> <li>Specify required emergency preparedness and response measures, including a project-specific crisis management plan and emergency program plan.</li> <li>Outline mandatory training, drills, and coordination with regulatory agencies.</li> </ul>
	<i>Applicability</i> <ul style="list-style-type: none"> <li>Ensure the provision applies across projects with varying risk levels (e.g., high-risk industrial vs. commercial construction).</li> </ul>

	<ul style="list-style-type: none"> <li>Define how emergency management requirements scale based on project complexity and jurisdictional regulations.</li> </ul> <p><i>Risk Allocation</i></p> <ul style="list-style-type: none"> <li>Clearly allocate responsibilities for implementing emergency procedures and funding emergency responses.</li> <li>Define CM's obligations in mitigating emergencies versus owner or subcontractor responsibilities.</li> </ul> <p><i>Enforceability</i></p> <ul style="list-style-type: none"> <li>Establish enforcement measures ensuring CM compliance with emergency preparedness, response, and recovery protocols.</li> <li>Require submission and periodic updates of crisis management and emergency program plans.</li> <li>Specify documentation and reporting requirements for emergency incidents.</li> </ul>
Constructability	<p><i>Clarity and Specificity</i></p> <ul style="list-style-type: none"> <li>Require CM to review design documents for constructability concerns.</li> <li>Specify how constructability input should be documented and communicated to the owner.</li> </ul> <p><i>Applicability</i></p> <ul style="list-style-type: none"> <li>Ensure the provision applies across various project complexities and contract phases.</li> </ul> <p><i>Risk Allocation</i></p> <ul style="list-style-type: none"> <li>Determine whether constructability risks should be allocated to the CM, designer, or shared responsibility.</li> </ul> <p><i>Enforceability</i></p> <ul style="list-style-type: none"> <li>Define reporting requirements for constructability reviews and how constructability issues should be resolved contractually.</li> </ul>
Temporary Structures	<p><i>Clarity and Specificity</i></p> <ul style="list-style-type: none"> <li>Define contractual responsibilities for designing, approving, installing, maintaining, and removing temporary structures.</li> <li>Specify compliance with industry safety and engineering standards.</li> </ul> <p><i>Applicability</i></p> <ul style="list-style-type: none"> <li>Ensure applicability to projects requiring extensive temporary structures (e.g., scaffolding, shoring, falsework).</li> </ul> <p><i>Risk Allocation</i></p> <ul style="list-style-type: none"> <li>Clearly allocate responsibility for structural failures, safety risks, and inspection requirements.</li> </ul> <p><i>Enforceability</i></p> <ul style="list-style-type: none"> <li>Establish compliance verification measures requiring engineering approval and regular safety inspections.</li> </ul>

The checklist is designed for proactive use throughout the contract development, negotiation, and administration phases of CM/GC projects. It should be implemented at key stages of project planning and execution, including the preconstruction phase, where contract drafters, legal teams, and project owners can systematically evaluate contractual obligations related to safety, temporary structures, and emergency management before finalizing the contract. During the construction phase, construction managers and site safety representatives can apply the checklist as a structured contract assessment tool to verify compliance with enforceable safety provisions, temporary structures management, and emergency measures. In contract audits and dispute resolution, contract administrators and legal professionals can utilize the checklist to systematically assess enforceability and identify contractual deficiencies when disputes arise over safety obligations, constructability issues, or risk allocation. The checklist is not contract-specific but addresses common gaps inherent to the CM/GC delivery model, making it applicable across various CM/GC projects. Its effectiveness depends on the project's scope, complexity, and risk profile, especially in contexts where safety management and enforceability are paramount. Derived from a structured comparative analysis of AIA A133-2019 and ConsensusDocs 500, two widely recognized contract models in CM/GC project delivery, the checklist aligns with best practices in contract administration. It is especially beneficial for large-scale projects, such as transportation infrastructure, where contractual clarity and enforceability are essential for safety risk mitigation (Papajohn et al. 2019). However, the checklist may need to be adapted for smaller projects to maintain proportionality in contract oversight. While the checklist aligns with best practices in contract administration and provides a structured assessment approach, it is

not intended as a standalone tool. Instead, it is a complementary resource for contract administrators, legal professionals, and project managers, offering a systematic framework to evaluate contractual provisions. Its recommendations should be applied contextually, considering project-specific requirements, regulatory obligations, and industry standards. Future research and practical applications may further refine its effectiveness, ensuring continuous improvement in contract administration within CM/GC projects.

