THE DESIGN-BUILDER'S GUIDE TO DESIGN MANAGEMENT:

A Playbook for the Aviation Sector

CHARLES PANKOW FOUNDATION

THE DESIGN-BUILDER'S GUIDE TO DESIGN MANAGEMENT: A PLAYBOOK FOR THE AVIATION SECTOR

March 2024

Authors

Dr. Jennifer Shane, W.A. Klinger Teaching Professorship, Associate Professor, Iowa State University

Dr. Susan Bogus, AGC Endowed Chair Professor, University of New Mexico

Wedad Abu Adi, Research Assistant, Iowa State University

Dominica Bennett, Research Assistant, University of New Mexico

Managing Editor
Oksana Gieseman

Editor
Peter Hunsinger

Graphic Design and Layout
Alicia Hoermann

CHARLES PANKOW FOUNDATION

A GUIDE FROM
Charles Pankow Foundation
1390 Chain Bridge Rd #700
McLean, VA 22101
www.pankowfoundation.org
(360) 326-3767

Contents

CONTRIBUTORS TO THE AVIATION SECTOR PLAYBOOK

Subject Matter Experts

Christine Angleton
Senior Design-Build Manager
Clark Construction Group, LLC

Gary Brandau
Senior Design Manager
Hensel Phelps

Matt Dahlberg
Senior Design Manager
Haskell

Allan Van Horn
SPP&ID SME
Kiewit Energy Company

Frank Mangin
President of Operations
Haskell

Judi Mosqueda
Chief Development Officer
San Francisco International Airport

Sean Mulholland
Assistant Professor
United States Air Force Academy

Corey Ochsner
Principal
Fentress Architects

Mark Rothman
Corporate Director of Design and Sustainability
Hensel Phelps

EXECUTIVE SUMMARY

Design-build projects in the aviation sector require the expertise and experience of owners who understand the complex nature of these projects.

The most common structure for a design-build team involves a design-builder that subcontracts the design responsibilities to one or more design firms. Within this structure, the design integration manager is typically an employee or representative of the design-builder and is responsible for coordinating and integrating the design process. On large or complex projects, these responsibilities may be distributed across several people in different departments.

This *Aviation Sector Playbook* offers guidance tailored to the characteristics of design-build project delivery in the aviation sector primarily for professionals who have been tasked with the role of design integration manager. This playbook is meant to be used in conjunction with *The Design-Builder's Guide to Design Management*. The guide aims to help owners, designers, and builders of design-build projects achieve greater success by understanding and fully leveraging the unique role of the design integration manager. To complement the guide, this playbook provides detailed information specific to the design integration manager's role in the aviation sector and describes how this individual interacts with project stakeholders across different project phases.

To succeed as a design integration manager in the aviation sector, it is crucial to recognize the key characteristics that differentiate this sector from other sectors and to understand the diverse skills, abilities, and characteristics that a design integration manager needs to effectively guide a project from start to finish. This playbook addresses the skills and qualifications a design integration manager needs to effectively deliver a design-build project in the aviation sector and outlines the design integration manager's roles, responsibilities, and involvement throughout all phases of aviation design-build projects.

In aviation design-build projects, the role of the design integration manager spans five distinct phases:

1. The **Proposal/Pre-Award Phase** begins with the development of teaming agreements among the design-build partners and concludes when the contract between the owner and the selected design-builder is finalized.
2. The **Post-Award Phase** begins with execution of the basis of design and concludes when subcontracts are issued to all partners.
3. The **Early Design Phase** begins with visioning sessions and the initiation of early work packages that, as the design progresses, are further developed during the detailed design phase.

> *"This playbook provides detailed information specific to the design integration manager's role in the aviation sector and describes how this individual interacts with project stakeholders across different project phases."*

4. The **Detailed Design Phase** begins with further development of the work packages created during the early design phase and concludes when all work packages are finalized along with the necessary documentation.
5. The **Construction Phase** begins immediately upon formal notification of the award and ends when the project is handed over to the owner.

Each phase involves a set of key tasks and presents unique challenges and opportunities, and the design integration manager plays a critical role in ensuring seamless coordination and integration across all project phases. By understanding the responsibilities and tasks expected during each phase, the design integration manager can effectively navigate the complexities of aviation projects and contribute to their successful delivery.

To provide a clear overview of the aviation design-build process, establish a structured approach to project management, and facilitate efficient decision-making throughout a project's life cycle, the following table organizes the tasks by project phase and notes the frequency at which the design integration manager must perform them. The highlighted tasks, indicated by an airplane icon, represent additional or alternative tasks specific to the aviation sector that are not included in *The Design-Builder's Guide to Design Management*.

Phase	Task	Frequency
Proposal/Pre-Award	Review the owner's project announcement and identify the design, supplier, and trade contracting partners	Once
	Negotiate a teaming agreement with all partners	Once
	Assign initial scopes of work to all partners based on the owner's project announcement	Once
	Coordinate with partners to identify project-specific risks and create a risk register	Every few days to weekly until proposal submission
	Develop a preliminary schedule for proposal and design deliverables	Daily*
	Develop a conceptual cost estimate for professional services	Daily*
	Verify that the design subcontracts to be issued to partners upon award meet the project requirements	Once
	*↗ Manage development of the proposal and its content*	*Daily until proposal submission*
	*↗ Manage the scope responsibility matrix among all partners*	*Weekly throughout the project*
Post-Award	Document the initial basis of design and review project program to reconcile the owner's "ask" with the design-build team's "offer"	Weekly throughout the project*
	Manage and oversee the execution of the design subcontracts with partners**	Once
	Identify and communicate key project expectations to all partners	Once
	Establish a communication plan with partners	Weekly throughout the project*
	Build a supportive team culture	Daily throughout the project
	Update and manage the project-specific risk register	Every few days to weekly throughout the project
	Refine the schedule for design deliverables	Weekly throughout the project*

Table continued on following page

** Phrasing has been modified slightly from The Design-Builder's Guide to Design Management to reflect the unique characteristics of the aviation sector*

*** Task typically managed by the project manager with assistance from the design integration manager*

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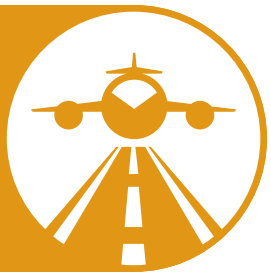
Phase	Task	Frequency
Early Design 	*↗ Manage the design visioning sessions*	*Weekly throughout design*
	Confirm that the design aligns with the project budget and schedule*	Weekly to every few weeks throughout design
	Set goals for meetings, then plan and organize effective meetings	Every few days to weekly throughout design
	Facilitate meetings with the authority having jurisdiction to discuss project-specific code compliance	Every few weeks to monthly throughout design
	Mediate design questions and concerns between the project designer and the owner	Every few days to weekly throughout design
	*↗ Verify that the design aligns with the visioning sessions*	*Every few days to weekly throughout design*
	Create and maintain a log of design changes and their associated costs	Every few days to weekly throughout design
	Oversee the progress of the design schedule	Weekly to every few weeks throughout design
Detailed Design	Facilitate quality in the design process through design and constructability reviews with internal and external stakeholders	Every few weeks to monthly throughout design
	Document the final basis of design and obtain owner approval	When each work package is completed*
	Maintain morale and refocus the team	Every few days to weekly throughout the project
	Track and monitor the actual design costs	Every few days to weekly throughout design
	Monitor the procurement schedule with the construction team and coordinate deliverable deadlines with the design team	Weekly throughout design*
Construction	Bridge design team and construction team efforts to maintain project alignment	Every few days to weekly until project close-out
	Document key design changes and communication with the authority having jurisdiction during construction	Every few weeks to monthly until project close-out
	Facilitate the project close-out documentation process	Every few weeks to monthly until project close-out

** Phrasing has been modified slightly from* The Design-Builder's Guide to Design Management *to reflect the unique characteristics of the aviation sector*

CHAPTER 1: CHARACTERISTICS OF THE AVIATION SECTOR



The characteristics of aviation sector design-build projects differ from those identified in *The Design-Builder's Guide to Design Management*—which focuses on the building construction sector—in ways that can impact the role and responsibilities of a design integration manager. Aviation projects require a unique approach due to their intricate nature, the considerable durations involved, and the need for compliance with stringent regulations. Exploring the characteristics of these projects can help professionals better understand the challenges that arise and considerations that must be addressed when managing the design process in this sector. Key characteristics of aviation sector design-build projects are described in the following sections.

