Contract management of public-private partnership building projects in countries experiencing economic crises: The case of the University of Crete

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Extended Abstract

Introduction

Contract management is a complex and multifaceted concept with various approaches and interpretations found in literature. These differences arise from the diverse experiences, attitudes, and viewpoints of managers (Baloi & Price, 2003). A possible way to define successful contract management is ensuring that "contractual obligations are met" (Latilo et al., 2024a, 2024b; Singh et al., 2024; Shalehin et al., 2024; Mabelele & Mrindoko, 2024; Haidar, 2021; Mokwena et al., 2020; Eliufoo, 2018; Natovich, 2003; Griffith-Jones et al, 2003), thereby achieving project objectives in terms of cost, time, and quality (Nsefu et al., 2020; Berton et al., 2018; Lengwe, 2014).

Several researchers have examined public-private partnership (PPP) projects in countries experiencing economic crises (Eguren et al., 2020; Torres & de Freitas, 2019 a,b; Ushakov, 2018; Gao & Eshaghoff, 2004). They all identified that the most critical contractual issues revolve around financial aspects, government policies affecting the projects, economic conditions, and project relationships (Eguren et al., 2020; Torres & de Freitas, 2019a,b; Ushakov, 2018; Gao & Eshaghoff, 2004). Similar risks noticed in developing countries, such as Guinea and Mexico (Haarmeyer & Mody, 1997; Thobani, 1999)

This research aims to explore the contract management processes from a financial perspective, in countries affected by economic crises. Thus, the research question is: "What is the management strategy for public-private projects in countries facing economic crises?". The specific objectives of the paper are to identify what information is required for evaluating a PPP project, and to assess contract management strategies. Then, the propose is to evaluate contract allocation and potential bias within the contract.

The methodology

This study, focused on analyzing PPP projects in countries experiencing economic crises, employs an iterative methodology to map and highlight knowledge embedded in contractual documents. By weaving back and forth between data and theory, the research explores contract management through the lens of critical realism, which emphasizes understanding mechanisms and their functions to provide explanations and

introduce necessary changes (Bryman & Bell, 2007). The study aims to fill the gap in the literature by examining contract management in countries and regions experiencing economic turmoil, such as Greece, to enhance project outcomes.

The documents are analyzed with the method "networks and cohorts" (Hill, 1993), a qualitative research method used to understand relationships and group dynamics over time. **Network analysis** involves mapping connections between individuals or entities, identifying key actors, and understanding patterns, revealing how information, influence, or resources flow within the network (Hill, 1993). Network analysis can map relationships between documents, departments, and stakeholders to improve efficiency and compliance (Hill, 1993). **Cohort analysis** focuses on tracking changes and trends over time (Hill, 1993).

Combining these approaches deepens the understanding of contract management. This study adopts qualitative data collection to describe and explain contract management within PPP projects. Such qualitative methods allow for an understanding of contextual conditions that quantitative methods may not fulfill (Yin, 2009).

Case study: The University of Crete's Public-Private Partnership Building Project

We particularize the analysis for the case of the largest PPP building project in Greece. Specifically, our case study is the University of Crete's Public-Private Partnership Building Project in Greece, which is the largest of its kind of projects in Greece.

