



Building Lifecycle Management Initiative

Aligning AEC Contract Deliverables with Operations Data Turnover

March 2025



FORWARD

This document outlines the critical need for integrating enforceable operations data turnover requirements within AEC contracts to improve long-term facility management efficiency. By mandating structured data exchanges, defining milestone-based compliance reviews, and enforcing financial penalties for non-compliance, project stakeholders can ensure that facilities receive complete, accurate, and usable asset data at handover, reducing lifecycle costs and operational inefficiencies.



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Introduction

Ensuring the seamless transfer of operations data from AEC contract deliverables to facility management systems remains one of the most persistent challenges in commercial real estate. Despite industry efforts to integrate operations stakeholders earlier in project design, data turnover requirements often remain absent from contract language by the time key agreements are issued. This paper examines where these omissions occur, how they can be corrected, and what compliance mechanisms must be in place to incentivize proper data turnover.

Why Development and Construction Projects Fail to Deliver Operations Data

The failure of development and construction projects to deliver usable operations data is rooted in the industry's historical emphasis on short-term project milestones rather than long-term asset performance. Often, project teams prioritize design intent, construction schedules, and cost efficiency over the structured handover of critical operations data. This misalignment results in facility managers inheriting incomplete, unstructured, or inaccessible data, which significantly impacts building performance and ongoing maintenance efficiency.

Several factors contribute to this persistent issue. The exclusion of facility management professionals from early contract negotiations prevents critical data needs from being formally documented. The segmented nature of project execution further exacerbates the problem, as information silos between architects, contractors, and facility managers lead to inconsistent or missing data at handover. Compounding this issue, contracts frequently lack standardized data exchange formats, forcing operations teams to manually reformat or recreate essential asset information. Additionally, general contractors and subcontractors are typically incentivized based on cost and schedule adherence, with little contractual accountability for ensuring high-quality data turnover. Without clear data requirements and enforceable mechanisms, project teams often prioritize physical deliverables over structured operational data, leaving building owners and operators with significant inefficiencies.

When Do These Omissions Occur?

Omissions in operations data requirements occur at multiple points in the project lifecycle, often before stakeholders recognize their long-term impact. The earliest opportunity to define these requirements is during the Request for Proposals (RFP) and bid specification process. However, if operational data standards are not explicitly



defined at this stage, they are unlikely to be incorporated later. Design and engineering contracts represent another critical point where gaps emerge. While architects and engineers generate vast amounts of asset-related information, the absence of structured coordination with operations teams often leads to gaps in data formatting and completeness.

During the construction phase, omissions become more pronounced. Contractors frequently capture construction submittals, as-built conditions, and commissioning data, but without explicit contract clauses mandating structured and standardized data formats, this information may be delivered in non-digital or fragmented formats. Finally, at project closeout and commissioning, data is often provided as static documents rather than as structured datasets compatible with asset management systems. This failure to deliver interoperable data at project turnover results in inefficiencies, increased costs, and lost operational insights.

What Contract Language would Improve Operations Data Turnover?

To improve operations data turnover, contract language must explicitly define structured data requirements and ensure accountability across project stakeholders. Contracts should require comprehensive asset information, including manufacturer details, model numbers, serial numbers, installation dates, warranty data, and preventive maintenance schedules. Additionally, accepted data formats such as COBie, IFC, and XML must be specified to ensure interoperability with facility management systems. Detailed specifications on COBie and IFC data structure requirements are provided in [Appendix A](#).

Beyond specifying required data and formats, contracts must establish milestone-based data submittals throughout the project. Instead of deferring data turnover to project closeout, structured submissions should occur at multiple stages, including 30%, 60%, and 100% design completion, as well as 60% construction, substantial construction completion and commissioning. Furthermore, roles and responsibilities for reviewing and validating data should be clearly assigned, ensuring that facility management teams have the opportunity to confirm completeness and request corrections before final project acceptance.

Where in the Contract Should This Language Appear?

To ensure enforceability, operations data turnover language should be embedded in multiple sections of project agreements. The general terms and conditions of contracts should establish data turnover as a fundamental project requirement, reinforcing its



significance alongside traditional construction deliverables. Technical specifications should detail required formats, data attributes, and documentation standards to prevent ambiguity and should be illustrated in the contract Scope of Work (SOW). Note that most personnel assigned to project teams will only refer to the Scope of Work and may never reference the larger contract terms and conditions.

Project deliverable schedules must outline specific submission milestones, linking data handover to key project phases. Additionally, payment schedules should be structured to incentivize compliance, ensuring that final contractor payments are contingent upon the acceptance of complete and structured data by the facility operations team. Embedding these requirements across contractual documents provides a structured framework for data accountability and compliance.

What Operations Reviews Should Occur, and in What Project Phases?