> *"Exploring the characteristics of aviation projects can help professionals better understand the challenges that arise and considerations that must be addressed when managing the design process in this sector."*

Complexity

Aviation projects are in many ways more complex than building projects. This greater complexity can introduce additional challenges during the planning and design phases, more significant risks of unexpected cost overruns and delays, and more extensive permitting requirements. Factors unique to the aviation sector that increase project complexity include the following:

- **Lengthy project timelines and stakeholder changes.** Aviation sector design-build projects feature extensive timeframes, often spanning years or even decades. Because of these durations, changes within the project team, adjustments to the team's structure, and accommodations for shifts in stakeholder priorities are often necessary over the project's life cycle.
- **Long-term planning.** Long-term planning, which involves forecasting facility use over 20 to 30 years and collaborating with airlines to predict long-term schedules and projected growth, is inherent in aviation design to ensure functional facilities throughout their life cycles. Factors such as jet blast effects, lobby transaction times, and curb arrival times all contribute to a holistic long-term planning approach that anticipates diverse operational needs over time and accommodates evolving industry demands, which adds complexity to aviation projects. For instance, organizations like the San Francisco International Airport engage in extensive pre-planning activities, ensuring that expansions and renovations are strategically orchestrated many years in advance.

- **Design changes and the role of documentation.** Design changes during the construction phase can lead to added project complexity when the re-engagement of architects, designers, and stakeholders is required. Effective documentation becomes pivotal in aviation projects due to the numerous stakeholders involved and the projects' extended durations. Proper documentation helps keep track of decisions made years ago and ensures clarity and accountability during design.
- **Dynamic equipment and technology utilization.** The aviation industry is marked by rapid technological advancements and changing equipment needs. The long lead times of aviation projects amplify the challenge of staying up to date with the latest equipment and technology and maintaining flexibility in adapting to new developments. For instance, the integration of building information modeling (BIM) technology is fundamental to aviation projects, with BIM tools utilized from the project's inception. The BIM tool of choice is an investment at the project team level and may be dependent on project specifications, though architects may initiate designs with one software package and the team may need to transition to another for further development. The crucial role of BIM execution manuals during the design process must be emphasized, along with the challenges that may be introduced when partners follow their own BIM execution plans.
- **Industrial focus and regulatory uniqueness.** Aviation projects have an industrial orientation, with elements of the aerospace and aviation sectors often intertwined in a way that blurs the boundary between the two. Compliance with Federal Aviation Administration (FAA), Transportation Security Administration (TSA), and United States Customs and Boarder Protection (CBP) regulations is paramount, making the aviation sector unique regarding its regulatory considerations. For instance, a prominent aspect of aviation projects is the fusion of significant horizontal structures (such as runways) and vertical structures (such as terminal buildings). This unique combination necessitates meticulous planning and execution. The federal component underlying aviation sector design, including FAA regulations, is significant in shaping project frameworks and specifications.
- **Cargo operations and baggage handling.** Cargo operations in the aviation sector are multifaceted and are often managed by specialized providers. Cargo facilities play a crucial role in diverse services, ranging from delivering food to aircraft to managing waste removal. A notable feature of cargo operations is the incorporation of multiple functions within a single facility, which underscores the complexity of aviation projects. Moreover, baggage handling is a crucial operation in aviation facilities that extends beyond simply managing passenger baggage to encompass tasks such as handling mail and bulk items.

Visioning Sessions

Throughout the life cycle of an aviation project, visioning sessions play a pivotal role in bridging overarching aspirations with the specifics of implementation. These sessions are typically held early in a project's planning and design stages and serve several important purposes, such as establishing project goals, objectives, stakeholder expectations, communication protocols, collaboration procedures, and design principles; identifying risks; and outlining phasing and sequencing plans. These sessions commence with broad objectives and gradually narrow in scope to intricate operational details. Visioning sessions cover the following considerations:

- **Site selection.** Site selection often takes place during the master planning process for an airport and sets the stage for the project's subsequent progress.

- **Site planning and unique design components.** The aviation industry's reliance on large-scale movements within its facilities emphasizes the criticality of early-stage site planning. Ensuring that site planning is accurate and comprehensive is essential given the limitations that may arise later in the project. Additionally, many unique components demand careful attention during aviation design. For instance, the planning of passenger flows, the layout of lobbies, and the sequencing of passenger movements are complex aspects of design that impact the public's experience of the facility. These complexities of aviation design often introduce challenges that must be carefully managed. The design team must ensure that the project's design aligns with the specific requirements of stakeholders, including the TSA and FAA. Some design documents are classified as sensitive security information (SSI) and are hidden from public view to maintain security standards. Additionally, design considerations extend to ensuring the safety of the facility and its users, encompassing elements such as addressing the threat of active shooters, enhancing building safety, and managing potential hazards such as blasts.
- **Efficient project phasing.** Aviation projects are characterized by an emphasis on effective project phasing, especially during holidays. The extended duration of aviation projects demands a systematic approach to managing a project's different phases, especially when projects involve pedestrian bridges and other extensive components.
- **Procurement dynamics and early work packages.** A noteworthy aspect of aviation projects is the emphasis on early work packages, also known as enabling packages. These packages lay the groundwork for subsequent phases of work by addressing preparatory tasks that contribute to the project's overall success. The increased need for aviation projects to procure items early, especially those with extended lead times, influences project dynamics.
- **Collaboration and complex decision-making.** Collaboration is a cornerstone of aviation projects, with stakeholders from various sectors and regulatory bodies contributing to the complex decision-making process. The complexities of decision-making are further heightened by the need to comply with many rules and to fulfill diverse stakeholder requirements. While smaller airports often rely on federal funding alone to support their projects, larger airports combine federal funding with fee structures, which multiplies the stakeholders involved in decision-making.
- **Risk management.** The aviation sector heavily relies on risk registers to manage the risks stemming from various challenges, for example, the need to accommodate the unique requirements of specific gates or address operational complexities.
- **Facility management data for enhanced management.** The models used in aviation projects tend to incorporate facility management (FM) data, which encompasses detailed specifications such as model numbers, serial numbers, engine revolutions per minute (RPMs), and more. Integrating this information into the models is vital for efficient airport facilities management, and early planning is essential for ensuring the seamless integration of this information into the models without incurring future costs.
- **Striking a balance between public and private sector elements.** Aviation projects often blend public and private sector elements, requiring intricate coordination among these parties to meet diverse stakeholder needs.

The Role of Data Science in the Future

Experts in the aviation field express optimism about the future growth and evolution of data science. As data science gains prominence, however, ethical considerations and privacy concerns take center stage. The responsible use of data will become crucial to ensuring that advances in the field align with ethical standards and respect user privacy.

Emphasis on Asset Management and Commissioning

Asset management is a critical concern in aviation projects, with consistent asset management tags across manufacturing facilities being essential. Additionally, commissioning holds immense significance for aviation facilities. Commissioning ensures that the systems built align with the project's requirements and function as intended. The commissioning process is executed later in the project and often overlaps with the construction phase.

Teaming Agreements and Contracting Mechanisms

The aviation industry employs varied teaming agreement models, which allows for flexibility in collaboration and partnerships. However, challenges may arise if the use of different teaming agreements and contracting mechanisms creates conflicts among the various partners.

Stipends and Contractual Considerations

Stipends, at one time quite prevalent in the aviation sector, have become less common. The complexity of contract negotiations in aviation projects underscores the importance of streamlined contractual processes.

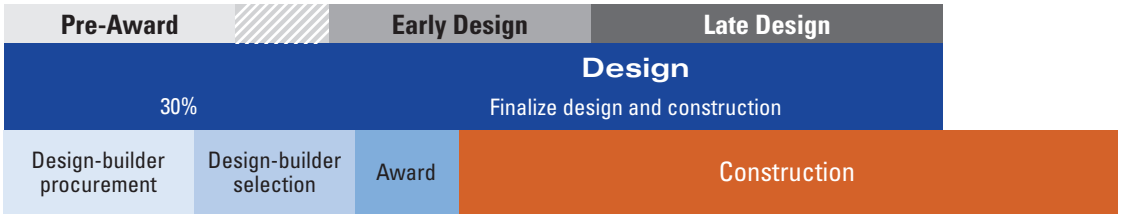
CHAPTER 2: THE DESIGN-BUILD AND PROGRESSIVE DESIGN-BUILD PROCESSES

In the aviation sector, the progressive design-build (PDB) and construction manager at risk (CMAR) delivery methods are gradually becoming more frequently used than traditional design-build delivery. The selection of a particular project delivery method depends on the owner's preferences, the procurement strategy used, and the project specifics. Smaller projects or projects that involve the construction of a supporting facility or manufacturing facilities tend to use the traditional design-build delivery method. In contrast, larger projects or projects that involve the construction of terminal facilities usually use the PDB or CMAR delivery method.