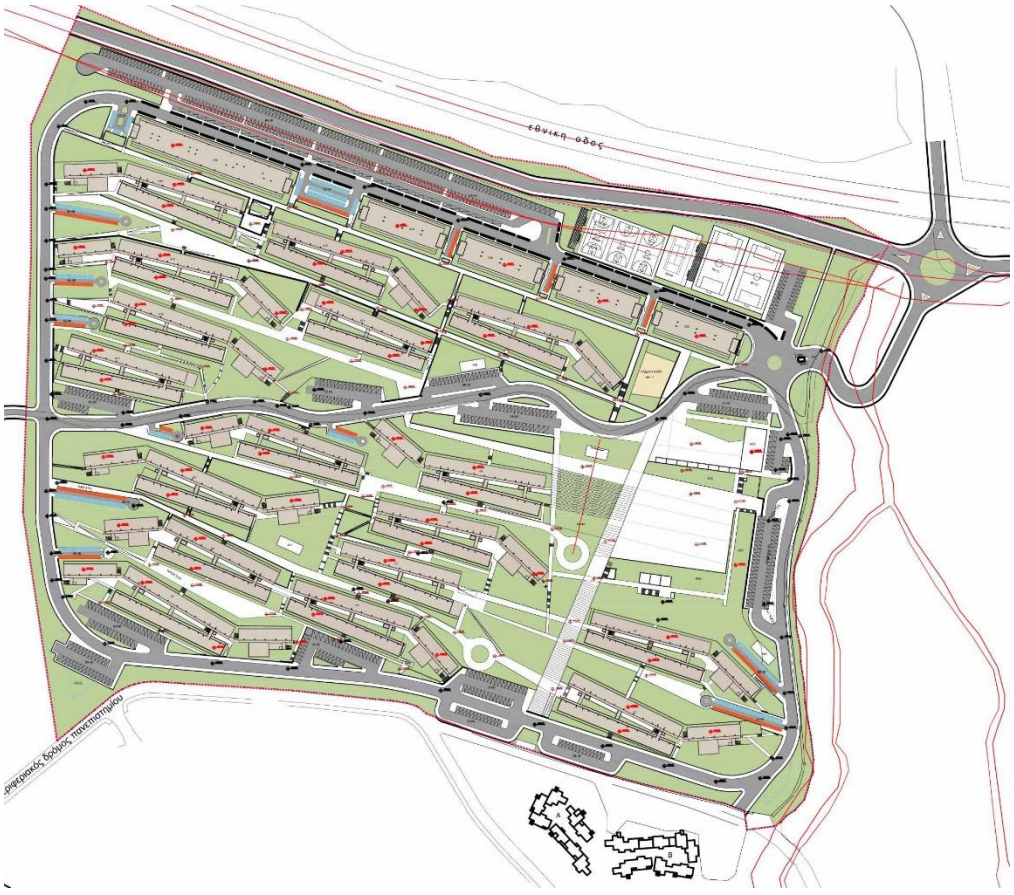

Figure 1: The layout of the University of Crete's PPP Building Project (University of Crete, 2025)

Figure 2: 3D Representation of the University of Crete's PPP Building Project (University of Crete, 2025)

The Greek university accommodation PPP contracts utilize the Availability Payment PPP model, wherein the government or university provides monthly payments to a Special Purpose Vehicle (SPV) formed by project sponsors. These payments are contingent upon the performance and availability of the facilities and services, with deductions for any deficiencies. The SPV is responsible for financing, designing, constructing, and maintaining the facilities over an approximately 30-year term, managing contractors and sub-contractors. The Contracting Authority (CA) oversees the SPV's performance and issues monthly performance-based Service Payments, ensuring continuous service delivery. Ownership of the facilities remains with the CA, transferring fully to the university at the end of the PPP term.

Under this arrangement, the SPV raises the necessary finance for the construction of the facilities from private sources (see Figure 1). Upon satisfactory completion of the construction, the buildings open for use, and Service Payments commence from the CA (see Figure 2).

Key-stakeholders

Contracting Authority (CA) University governance in the context of Public-Private Partnership (PPP) projects is regulated by national legislation to act as Contracting Authority by defining responsibilities for departments, units, and services. The University of Crete has established the University Council to manage these responsibilities, with the Rector as the ultimate decision-maker. The University will outsource most services related to PPP management, but employees remain liable for delegated actions. During construction, the Rector acts as the "Principal" with the Head of University Technical Services overseeing the construction and handback phases. In the operational period, service assessment is managed by the Monitoring and Assessing Committee (MAC), while the Executive Director, Property Management Company, or other university members may take on contract management functions.

Special Purpose Vehicle (SPV): A Special Purpose Vehicle is uniquely structured for each project, reflecting specific requirements, local regulations, and partner expertise. SPVs have diverse shareholders, including construction contractors, facilities

management contractors, and specialist investors, each contributing to the project's goals. The SPV oversees design, construction, financing, operation, and maintenance, employing contractors to meet agreed specifications. Additionally, the SPV manages project finances, secures funding, and calculates Availability Payments. To fulfill these responsibilities, many SPVs establish Management Services Agreements with specialist companies to handle performance monitoring, financial management, stakeholder communication, and compliance reporting. This ensures the project's financial viability and adherence to performance standards throughout its lifecycle.