Operations data must undergo systematic reviews throughout the project lifecycle to ensure completeness, accuracy, and usability. Early in the concept and design phases, facility managers should participate in defining operational data needs and reviewing design documentation to confirm alignment with acceptable terminology/nomenclature and long-term asset performance objectives.

During construction, periodic reviews should be conducted at major project milestones to validate progressive data submissions against agreed-upon standards. By identifying gaps early, project teams can prevent last-minute deficiencies at project turnover. Finally, during commissioning and closeout, a comprehensive review should be undertaken to ensure that all required data is delivered in structured, usable formats before project handover.

What Common Project Mechanisms Should Be Utilized for These Reviews?

To institutionalize operations data reviews, the common project Submittal process should be leveraged. Regular design review meetings with facility teams ensure operational data requirements are addressed early in the process. Data verification checklists should be integrated into Submittal milestone approvals to track completeness and compliance with contractual obligations.

Utilizing digital model validation through common data environments (CDEs) can further enhance data accuracy and coordination between stakeholders. Additionally, third-party audits may be employed to provide unbiased verification of data



completeness, ensuring contract compliance before final project acceptance. This is a crucial option for new construction projects where the facility operations teams has not yet been assigned or hired.

What Project Roles Have Accountability and Responsibility for Ensuring Operations Data Turnover?

Responsibility for ensuring operations data turnover must be distributed across multiple project roles. The project owner or developer must establish clear data requirements and enforce compliance throughout the project lifecycle. Architects and engineers must generate structured design data that aligns with operational needs, while general contractors bear responsibility for assembling and delivering accurate asset data. The project manager is responsible for ensuring data submittal milestones are being met and completed (accepted) throughout the project.

Commissioning agents play a crucial role in verifying the completeness of documentation and validating data integrity. Ultimately, the facility management team must review and approve data before project acceptance, ensuring seamless integration into ongoing operations.

The following compliance matrix outlines the responsibilities and performance tracking for ensuring structured and enforceable operations data turnover throughout the project lifecycle. This matrix provides a clear framework for accountability by assigning data submission, review, and approval responsibilities to relevant project stakeholders at each phase. By integrating this matrix into contractual agreements, all parties are held accountable for delivering complete and usable operations data to facility management teams.



Compliance Matrix

Phase	Deliverable	Responsible Party	Reviewer	Approval Authority	Due Milestone
Design Phase (30%)	Preliminary Asset Data (Metadata, Equipment List)	Architects, Engineers	Project Manager, Independent Operations Advisor	Project Owner	Design Completion 30%
Design Phase (60%)	Updated Asset Data, Initial COBie Data Submission	Architects, Engineers	Facility Management Team (or Independent Operations Advisor)	Project Owner	Design Completion 60%
Design Phase (100%)	Final Design Asset Data, COBie/IFC Submission	Architects, Engineers	Commissioning Agent, Facility Management Team	Project Owner	Design Completion 100%
Construction Phase (60%)	Updated As-Built Asset Data, Maintenance Schedules	General Contractor, Subcontractors	Project Manager, Facility Management Team	Project Owner	60% Construction Completion
Substantial Completion	Commissioning Data, Final As-Built Drawings, COBie Validation	General Contractor, Commissioning Agent	Independent Operations Advisor, Facility Management Team	Project Owner	Substantial Completion
Final Turnover	Full Operations Data Submission, CMMS Integration, Training Documentation	General Contractor, Commissioning Agent	Project Manager, Facility Management Team	Project Owner, Facility Manager	Final Acceptance



Who Approves the Final Operations Data Contract Deliverable?

Final approval of operations data should be conducted by the owner's representative and the facility operations team, ensuring usability before project closeout. Third-party auditors or commissioning agents should validate compliance with contractual requirements, serving as independent arbiters of data integrity.

The Role of Compliance Penalties in Ensuring Operations Data Turnover Occurs

Compliance penalties play a critical role in ensuring adherence to data turnover requirements by creating financial consequences for non-compliance. Retainage withholding, where a percentage of contract payments is held until data compliance is verified, serves as a strong incentive for contractors to meet their obligations. However, for this mechanism to be effective, the withheld amount must be substantial enough to ensure compliance. If the withholding is too small, contractors may deprioritize data turnover, citing a lack of time or resources, and simply walk away from their obligations.

Similarly, financial penalties for non-compliance must be large enough to act as a meaningful deterrent. A minor penalty may be considered an acceptable loss by contractors who do not prioritize structured data handover. To ensure effectiveness, penalties should be scaled relative to project size and contract value, reinforcing the importance of proper data submission. Additionally, mandated corrections at the contractor's expense should be required for any deficiencies, ensuring that data integrity is upheld at no additional cost to the owner. These measures will help ensure that contractors take their data turnover obligations seriously and fulfill their contractual commitments.