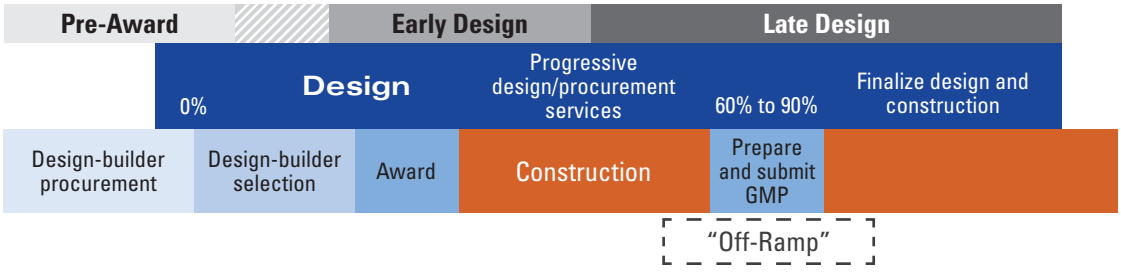
The notable difference between using traditional design-build and PDB in aviation projects is that PDB involves the use of enabling packages, also known as early work packages, and enables early commencement of construction. Importantly, PDB allows for early decision-making and resolution regarding anomalies that have a high occurrence rate in aviation projects. As the project progresses, various unknowns can be resolved simultaneously through the use of enabling packages.

> *"In the aviation sector, the PDB and CMAR delivery methods are gradually becoming more frequently used than traditional design-build delivery."*

Traditional (Fixed Price) Design-Build Delivery



Progressive Design-Build Delivery



Traditional design-build and progressive design-build delivery

In order to facilitate the PDB sequence, the design-build team encourages the designers to work quickly on the design, particularly for the "make-ready" aspects of the project, and encourages the owner(s) to release the completed work packages earlier to benefit the project. The enabling packages can be initiated before the guaranteed maximum price (GMP) is established if the project requires items with potentially long lead times and can be essential for monitoring project performance and coordinating stakeholders. PDB in the aviation sector does not use the traditional design completion percentages of 30%, 60%, and 90% but instead uses the enabling packages to stagger the work capacity and avoid overstraining the design team. If construction begins before the GMP is established, separate work packages can be distributed (e.g., one for the site, another for the superstructure). PDB allows for overlaps in the schedule due to its use of early work packages and can thus achieve a shorter project timeline than would be possible with traditional design-build delivery.

The design integration manager plays a beneficial role in the development and shepherding of enabling packages through his or her unique skills and characteristics, understanding of the design and construction aspects of the project, and ability to communicate among various project participants.

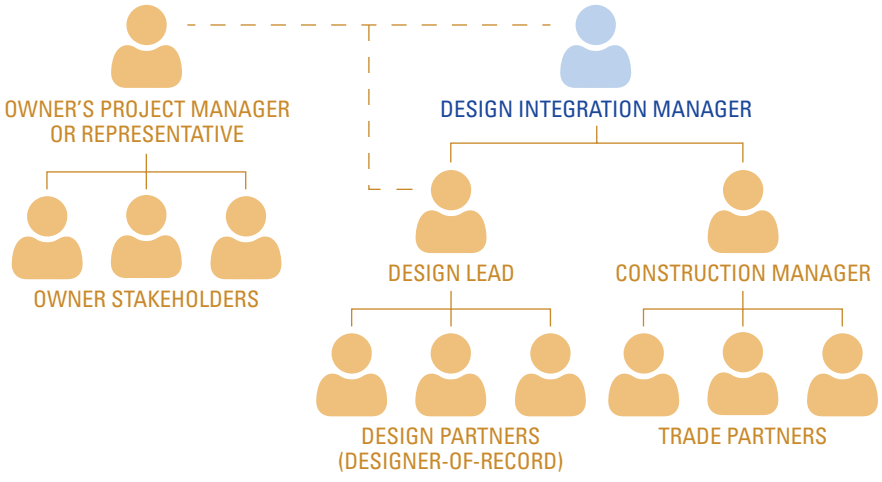
Aviation sector design-build projects can be divided into five main phases: the proposal/pre-award phase, the post-award phase, the early design phase, the detailed design phase, and the construction phase. In each of these phases, the design integration manager's tasks vary somewhat from those outlined in *The Design-Builder's Guide to Design Management*. Chapters 5 through 9 describe the typical tasks of a design integration manager in each phase of the project. While most of these tasks are described in detail in *The Design-Builder's Guide to Design Management*, additional tasks specific to aviation projects are highlighted and described in more detail in this playbook.

CHAPTER 3: ROLE OF THE DESIGN INTEGRATION MANAGER

In the aviation sector, the design integration manager is essential in ensuring the successful execution of design-build projects. The role of design integration manager is recognized across the sector, though the title may vary from company to company. The design integration manager is especially significant in the aviation sector due to the unique challenges of aviation projects, which encompass intricate infrastructure planning, strict regulatory compliance, and consideration of the dynamic demands of passenger flow. Unlike in other sectors, where the design integration manager's role might be introduced later in a project, in the aviation sector the design integration manager is active right from the project's initiation. The design integration manager plays a pivotal role in ensuring seamless collaboration, communication, and synchronization among diverse teams and stakeholders and bridging the gap between design and construction.

Organizational Structures of Aviation Sector Projects

The organizational structure of an aviation project plays a vital role in successful project management. To effectively implement the guidance provided in the *Aviation Sector Playbook*, it is essential to understand the most common organizational structure that aviation projects use. In this structure, the owner's representative is effectively parallel to the design integration manager, a relationship that contrasts with the more hierarchical relationship presented in *The Design-Builder's Guide to Design Management*. This structure also features a direct connection between the owner's representative and the design lead to ensure that communication between the owner and the project team is seamless and that concerns are shared. This feature of the organizational structure reflects the responsiveness of aviation projects to the diverse needs and preferences of stakeholders, which ultimately contributes to successful project outcomes.



Organizational structure featuring an owner's representative, design integration manager, design lead, and construction manager

> *The design integration manager plays a pivotal role in ensuring seamless collaboration, communication, and synchronization among diverse teams and stakeholders and bridging the gap between design and construction.*

It is important to note that this structure is not the only structure used in aviation projects. Each project's organizational structure adapts to meet the unique demands of that project and may change depending on the following:

1. **Entity overseeing the project.** Organizational structures can vary based on the entity overseeing the project. Different entities may have distinct preferences and requirements, leading to adaptations in the structure to accommodate the entity's specific needs.
2. **Project manager's engagement.** Depending on the project's scale and complexity, the project manager's level of engagement may vary. However, it is suggested that the project manager and design lead always remain in contact to some degree to facilitate collaboration, especially in projects with significant overlap in their roles.
3. **Project size and complexity.** Organizational structures are adapted to the project's size and complexity. Larger projects often entail more complex organizational hierarchies with many roles, whereas smaller projects may adopt streamlined structures with fewer hierarchical layers.

Roles and Responsibilities of the Design Integration Manager in the Aviation Sector

In addition to the responsibilities discussed in *The Design-Builder's Guide to Design Management*, the design integration manager also takes on several **specific key roles and responsibilities** within aviation sector projects, as described in the following sections.

Navigation of the Design Visioning Process

The aviation sector introduces a unique dynamic to the role of design integration manager. Unlike projects in other sectors, where the design integration manager's role may begin later, aviation projects necessitate the involvement of the design integration manager from the very beginning. One of the core responsibilities of the design integration manager is to guide the design visioning process, which entails establishing the project team and conducting a meeting to kick off the project. This early-stage endeavor generates ideas, sets the design objectives and goals for the project, refines the project's direction, and validates the project's vision and programmatic requirements. Through detail-oriented visioning meetings, activities such as rerouting roads, planning passenger flow, optimizing signage placement, and enhancing the overall user experience are thoroughly strategized. This front-end planning sets the stage for successful project execution. The design integration manager's skill in early long-term planning is especially critical considering project owners' unique requirements and terminologies.

Effective Communication and Collaboration

While the design integration manager's technical skills are vital to project success, the role of the design integration manager extends beyond proficiency in technical matters. Effective communication and collaboration with nontechnical stakeholders and the owner is paramount. Simplifying complex data and translating them into actionable insights fosters a shared understanding of project goals and aligns the efforts of all parties toward a common vision. Ensuring a continuous flow of communication between all parties in this way is vital to project success.