Independent Auditor (IA): The role of the Independent Auditor (IA) in Greek Public-Private Partnership (PPP) projects is pivotal for ensuring high standards of performance. In contrast to other European markets, the IA's role in Greek PPPs is particularly significant, necessitating an independent, prestigious firm specialized in similar projects. The IA acts as a neutral third party, responsible for verifying and certifying that construction works and other project activities comply with the specified standards. This includes ensuring that both financial and technical obligations are met. The IA oversees the quality and progress of work performed by the Special Purpose Vehicle (SPV) and provides regular reports to both the Contracting Authority (CA) and the SPV. This ensures adherence to contractual standards and acts as a safeguard for maintaining the project's integrity throughout its duration.

The CA must meticulously manage the relationship with IA to ensure the IA’s effective performance, independence, and avoidance of complacency. This can be achieved by establishing clear communication channels, setting expectations for independence and quality, and maintaining regular monitoring. Furthermore, the team should conduct independent evaluations, periodically assigning in-house experts or engaging external advisers to assess the IA's performance. Should any signs of underperformance or bias be detected, the team must take immediate corrective action to safeguard the project's integrity. This oversight ensures that the IA remains truly independent and effectively verifies the compliance and performance of the SPV.

Construction Contractor (CC): In a PPP project, the Construction Contractor's role, responsible for the design and construction of facilities, is exclusively aligned with the SPV under a construction contract, emphasizing that the CA must engage with the contractor only through the SPV to maintain the project's structure and efficiency.

Results and Analysis

Network analysis helps understand relationships between parties in a contract, identifying key players and potential risks, based on the documents provided by the University of Crete (2025) (see Table 1). Cohort analysis tracks contract performance and outcomes over time, providing insights into successful contract types and reasons for their success based on the documents provided by the University of Crete (2025) (see Table 2). Combining these approaches leads to better decision-making and improved document and contract management processes.

Table 1: Interactions in the University of Crete's PPP project (network analysis)

Department / Function	Independent Auditor (IA)	SPV: Construction Manager & Section Heads	SPV: Procurement (Material Management)	SPV: Design Disciplines (Civil, Mech, Electe, Instr) if applicable, or, QA/QC	External Auditor or IA: Finance/ Accounts
Preparations and Updating of Method Statement	Review Schedule & Recourses compared to Tender	Create Document		Input as required	
Procurement of Materials and Services	Issue list of requirements with particulars. Check conformity to schedule and cost. Contract administration of Sub-contractors & Suppliers.		Float requests for Quotations, Negotiate& Issue Comparative Statements. Issue Award letters and finalize agreements.	Technical Evaluation of Quotations	Check comparative statement.
Variations					
-Ste instructions -Design Changes- Contract with Design Scope	IA to coordinate Record keeping and quantify time & cost; IA to identify changes in drawings and notify client;	Identify changes in project specifications and notify the University of Crete. Record keeping and qualification by IA.		Identify changes and notify client.	
Reporting	Develop report format and circulate "required by" dates for filling reports. Consolidate and develop reports for the University of Crete.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Fill relevant section of daily/ weekly/ monthly report on required basis.	Check relevant section of monthly report on required basis.
Cost Control	Develop Monthly Cost Control report based on monthly cost reports.	Make sure that correct cost center has been used in the stores issues, equipment and personnel time sheets.			Make sure that costs are posted correctly as per cost codes.
Planning & Scheduling	Coordinate schedule development and discuss planning with project team. Update schedule according to progress given by other departments.	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Prepare lists of activities, durations, resourcing, sequence and logical links and provide progress	Provide progress to the University of Crete
Invoicing	Develop according to information at hand and follow up issue of payment certificate	Review			
Monitor Expected Final Contract Amount	Quantify all changes to identify expected final contract amount.	Review			
Contract Review	Identify contractors and employer's obligations under the contract. Communicate such to all stakeholders				
Insurances	Provide contract and other information as necessary for the issue of insurance certificates. Inform Insurance Department of any deviations to design and any significant change of contract. In case of claim to insurance coordinate and quantify repair/reinstatement cost	Inform claimable event			Check insurance certificates for equipment and personnel and CAR insurance as required by contract. Notify the University of Crete for claimable event
Bonds	Provide contract and other information as necessary for the issue of bonds required by the contract. Provide info to the University of Crete if any changes occur.				Issue bonds in the manner and time required
As-build Drawings required by the University of Crete	Coordinate during the course of the works and compile at the end of the project "As-built" drawings for submittal to the University of Crete.	Mark Drawings as required showing "As-built" situation		Mark Drawings as required showing "As-built" situation.	
End of Project Report –Internal	Prepare at end of project report as outline in the contract. Collect all final approved documents and drawings, quality records, reports, method statements, material submissions, correspondence with client and organize in sections in hyper linking each document.	Review /Consent			