Conclusion

Ensuring that operations data turnover is a fundamental contractual obligation is critical to long-term facility performance and cost management. Without enforceable contract language, structured data handover remains an afterthought, leading to inefficiencies, increased maintenance costs, and missed opportunities for operational optimization. The industry must shift towards a proactive stance, where clear data requirements, structured milestone reviews, and substantial financial incentives ensure that contractors fulfill their obligations.



Standardized data formats such as IFC and COBie provide a proven framework for ensuring interoperability and data usability, but their success hinges on their proper implementation and validation at every project stage. Contracting practices must evolve to mandate these structured data exchanges, reinforce compliance through meaningful measures, and require corrections at the contractor's expense when necessary.

By embedding these principles into contractual frameworks, owners and facility managers can significantly reduce the risks associated with incomplete or inaccurate data handover. This approach not only enhances the efficiency of facility operations but also extends asset longevity, improves lifecycle cost management, and supports broader sustainability goals. The time has come for the industry to move beyond informal data handovers and enforce structured, accountable, and standardized data turnover as an essential part of every AEC contract.

Ensuring operations data turnover is contractually enforced is critical to long-term facility performance. By integrating enforceable requirements in AEC contracts, leveraging standardized data formats, and applying compliance penalties, the industry can drive meaningful improvements in data turnover practices. This shift will enable more efficient operations, reduced lifecycle costs, and better-informed facilities management practices.

Disclaimer

This document, titled "Aligning AEC Contract Deliverables with Operations Data Turnover," provides general information intended to support stakeholders in understanding the importance of structured data turnover in Architecture, Engineering, and Construction (AEC) contracts. However, the content within does not constitute legal or procurement advice. Readers are advised to consult their organization's legal counsel and procurement departments to develop specific contract language tailored to their unique requirements and objectives. Proper drafting of contracts, including enforceable clauses, compliance reviews, and applicable penalties, should be performed in consultation with qualified legal and procurement professionals to ensure alignment with organizational goals, compliance with local regulations, and effective risk management.



Appendix A: Detailed IFC and COBie Requirements

IFC (Industry Foundation Classes) and COBie (Construction Operations Building Information Exchange) are two widely recognized industry-standard data exchange mechanisms designed to facilitate the seamless transfer of information across the building lifecycle. While other options may exist, IFC and COBie are extensively supported by design, construction, and operations software tools, ensuring interoperability and long-term data usability for facility management systems. These standards help bridge the gap between construction data and operations data, making it easier for facility managers to leverage digital information for asset maintenance, performance monitoring, and future upgrades. While these tools facilitate the exchange of information, ensuring the consistency, validity, and accuracy of the data is the joint responsibility of the project and operations teams. Collaborative efforts between stakeholders at all project stages are essential to maintaining high-quality, structured, and actionable data for effective facility management.

Industry Foundation Classes (IFC) Requirements

IFC (Industry Foundation Classes) is an open standard developed by buildingSMART to facilitate interoperability between BIM applications. It ensures that critical building data can be exchanged seamlessly throughout the lifecycle of a facility. Contracts should specify that:

- IFC data must comply with the latest buildingSMART specifications to ensure compatibility across platforms.
- Design and construction models should be delivered in IFC format, ensuring that asset information remains structured and accessible for future operations.
- IFC data must contain complete geometry, classification, and metadata for all major building components, including mechanical, electrical, plumbing (MEP), structural, and architectural elements.
- A validated IFC schema must be used to align asset attributes with facility management needs, ensuring a direct integration pathway into CMMS, IWMS, and other operational databases.
- The IFC model should include as-built conditions, reflecting any modifications or deviations from original design to maintain an accurate representation of the final structure.



Construction Operations Building Information Exchange (COBie) Requirements

COBie (Construction Operations Building Information Exchange) is a widely adopted standard for structuring facility asset data to support operations, maintenance, and lifecycle management. Contracts should require that:

- COBie datasets must be provided in a structured digital format (spreadsheet or database) to facilitate direct integration into asset management systems.
- The COBie data structure must include key asset attributes such as equipment identification, classification, manufacturer details, installation dates, warranty information, and maintenance schedules.
- Data should be compiled incrementally at various project milestones, including design phases, construction completion, commissioning, and project handover, to prevent last-minute data deficiencies.
- Asset data must be validated using COBie-compliant tools to ensure completeness, accuracy, and adherence to industry data exchange protocols.
- Periodic audits and compliance checks must be conducted at defined project stages to verify COBie data integrity and alignment with facility management requirements.

By mandating these requirements in contracts, project stakeholders can ensure that operations teams receive complete and usable data at project turnover, reducing the cost and inefficiencies associated with incomplete handover documentation.