Site Selection and Master Planning

On aviation projects, site selection and master planning are pivotal to project success. While these activities typically occur prior to issuance of the request for proposals (RFP) and the design integration manager does not typically play a significant role in the activities themselves, the design integration manager does play a significant role in ensuring that the site choice aligns with project objectives and anticipated needs. These activities demand a comprehensive understanding of both design and operational requirements because decisions made at this stage can significantly impact the project's subsequent progress and execution.

Modeling, Forecasting, Projection, and Long-Term Planning

In the aviation sector, projections are more than mere predictions; often extending over decades, they are critical for strategic planning and serve as the foundation for the phased development of airports. The design integration manager's understanding of staffing forecasts, aircraft movements, baggage handling system requirements, and other variables over several years is instrumental in shaping the project's phasing and enabling efficient resource allocation and strategic decision-making.

Adaptability to Technological Advancements

The role of the design integration manager in the aviation sector demands adaptability to evolving technologies and emerging tools and methodologies, with data science playing an increasingly crucial role. The design integration manager's ability to adapt to new technological advances ensures that the project benefits from the latest innovations and enhances the project's efficiency and effectiveness.

Design Phase Integration

The role of the design integration manager extends beyond the initial phases of the project. During the proposal/pre-award phase, the design integration manager focuses on aligning the construction timeline with the progression of the building model. Comprehensive understanding of the project among stakeholders is essential to ensuring smooth coordination between the design schedule and the buyout package schedule.

Synchronization and Coordination of Design and Construction Phases

The early engagement of the design integration manager facilitates effective coordination between the design and construction teams, allowing for timely adjustments and smooth transitions throughout the project. This coordination involves aligning design schedules with buyout package schedules to optimize project efficiency. Challenges may arise as a result of project changes, necessitating productive consultations with all stakeholders to ensure alignment and minimize disruptions. A distinctive characteristic of aviation projects is the necessity for extensive coordination between the design and construction phases. While some companies opt to design the project using in-house staff, the design integration manager in any design-build project must possess a comprehensive understanding of both design principles and construction processes. This breadth of knowledge is crucial for seamless integration, especially when tasks related to fast-tracking and phasing are involved.

Consistency, Continuity, and Documentation

While some roles might diminish in significance as the project progresses, the design integration manager remains a consistent and valuable presence throughout the project, particularly for progressive design-build (PDB) projects. The value of this consistency is underscored in the aviation sector. With the tendency for aviation projects to evolve over time, the design integration manager plays a pivotal role in adapting designs for new circumstances, addressing dynamic challenges, and ultimately ensuring the project's success. A significant responsibility of the design integration manager in this regard is to act as a repository of past decisions and their rationales. The design integration manager's deep understanding of past decisions helps the team maintain alignment and uphold the project's original vision. This responsibility becomes particularly crucial when team members change. With the design integration manager ensuring consistency, continuity, and informed decision-making throughout the project's life cycle, the project's vision remains intact and new team members are seamlessly onboarded.

What the Design Integration Manager Needs to Be Successful

The Design-Builder's Guide to Design Management provides a list of competencies that the design integration manager needs to be successful. In addition to the knowledge, skills, abilities, and other characteristics outlined in the guide, the design integration manager working in the aviation sector requires a supplementary set of competencies to ensure that the design integration manager is qualified to engage in all stages of the project, from the proposal/pre-award phase to the construction phase. Knowledge, skills, abilities, and other characteristics unique to the aviation sector are indicated by an airplane icon.

Key Recommended Knowledge in the Aviation Sector

	Construction work sequencing
	Document management procedures
	Sources of risk and risk management practices
	Familiarity with applicable local, state, and federal building codes
	Airport-specific design standards
	Hands-on experience with aviation sector design and construction
	Aviation-specific terminology and acronyms
	Airport and flight operations

On aviation projects, processing the right knowledge can make all the difference. Of the recommended knowledge documented in *The Design-Builder's Guide to Design Management*, the following is key in the aviation sector:

- **Construction work sequencing.** In the aviation sector, it is essential for the design integration manager to have a deep understanding of construction work sequencing. This knowledge goes beyond simply understanding typical construction processes because aviation projects often involve complex schedules that must account for airport operations and security considerations. Construction work sequencing in the aviation sector involves detailed planning to ensure minimal disruption to airport activities, for example, when planning runway maintenance or a terminal expansion. The design integration manager must know how to coordinate construction tasks, what needs to be done, and when and how work can be executed in a way that allows the airport to continue functioning smoothly.
- **Document management procedures.** Aviation projects generate an extensive number of documents, ranging from safety protocols and regulatory compliance reports to construction blueprints and equipment manuals. Effective document management is essential to maintaining project integrity, safety, and regulatory compliance. The design integration manager in the aviation sector must excel at organizing, tracking, and ensuring the accuracy of these documents and must coordinate with various stakeholders, including regulatory bodies like the Federal Aviation Administration (FAA) and Transportation Security Administration (TSA), to guarantee that all necessary documentation is in order.

- **Sources of risk and risk management practices.** Aviation projects are often subject to strict security measures and rigid timelines. The design integration manager must have a comprehensive understanding of the potential risks inherent in aviation projects, such as disruptions to flight schedules, security breaches, or budget overruns. The design integration manager must also be knowledgeable in risk management practices tailored to aviation, which may involve contingency planning for sudden operational changes, security protocols, and emergency response procedures.
- **Familiarity with applicable local, state, and federal building codes.** Unlike projects in many other sectors, aviation facilities must adhere to a complex set of regulations and codes, which can vary not only from state to state but also at the federal level. The design integration manager in the aviation sector must navigate this regulatory landscape precisely, ensuring that all aspects of the project align with the relevant codes. Failure to comply can result in costly delays, regulatory penalties, and compromises in airport safety.

In addition to the key recommended knowledge highlighted above, the following supplementary knowledge is required to ensure that the design integration manager is qualified and successful in the aviation sector:

- **Airport-specific design standards.** Airports operate under a unique set of design standards and guidelines that govern everything from runway dimensions and terminal layouts to security protocols. The design integration manager must possess an in-depth understanding of these airport-specific design standards, which serve as the foundation for all design and construction activities in aviation facilities. These standards provide detailed instructions on how different aspects of the airport should be designed to ensure operational efficiency and compliance with safety regulations and security measures. By becoming familiar with these standards, the design integration manager can effectively translate their requirements into actionable design decisions, thereby facilitating seamless alignment between the project's objectives and the airport's specific operational and safety needs.
- **Hands-on experience with aviation sector design and construction.** A standout design integration manager in the aviation sector possesses hands-on experience that spans both design and construction. This comprehensive background equips the design integration manager with an accurate understanding of the challenges and complexities inherent to each phase of the project. The design integration manager who has navigated both design and construction is adept at bridging potential gaps, fostering seamless communication, and facilitating well-informed decisions that resonate with both design and construction teams and lead to the successful execution of tasks.
- **Aviation-specific terminology and acronyms.** The aviation sector is characterized by its distinct language, rich in acronyms and specialized terminology. Therefore, a comprehensive knowledge of aviation terminology and acronyms is essential for effective communication with stakeholders ranging from aviation authorities to project team members. A proficient design integration manager should be well-versed in the specific terminology, regulations, and requirements that characterize the aviation sector. This familiarity minimizes misunderstandings, enhances collaboration, and contributes to the project's success.
- **Airport and flight operations.** The design integration manager's understanding of flight operations, including aircraft movements and terminal functionality, and the mechanics of various airport stations is critical in aviation projects. Moreover, a proficient design integration manager brings niche knowledge to the table, for example, in areas such as control towers or specialized terminal components. This knowledge enables the design integration manager to align design decisions with the operational needs of the aviation environment, ensure that the project meets both functional and regulatory requirements, foresee challenges and propose tailored solutions, and drive innovation that aligns with aviation-specific requirements and contributes to project excellence.

Key Recommended Skills in the Aviation Sector

Determining client and stakeholder expectations
Prioritizing work
Conveying a message in written form

On aviation projects, possessing the right skills can make all the difference. Of the recommended skills documented in *The Design-Builder's Guide to Design Management*, the following are key in the aviation sector:

- **Determining client and stakeholder expectations.** Aviation projects involve many stakeholders, each with a specific set of expectations, requirements, and concerns. The design integration manager in the aviation sector must be skilled in determining and aligning client and stakeholder expectations through conducting thorough stakeholder analyses, identifying key client priorities, and ensuring that all project stakeholders are on the same page regarding project objectives and outcomes. This skill involves active listening, effective communication, and a keen understanding of the aviation industry's unique challenges and regulatory requirements.
- **Prioritizing work.** Prioritizing work is a significant component of any progressive design-build project. For aviation projects specifically, this skill involves not only managing project tasks but also considering the broader implications of these tasks on airport functions. The design integration manager must therefore be adept at aligning project work sequences with airport operational needs. This skill requires a deep understanding of aviation-specific requirements and the ability to coordinate with various airport stakeholders, such as airlines, ground services, and regulatory agencies. It also involves the capacity to devise innovative solutions that balance project demands with the critical timing and sequencing requirements of the aviation environment.
- **Conveying a message in written form.** A critical skill for the design integration manager is to articulate ideas, decisions, and rationales clearly and concisely in writing. In the aviation sector, a key dimension of this skill is developing documentation that captures project information comprehensively, serves as a reference point for any given moment in the project's life cycle, fosters accountability, and mitigates risks associated with misunderstandings.