Table 2: Gantt chart to track contract performance and outcomes over time (cohort analysis)

Task	Contract Articles	Task execution part	Consultant	Final Decision maker	Starting Date	End date
Planning phase						
Validate Letter of Guarantee for Works	Article 6.1	UoC's Technical Services dept		Financial dept	11/4/24	12/2/24
Payment schedule	Not a contractual requirement.					
Validate Letter of Guarantee for Investment	Article 6.2	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept/ Financial dept	12/2/24	12/4/24
Declarations of Responsibility	Article 3.3	Rector		Rector	11/4/24	12/2/24
Contact persons for Works and Service period.	Article 7.1	Rector		Rector	11/4/24	12/2/24
Protocol of hand over of building site	Article 15	UoC's Technical Services dept		UoC's Technical Services dept	11/5/24	11/7/24
Noise and air pollutions study- Approval	Article 39.4	UoC's Technical Services dept	TB/ IA/ TP	UoC's Technical Services dept/IA/CC	11/4/24	12/2/24
Risks Insured / Submission of copy /Check for co-insurance	Article 42	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept	11/4/24	12/2/24
Studies/designs for approval	Article 9	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept/IA/CC	11/4/24	12/2/24
Signing of the PPP contract		Rector/ UoC's Technical Services dept	Rector/ UoC's Technical Services dept	Rector/ UoC's Technical Services dept	3/31/25	3/31/25
Design and Construction						
Daily project calendar	Not a contractual requirement.	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept	3/31/25	12/31/27
Review/request comment on Independent monthly report	Article 8	UoC's Technical Services dept		UoC's Technical Services dept	3/31/25	12/31/27
Monthly project reports	Article16.2	UoC's Technical Services dept	IA	UoC's Technical Services dept	3/31/25	12/31/27
Monthly meetings during construction	Article 16.6	UoC's Technical Services dept	UoC's Technical Board/IA/CC	UoC's Technical Services dept	3/31/25	12/31/27
Monthly certificate of completion of work	Article 17	UoC's Technical Services dept	UoC's Technical Board/ IA	UoC's Technical Services dept	9/27/25	
Response to Request support for public utility services	Article10.3	UoC's Technical Services dept		UoC's Technical Services dept	9/27/25	

Review of the management plan of hazardous substances	Article 10.4	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept		
Financial statements - quarterly and annually audited	Not a contractual requirement.				12/2/24	12/31/27
Review/comments/approval of Quality Management System	Article11.2	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept	3/31/25	12/31/27
Comments/ Acceptance Certificate of achievement	Article 18.2.1	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	Rector/ UoC's Technical Services dept	3/31/25	12/31/27
Construction closeout						
Commissioning and Acceptance	Article 17	UoC's Technical Services dept	IA/ CC	UoC's Technical Services dept		
Maintenance programme	Article21.3	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept		
End of Life cycle replacement schedule	Article 21.4	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept		
Quality Management System	Article 25	UoC's Technical Services dept	UoC's Technical Board/ IA/ CC	UoC's Technical Services dept		
Approve on onsite personal	Article 24	UoC's Technical Services dept	UoC's legal dept	Contract Contact Person		
Risks Insured / Submission of copy/ Check for co-insurance	Article 42	UoC's Technical Services dept	UoC's Technical Board	UoC's Technical Services dept		
Operation, Management and Maintenance						
Monthly Availability fee payment + VAT tax (monthly)	Article 27.1/ Annex 3/ Article 27.8	Contract Contact Person	Monitoring Committee	Rector		
Calculation of reductions to monthly availability fee (monthly)	Article 27.1/ Annex 3	Monitoring Committee	TB/ IA/ TP	Monitoring Committee		
Monitor Maintenance programme (monthly)		Monitoring Committee	UoC's Technical Services dept	Monitoring Committee		
Validate Letter of Guarantee for Services (annually)	Article 6.3	Contract Contact Person		Accounting department		
Calculation of Annual Availability fee (annually)	Annex 3			Accounting department		
University Annual budget approval/request (annually)			Accounting department	UoC's Technical Board/ Rector		