## **6. CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Summary of Key Findings**

The researchers conducted a comparative analysis of AIA A133-2019 and ConsensusDocs 500 contracts, evaluating their contractual effectiveness in six key areas: safety programs, safety representative, unsafe worksite provisions, emergency management, constructability, and temporary structures. The contracts were assessed based on clarity, specificity, applicability, risk allocation, and enforceability. Findings indicate that ConsensusDocs 500 offers clearer enforceability, particularly in safety programs, unsafe worksite provisions, and constructability reviews. Meanwhile, AIA A133-2019 emphasizes collaboration but lacks detailed procedural requirements, creating potential ambiguities in enforcement. However, both contracts require enhanced provisions for managing contractual risk allocation in temporary structures and emergencies to improve contract enforceability. This study introduces a contract evaluation checklist as a structured tool for refining CM/GC provisions, strengthening enforceability, and improving risk management. Academically, this research contributes to contract administration literature by introducing a structured methodology for evaluating CM/GC contracts and enhancing the understanding of safety risk allocation mechanisms in construction agreements. The framework provides a structured, replicable approach for contract evaluation and can serve as a foundation for future studies assessing contractual provisions across various project delivery models. These findings are preliminary and reflect an academic evaluation. A follow-up study involving industry practitioners will be conducted to validate the results and enhance practical applicability.

### **6.2 Limitations and Recommendations**

While this study provides valuable insights, several limitations should be acknowledged. First, the analysis was limited to six key contract provisions, excluding areas such as accountability, cooperation, construction personnel management, and law adherence due to space constraints. Additionally, five academic researchers with focused knowledge of CM/GC contracts and safety-related risks and an average of one year of professional experience in the construction industry conducted the pilot testing and comparative evaluations. While the researchers' background ensured a structured and informed analysis, the absence of extensive practitioner experience may limit the practical depth of the findings, highlighting the need for future validation through engagement with seasoned industry professionals. Expanding the analysis to include these other aspects could provide a more comprehensive assessment of CM/GC contract effectiveness. Additionally, the study focuses on two standard contract models (AIA A133-2019 and ConsensusDocs 500). Future research should incorporate other industry-standard contracts, such as those provided by DBIA, EJCDC, or FIDIC, to evaluate broader applicability. Furthermore, while the checklist offers a structured approach to contract evaluation, it does not propose specific contractual provisions. Future work should explore the development of standardized contract language to address identified deficiencies and improve CM/GC contract enforceability. These limitations highlight the need for comprehensive CM/GC contract evaluations, emphasizing expanded criteria, additional contractual sections, and improved enforcement mechanisms to enhance CM/GC contract administration.

### **6.3 Future Research Directions**

Future research should refine CM/GC contract administration by expanding the comparative analysis to include additional contractual provisions, such as accountability, coordination, legal adherence, and personnel management, to provide a more holistic evaluation of contract effectiveness. Developing standardized contract provisions can help clarify key CM/GC obligations related to managing safety,

temporary structures, and emergencies, ensuring more explicit risk allocation and enforceability. Moreover, designing a structured contract evaluation framework, such as a flowchart or decision matrix, could provide a systematic methodology for assessing contract effectiveness. Industry engagement through surveys with contract administrators, project managers, construction managers, legal experts, and risk management professionals can offer insights into common challenges and areas for improvement. Furthermore, expert interviews and focus groups with these key stakeholders can help refine the proposed checklist, assess the feasibility of contract evaluation improvements, and explore additional provisions that should be considered beyond the key sections used in this study. These discussions will provide practical industry perspectives on contract needs and emerging issues, facilitating the development of enhanced provisions to address both current and potential challenges. Additionally, interviewers could aid in designing a standardized contract evaluation mechanism by identifying critical factors for contract assessments. This forthcoming study will incorporate expert feedback to enhance the applicability and reliability of the proposed checklist. Finally, a Delphi study involving legal and contract administration experts could help achieve expert consensus on best practices for CM/GC contract provisions and enforceability, further enhancing contract clarity, risk management, and compliance strategies.

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