Key Recommended Abilities and Other Characteristics in the Aviation Sector

 Practicing adaptable leadership

In addition to the key recommended abilities and other characteristics documented in *The Design-Builder's Guide to Design Management*, the following supplementary ability is required to ensure that the design integration manager is qualified and successful in the aviation sector:

- **Practicing adaptable leadership.** The design integration manager in the aviation sector not only leads by example but also serves as a source of inspiration and guidance for the project team. In the aviation environment, where safety, precision, and adherence to regulations are paramount, the design integration manager must exhibit qualities that instill confidence in team members. This includes being a role model regarding safety compliance, strict adherence to procedure, and a commitment to the highest standards. Aviation projects often involve diverse teams with various areas of expertise, making leadership characteristics essential for fostering collaboration, resolving conflicts, and maintaining a unified project vision. Effective leadership in the aviation sector goes beyond management to create a culture of excellence, continuous improvement, and unwavering dedication to the safety and success of the project.

CHAPTER 4: PROPOSAL/PRE-AWARD PHASE

Description of Phase

The proposal/pre-award phase in the aviation sector commences with the development of teaming agreements and concludes when the contract between the owner and the selected design-builder is finalized. The tasks of the design integration manager during the proposal/pre-award phase align with those in *The Design-Builder's Guide to Design Management*, apart from changes to the frequency of two tasks and the addition of two new tasks.

The Role of the Design Integration Manager

During the proposal/pre-award phase, the design integration manager is pivotal in coordinating and supervising a diverse team of designers, contractors, specialty consultants, vendors, and material suppliers. The design integration manager is highly active in the procurement process (e.g., request for proposals [RFP], request for qualifications [RFQ], and project announcement) because he or she serves as the liaison between the construction and design teams.

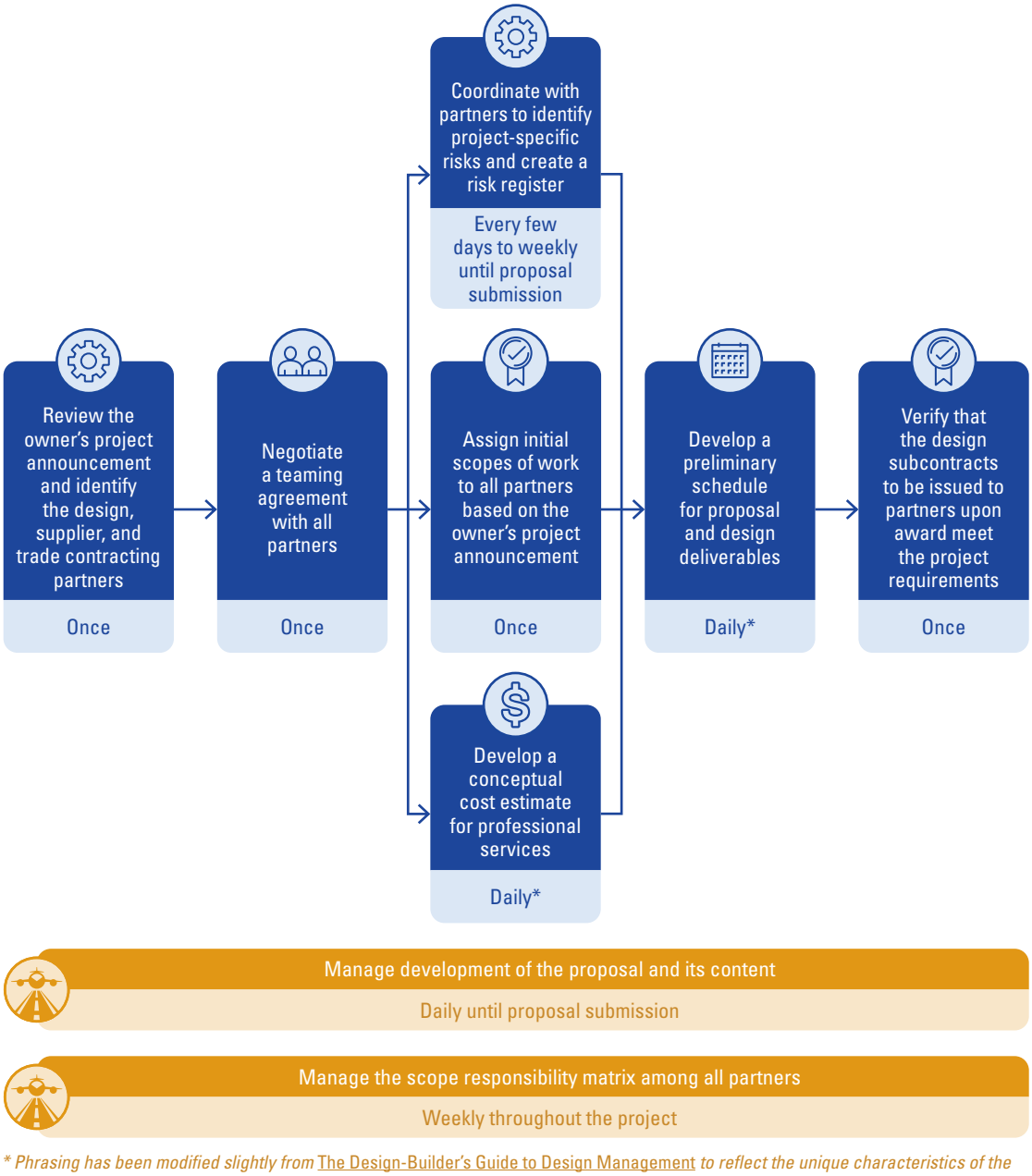
The responsibilities of the design integration manager encompass the formation of the project team, including identifying design, supplier, and contracting partners. Furthermore, the design integration manager leads the team in defining responsibilities and setting project expectations for all participants. Negotiating with stakeholders on teaming agreements before the project is awarded is essential because it establishes the team members' roles and the methods the team will use to address the owner's expectations. The number of teaming agreements depends on the project type or size; one or several teaming agreements may be needed to capture the relationships among the design-build trade partners.

Depending on the project type, proposals for aviation projects may require some degree of up-front design effort. In such cases, the design integration manager works with the design team to ensure that the proposed design aligns with the requirements in the RFP/RFQ. The design concept included in the proposal does not need to be fully finished but should reflect a project vision. The design integration manager assists with translating the proposed design into cost and schedule estimates for the design-build team and delegating responsibilities to partners based on the project announcement. The design integration manager also helps the design team limit its design effort and assists with reviewing the content (e.g., rendering). Daily tasks for the design integration manager during this phase include developing a preliminary schedule for proposal and design deliverables and developing a conceptual cost estimate for professional services.

> *"During the proposal/pre-award phase, the design integration manager is pivotal in coordinating and supervising a diverse team of designers, contractors, specialty consultants, vendors, and material suppliers."*

During this phase, the design integration manager begins development of a risk register or risk log to track potential sources of risk in the project. The risk register is inclusive and accessible, with both the design-build team and the owner involved in decision-making and all parties able to contribute their concerns. The risk register is further developed during the post-award phase and must be managed weekly by the design integration manager. Effective tracking and monitoring techniques for key decisions are highly recommended because aviation projects can have extensive timeframes.

In the aviation sector, the role that early work packages will play in project development must be considered during the proposal/pre-award phase. A key responsibility of the design integration manager is to ensure that the project's progress follows the early work packages in terms of schedule and budget. Additionally, it is essential to have a clear understanding of what is included in these packages and to achieve agreement among project participants.



** Phrasing has been modified slightly from The Design-Builder's Guide to Design Management to reflect the unique characteristics of the aviation sector*

Workflow of the design integration manager's tasks during the proposal/pre-award phase

Additional Task: Manage Development of the Proposal and Its Content

Daily until proposal submission

A key task for the design integration manager that is specific to aviation sector projects is to manage development of the proposal and its content.