5-year running Maintenance programme (annually)	Article 21.3	Contract Contact Person	TB/ IA/ TP	TS	
Report on replacement needs (36+5M)	Article 21.4	Contract Contact Person	TB/ IA/ TP	TS	
Tasks in case something goes wrong/ changes (to be added the date the change occurs)					
Refinancing	Article 28 & 32	SPV	European Central Bank	UoC's Technical Board/ Rector	
Corporate Changes	Article 51	SPV		UoC's Technical Board/ Rector	
Change in Law	Article 31	SPV	UoC's Technical Board	UoC's Technical Board/ Rector	
Changes in Scope - CAPEX - OPEX	Article 52	SPV/ Rector	UoC's Technical Board/ European Central Bank	UoC's Technical Board/ Rector	
Force Majeure Events	Article 35	SPV	UoC's Technical Board	Rector /UoC's Technical Services dept	
Economic Model Updates	Article 52	SPV/ Rector	UoC's Technical Board /European Central Bank	UoC's Technical Board/ Rector	
Dispute Settlement	Article 75	SPV/ Rector	UoC's Technical Board/ IA/ CC	UoC's Technical Board/ Rector	
Issues with local government services	Articles 59, 60, 61, 62, 65	UoC's Technical Services dept	IA/ CC/European Central Bank	UoC's Technical Board/ Rector	
Contract Termination Events- Compensations.	Annenx 6	SPV/ Rector	UoC's Technical Board	UoC's Technical Board/ Rector	
Project hardback phase					
Initiation of hand - over procedures (33 years)		UoC's Technical Services dept	UoC's Technical Board	Rector	2058
Protocol of hand back of PPP site	Article 15	UoC's Technical Services dept	UoC's Technical Board	Rector	2058

Payment mechanism

Availability Payment mechanisms are fundamental to the effective delivery and management of PPP projects, exemplified by the Greek university accommodation project. These mechanisms incentivize the SPV to meet all contractual obligations by focusing on providing agreed-upon services while maintaining financial stability and high performance standards. The Annual Service Payment (ASP) covers (1) debt service, (2) financing charges, and (3) operational expenditure, adjusted for inflation annually. **Asset impairments** for substandard performance or non-availability of services are calculated based on infrastructure availability and quality standards. Timeliness of payments and accrual of interest on late payments ensure financial stability for the SPV. The practical application of the payment mechanism incorporates flexibility, accommodating unforeseen circumstances, and supporting effective contract management while maintaining accountability

It worths mentioning that annual inflation is used in the payment mechanism after contract negotiation, since in the initial version of the document cumulative inflation was suggested. Cumulative inflation can be used in the payment mechanism of a PPP project instead of annual inflation. This approach involves adjusting payments based on the total accumulated inflation over the project's duration rather than year-by-year changes. Using cumulative inflation to adjust payments typically allocates the risk of inflation to the public sector. By adjusting payments based on cumulative inflation, the public sector ensures that the private partner is compensated for the overall increase in costs due to inflation over the contract period. This approach protects the private partner from inflation risk, making the project more attractive to private investors. Cumulative inflation adjustments provide long-term stability in payment calculations, which can be crucial for large infrastructure projects that span many years. This stability can help in securing financing and maintaining the financial viability of the project.

This approach assumes that the public sector, having more resources and financial stability, is better positioned to manage inflation risks in Public-Private Partnership (PPP) projects. By assuming the inflation risk, the public sector can provide more predictable and stable cash flows for the private partner, thus attracting investment and improving project viability. The public sector can employ various mechanisms to mitigate inflation risk, such as indexing payments to inflation rates, using price adjustment clauses, or employing financial hedging instruments. These measures ensure that the value of payments remains consistent over time, protecting both parties from adverse inflationary impacts. By effectively managing inflation risk, the public sector can foster a more conducive environment for successful PPP projects, although, due to the economic crisis, the aforementioned actions are debatable.