Knowledge	Skills	Abilities	Other Characteristics
• Document management procedures • The design process and stages of design • Local market conditions (e.g., competition, labor availability, quality of trade partners) • Construction work sequencing • Construction means and methods • Familiarity with applicable local, state, and federal building codes • Airport-specific design standards • Aviation-specific terminology and acronyms	• Conveying a message in written form • Conveying information verbally • Organizing information and record keeping • Compromising and finding equitable solutions • Reading and understanding design drawings • Forecasting cost and schedule impacts	• Collaborating with partners • Devising innovative solutions • Focusing on and remembering details • Collecting, analyzing, and interpreting information • Practicing adaptable leadership	• Focused • Trustworthy • Adaptable • Decisive

With a level of engagement dependent on the complexity and requirements of the project, the design integration manager assists in developing the project proposal and its content. This assistance includes ensuring that the proposal content meets the requirements outlined in the RFP/RFQ and by the owner. The design integration manager also helps translate the design information obtained from the design team into cost and schedule estimates. Additionally, the design integration manager may be responsible for reviewing the resumes, past project experience, and qualifications of potential design-build trade partners. The design integration manager then works with the designers and trade partners to form an effective team and compelling proposal for submission.

Additional Task: Manage the Scope Responsibility Matrix among All Partners

Weekly throughout the project

A key task for the design integration manager that is specific to aviation sector projects is to manage the scope responsibility matrix outlining the scopes of work assigned to the design-build partners.

Knowledge	Skills	Abilities	Other Characteristics
• Document management procedures • Contractual terms and conditions • Sources of risk and risk management practices • Airport-specific design standards • Aviation-specific terminology and acronyms • Airport and flight operations	• Conveying a message in written form • Conveying information verbally • Negotiating with partners and stakeholders • Resolving conflict among people on the project team • Organizing information and record keeping • Compromising and finding equitable solutions • Reading and understanding design drawings • Determining client and stakeholder expectations	• Collaborating with partners • Devising innovative solutions • Focusing on and remembering details • Collecting, analyzing, and interpreting information • Practicing adaptable leadership	• Focused • Trustworthy • Adaptable • Decisive

In the proposal/pre-award phase, the design integration manager is responsible for managing the scope responsibility matrix. This matrix assigns specific scopes of work to all design-build partners based on the owner's project announcement. Typically, this matrix is provided along with the teaming agreement to offer the design-build partners a preliminary understanding of their responsibilities. Though this task commences during the proposal/pre-award phase, the matrix is not resolved during this phase because responsibilities may change. This task can therefore extend into the post-award phase, when the contracts negotiations with partners are initiated, and beyond if circumstances change.

CHAPTER 5: POST-AWARD PHASE

Description of Phase

The post-award phase commences with execution of the basis of design and concludes when subcontracts are issued to all partners. During this phase, coordination among the design-build team transitions into coordination with the owner to validate the ideas and assumptions developed during the pre-award/proposal phase. The design-build team then negotiates and executes a contract agreement with the owner. However, this process is known for being time-intensive and complex because it involves consideration of budget-related contractual language. Finalizing contracts with the design-build partners can also be elaborate and time-consuming, even with initial teaming agreements in place, and execution can take a few weeks to several months depending on the project size and type. While the project manager typically performs contract negotiations with the owner and design-build partners, the design integration manager may assist. The tasks of the design integration manager in the post-award phase closely align with those outlined in *The Design-Builder's Guide to Design Management*, apart from changes to the frequency of three tasks.

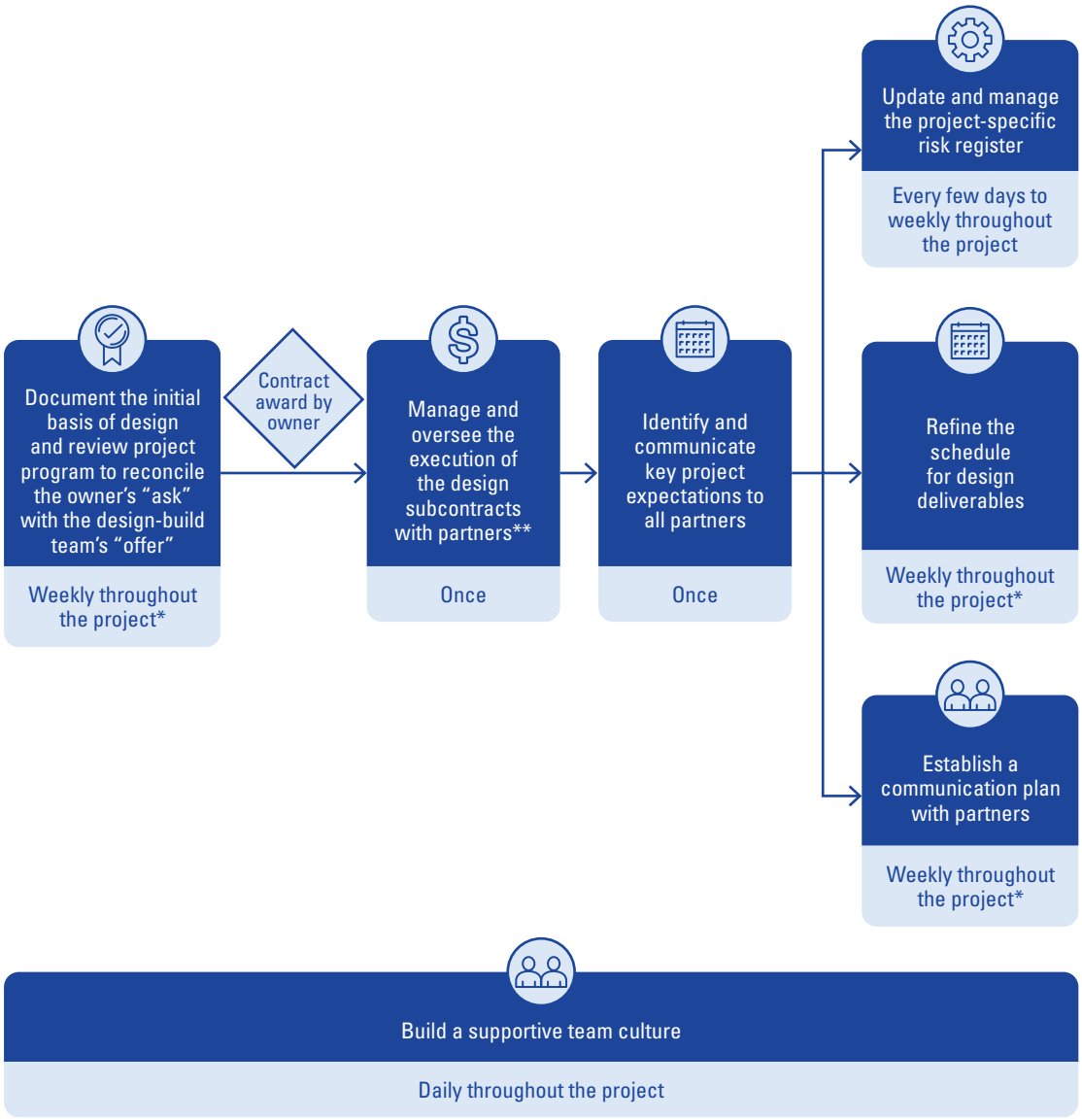
The Role of the Design Integration Manager

During the post-award phase, the design integration manager launches and oversees the initial basis of design and begins programming the project in collaboration with the design-build team. This task aims to ensure compliance between the design and the project's requirements and specifications.

Furthermore, the design integration manager remains actively engaged in the analysis of risk and enhancement of the risk register established during the proposal/pre-award phase. This task occurs on a weekly basis and expands the scope of the initial design deliverables prepared during the proposal/pre-award phase. The risk register includes challenges that may arise from the design phases to procurement, with decision-making deadlines listed for the owner to prevent indefinite delays and facilitate smoother project execution.

Throughout the post-award phase, the design integration manager is also responsible for establishing a comprehensive communication plan among the owner, partners, and stakeholders. As part of this plan, monthly update meetings may need to be established with the owner to fulfill contractual obligations.

> *"During the post-award phase, the design integration manager launches and oversees the initial basis of design and begins programming the project in collaboration with the design-build team."*



** Phrasing has been modified slightly from The Design-Builder's Guide to Design Management to reflect the unique characteristics of the aviation sector*

*** Task typically managed by the project manager with assistance from the design integration manager*

Workflow of the design integration manager's tasks during the post-award phase

CHAPTER 6: EARLY DESIGN PHASE

Description of Phase

The early design phase commences with visioning sessions to establish a design baseline and validate the project's vision and requirements. These sessions typically occur after the project is awarded and involve the design integration manager, construction manager, and design manager. This collaboration is crucial because it ensures that the design-build team fully understands the owner's vision for the project before moving into the detailed design phase.

The design integration manager plays a crucial role during this phase because he or she is responsible for coordinating the results of the early design phase with those of the detailed design phase to align expectations among all of the partners, a task that is especially important for the coordination of permitting for different work packages (e.g., core superstructures, shell superstructures, utilities, and site planning). The tasks of the design integration manager during the early design phase align with those in *The Design-Builder's Guide to Design Management*, apart from changes to the phrasing of one task and the addition of two new tasks.

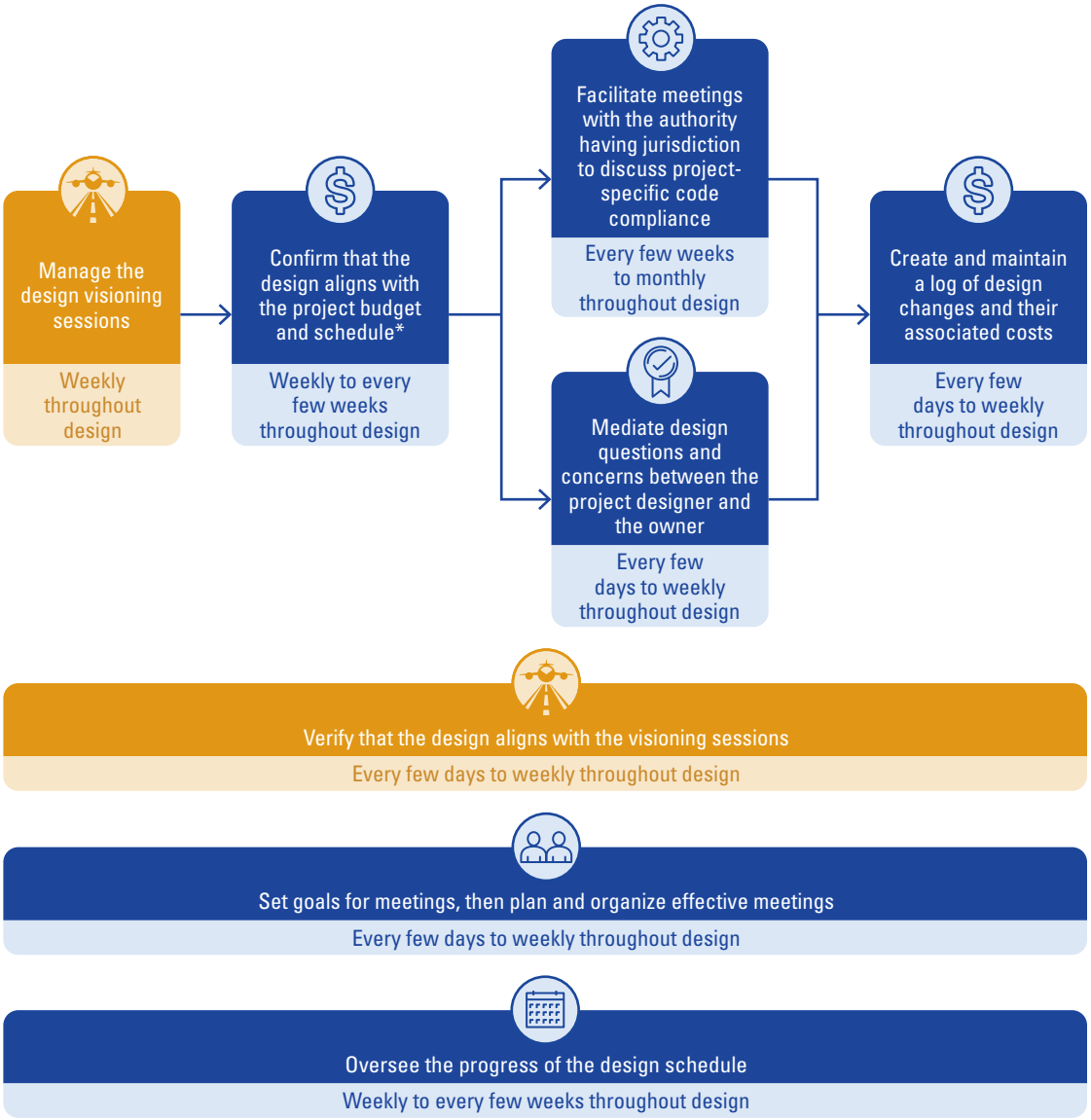
The Role of the Design Integration Manager

In the early design phase, the design integration manager monitors the cost and schedule estimates for the ongoing design and validates them against those listed in the awarded contract. If there are any discrepancies, the design integration manager collaborates with the design-build team to generate ideas and strategies for keeping the project within budget and on schedule. This involves close collaboration between the design team and the design integration manager to ensure that the design aligns with the project's requirements and complies with applicable codes.

In aviation projects, the traditional design completion percentages (typically 30%, 60%, and 90%) are not used because the project instead uses early work package deadlines. These standardized packages enable the initiation of work and facilitate the organization and coordination of various work package deadlines. It is important to note that the number and scope of work packages can vary significantly depending on the project type and size. In some cases, multiple design teams may collaborate to start the early work packages while another team concentrates on establishing the basis of design. As the early design phase transitions into the detailed design phase, these teams work on different work packages (e.g., core superstructures, shell superstructures, utilities, and site planning), and construction can begin while the work packages are being completed.

> *"The design integration manager plays a crucial role during this phase because he or she is responsible for coordinating the results of the early design phase with those of the detailed design phase to align expectations among all of the partners."*

As the design progresses, the design integration manager verifies and validates the alignment of concepts that were discussed during the visioning sessions. These verifications are an iterative process throughout design to ensure that project goals are being met. The design integration manager also facilitates meetings with federal agencies to ensure that permits and approvals are processed.



** Phrasing has been modified slightly from The Design-Builder's Guide to Design Management to reflect the unique characteristics of the aviation sector*

Workflow of the design integration manager's tasks during the early design phase

Additional Task: Manage the Design Visioning Sessions

Weekly throughout design

A key task for the design integration manager that is specific to aviation sector projects is to manage the design visioning process.

Knowledge	Skills	Abilities	Other Characteristics
• Document management procedures • The design process and stages of design • Construction work sequencing • Construction means and methods • Airport-specific design standards • Hands-on experience with aviation sector design and construction • Aviation-specific terminology and acronyms • Airport and flight operations	• Conveying a message in written form • Conveying information verbally • Organizing information and record keeping • Compromising and finding equitable solutions • Reading and understanding design drawings • Forecasting cost and schedule impacts	• Collaborating with partners • Devising innovative solutions • Focusing on and remembering details • Collecting, analyzing, and interpreting information • Practicing adaptable leadership	• Focused • Adaptable • Decisive

The design integration manager serves as the liaison between the owner, stakeholders, and the design-build team to establish and kick off the project. As part of this role, the design integration manager arranges and guides visioning sessions with the project team. These sessions serve a range of purposes, including developing ideas, setting design objectives and goals, and validating the vision and requirements for the project with the owner.

Additional Task: Verify that the Design Aligns with the Visioning Sessions

Every few days to weekly throughout design

A key task for the design integration manager that is specific to aviation sector projects is to verify that the design aligns with the visioning sessions held during the early design phase.

Knowledge	Skills	Abilities	Other Characteristics
• Document management procedures • The design process and stages of design • Construction work sequencing • Construction means and methods • Airport-specific design standards • Hands-on experience with aviation sector design and construction • Aviation-specific terminology and acronyms • Airport and flight operations	• Conveying a message in written form • Conveying information verbally • Organizing information and record keeping • Reading and understanding design drawings	• Collaborating with partners • Devising innovative solutions • Focusing on and remembering details • Collecting, analyzing, and interpreting information	• Focused • Decisive

As the design develops, the design integration manager conducts an iterative process of ensuring that the design aligns with the items discussed during the visioning sessions held earlier in the design process. Aligning the design with the visioning sessions ensures that owner's expectations and requirements are being met.