In contracts, **asset impairments** refer to the reductions in the value of assets due to wear and tear, damage, or other factors that affect their efficiency. Impairments can be calculated and applied to various assets, such as real estate, equipment, or even inventory. In financial valuation, impairments are an important part of risk management and business decision-making, as they help analyze the true value of assets.

Conclusions and discussion

The control procedure of a PPP project is a complex, multidimensional problem. It involves interactions between individuals and departments.

The cohort analysis starts once the contractor wins the contract and begins with project identification and creating a work breakdown structure (WBS). The contractor prepares a schedule aligning with the contractual constraints. The estimated cost and schedule are combined using the critical path method, approved by all parties, and followed by baseline schedule sign-off and project commencement. Continuous monitoring of the schedule, documents, and processes is conducted throughout the project.

The contract review identifies terms and conditions affecting time and cost, manages issues, and submits variations and claims. Planning and scheduling involve preparing a baseline program of work and updating it regularly. Monitoring quantities and contract value cross-checks quantities and tracks changes. Reporting to the University of Crete involves regular progress updates and milestone tracking.

The reporting systems collect execution period information for final reports. The cost control system identifies deviations between actual and allowable costs, invoking corrective actions. Procurement of materials and services ensures timely and appropriate sourcing. Insurance policies provide project coverage, including Contractors All Risks (CAR) insurance. Preparation of project closeout finalizes project activities.

The hypothesis that the financial risks significantly impact PPP projects is confirmed by this study, as the documents provided focuses on the financial risks rather than other types of contractual risks.

Some findings are obtained based on the documents provided and the literature:

- In Greek PPPs, the role of the Independent Auditor (IA) is notably significant, requiring the involvement of a reputable, independent firm with expertise in similar projects, a characteristic often seen in developing countries rather than developed ones (see Eguren et al., 2020; Torres & de Freitas, 2019a,b; Ushakov, 2018; Gao & Eshaghoff, 2004).
- Asset impairments for substandard performance or non-availability of services are calculated based on infrastructure availability and quality standards, ensuring that lenders receive their payments. However, these impairments, which can never be zero, do not guarantee the successful delivery of the project to the Greek Universities.
- When Universities' employees delegate tasks to contractors through contracts, such as construction contractor and facilities management contractor, they might assume that the contractors will handle all responsibilities. However, the employees still retain ultimate accountability for ensuring that the delegated tasks are performed correctly and in compliance with regulations. This means that if the contractors fail to meet the required standards or if something goes wrong, the Universities' employees (and, by extension, the organization they represent meaning the University) may still be held liable. This risk is significant because it can result in legal repercussions, financial losses, and damage to the organization's reputation. Therefore, even with contracts in place, Universities'

employees must maintain oversight, monitor performance, and ensure that contractors adhere to the agreed-upon terms and standards.

Another important contribution to the literature is the information needed. To be able to evaluate a PPP project either as a contractor (SPV) or as a public entity (CA) the following important information is required during planning phase, since this information is defined by the contract and due to the asset impairments payment mechanism cannot change:

1. Name of Project: Identifies the specific project and provides clarity.
2. Name of Employer/Client: Defines the primary stakeholder responsible for funding and oversight.
3. Name of Engineer/Consultant: Identifies the key technical expert responsible for the project's design and guidance.
4. Time of Completion: Establishes the expected duration, helping with planning and scheduling.
5. Sectional Completion: Specifies any partial completion milestones, aiding phased delivery and payment.
6. Liquidated Damages / Penalties (Whole): Sets financial penalties for delays, ensuring timely completion.
7. Liquidated Damages / Penalties (Sections): Specifies penalties for delays in specific sections, promoting phased progress.
8. Commencement Date: Marks the start of project activities, providing a reference for tracking progress.
9. Performance Bond: Provides financial security that the contractor will fulfill their obligations.
10. Date of Return of Performance Bond: Indicates when the bond will be returned, ensuring contractor accountability.
11. Defects / Maintenance Period: Defines the period for identifying and rectifying defects, ensuring quality.
12. Method of Measurement: Establishes the standards for assessing work, ensuring consistency.
13. Payment Terms: Outlines the financial arrangements, ensuring clear expectations for payments, retention, and advance payments.
14. Insurance Requirements: Specifies the necessary insurance coverage, mitigating risks.
15. Other Comments: Allows for additional relevant information to be documented.

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