CHAPTER 7: DETAILED DESIGN PHASE

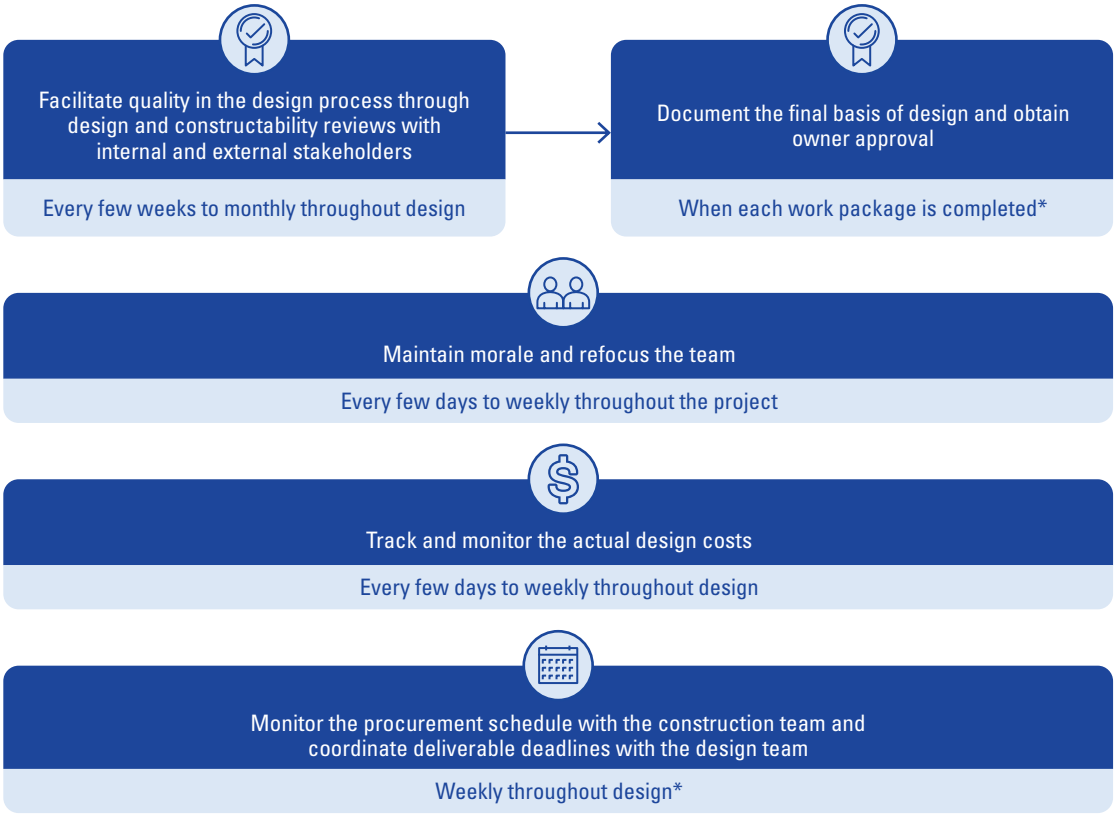
Description of Phase

As the detailed design phase begins, detailed design effort is already underway for the work packages begun during the early design phase. As the phase progresses, a series of design reviews is conducted continuously, and the construction team becomes involved. The phase concludes when all work packages are finalized and documented. The tasks of the design integration manager during the detailed design phase align with those in *The Design-Builder's Guide to Design Management*, apart from changes to the frequency of two tasks. Notably, the design integration manager documents the final basis of design and obtains owner approval after each work package is completed.

The Role of the Design Integration Manager

During the course of this phase, the design integration manager helps the design team finalize the work packages and shifts towards a managerial, monitoring, and maintenance role to ensure that the project stays on track toward successful completion. The design integration manager also ensures that all design-build trade partners are engaged throughout the remainder of the design process and coordinates review meetings among the project team and owner to ensure that the design meets the requirements.

"During the course of this phase, the design integration manager helps the design team finalize the work packages and shifts towards a managerial, monitoring, and maintenance role to ensure that the project stays on track toward successful completion."



** Phrasing has been modified slightly from The Design-Builder's Guide to Design Management to reflect the unique characteristics of the aviation sector*

Workflow of the design integration manager's tasks during the detailed design phase

CHAPTER 8: CONSTRUCTION PHASE

Description of Phase

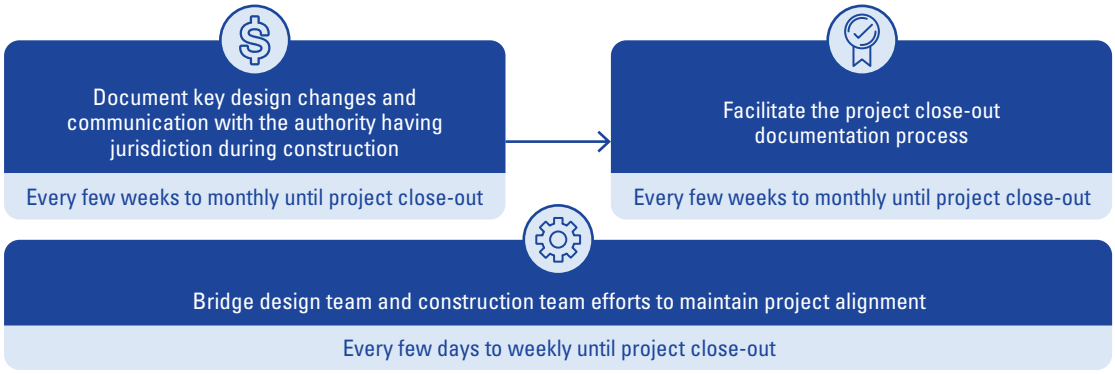
The construction phase commences immediately upon formal notification of the award and concludes when the project is officially handed over to the owner. Throughout this phase, activities include obtaining the necessary approvals and permits, procuring materials and equipment, and executing the construction work, any of which can begin as soon as the project is awarded. The design-build team must collaborate closely with the owner and other stakeholders to ensure that the project is constructed according to the specified requirements and to everyone's satisfaction. The tasks of the design integration manager during the construction phase align with those in *The Design-Builder's Guide to Design Management*.

The Role of the Design Integration Manager

During the construction phase, the design integration manager continues to play an essential role by acting as a bridge between the design and construction teams. The design integration manager also acknowledges and documents key decisions related to design throughout the construction process. This is a critical task for aviation projects especially, because design changes are constantly being submitted that must be monitored and tracked. Design changes in the aviation sector may be prompted by, for example, changes in the aircraft that the facility will serve, changes in anticipated passenger flows, and the introduction of new equipment and technology. The design integration manager must be prepared to address design changes and quickly coordinate with the design team, construction team, and the owner and other stakeholders.

Additionally, the design integration manager ensures effective coordination between the design and construction teams during the closeout documentation process, including the preparation and turnover of punch lists, record drawings, warranties, operations and maintenance information, and any commissioning requirements. Commissioning and startup may occur multiple times throughout a given project depending on when the enabling packages are scheduled.

> *"During the construction phase, the design integration manager continues to play an essential role by acting as a bridge between the design and construction teams."*



Workflow of the design integration manager's tasks during the construction phase

GLOSSARY

A

Asset management
The systematic process of cost-effectively developing, operating, maintaining, upgrading, and disposing of assets, including physical assets such as aircraft, infrastructure (airports, runways), technology systems, and equipment essential for airline and airport operations.

C

Construction manager at risk (CMAR)
A project delivery method in which the construction manager commits to completing a project within a guaranteed maximum price (GMP). The construction manager is involved in the design and construction phases in different capacities, acting as a consultant to the airport during the design phases and as the general contractor during the construction phase.

F

Facility management (FM)
The use of a range of disciplines and services to ensure the functionality, safety, and efficiency of the airport environment and its infrastructure. FM includes the management of airport terminals, runways, hangars, and other facilities in terms of operations, maintenance, safety, and sustainability.

S

Scope responsibility matrix
A document or tool that clearly delineates the roles, responsibilities, and expectations of different parties (such as contractors, airport authorities, or consultants) in various aspects of a project.

Startup
The point in a project at which construction activities officially commence and contractors, subcontractors, and construction teams mobilize to the site to carry out the planned construction activities. Activities may include, for example, acquiring aircraft, setting up operational procedures, obtaining necessary certifications and licenses, and establishing routes and services.

Stipend (honorarium)
Form of compensation provided to a design-build team for its participation in the procurement process. A stipend or honorarium is typically used in competitive procurement methods to encourage the submission of responsive and high-quality proposals from design-build teams.

Sitting at the intersection of multiple parties in a design-build project, the design integration manager must organize and manage the activities of many individuals to conceptualize and develop the project design.

In aviation design-build projects, the role of the design integration manager spans five distinct phases:

PROPOSAL/PRE-AWARD PHASE

POST-AWARD PHASE

EARLY DESIGN PHASE

DETAILED DESIGN PHASE

CONSTRUCTION PHASE

CHARLES PANKOW FOUNDATION

pankowfoundation.org
(360) 326-3767