Newly renovated portion of the Jeppesen Terminal, completed by DEN in Fall 2021

DENVER INTERNATIONAL AIRPORT

GREAT HALL
AFTER-ACTION REPORT

AUGUST 9, 2022

This DEN-initiated *After-Action Report* (AAR) is intended as a "lessons learned" (LL) analysis of the Denver International Airport (DEN) Great Hall Partners (GHP) Public-Private Partnership (P3)/ Design-Build-Finance-Operate-Maintain (DBFOM) project's challenges, successes, and issues.

We are providing an open and transparent summary of:

- What we did well and would do again
- The challenges we encountered
- What we would do differently next time

Increasing passenger levels, a need to update infrastructure that was more than three decades old, and overall modernization to enhance security at DEN drove the decision to undertake a $1.8 billion+ renovation. DEN has seen passenger traffic increase dramatically since it opened in February 1995. Originally built to accommodate 50 million passengers per year, DEN handled over 25 million passengers during its first year of operations, and by 2007 was about to broach the 50 million passenger level. By 2016, when the Great Hall Program P3 DBFOM contract was awarded to GHP, the annual passenger level exceeded 60 million.

DEN created this AAR to enable other agencies and governmental entities considering a P3 procurement of airport or other infrastructure to learn from our challenges and successes. Our goals are to:

- Enable other agencies to learn from our mistakes, challenges, and successes
- Capture useful details while they are still fresh
- Provide experiential information to a range of potential audiences
- Establish "best practices" for future P3 procurements

The series of individual LLs in this *AAR* provide more details about the issues and challenges we faced and suggests ways to mitigate, minimize, or avoid them. The key LLs are:

- Carefully consider project delivery options to ensure best practices are followed. Since vertical P3 procurements, particularly in an airport, are very new in the U.S., detailed and ongoing technical, legal, and financial analyses are essential. Contractors should have experience in domestic P3 project delivery and their construction team should have an experienced general contractor with staff that provide local knowledge and experience.
- Have a strong development agreement that ensures both owner and P3 contractor understand their roles and limitations and key project milestones and consequences for not meeting them.
- Conduct team-building activities to ensure all parties understand local requirements, cultural differences, and required interaction between owner and contractor staffs.
- Have the appropriate level of detail and specifications in the development agreement documentation to reduce the number and cost of change orders.

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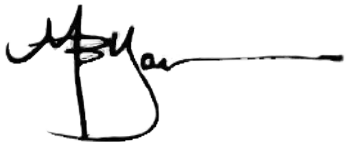

MICHAEL B. HANCOCK
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Acronyms and Abbreviations

AAAC ..... Airlines Airport Affairs Committee

AAR ..... After Action Plan

CDOT ..... Colorado Department of Transportation

the City ..... City and County of Denver

CM/GC ..... Construction Manager/ General Contractor

CO ..... Change Order

DA ..... Development Agreement

D-B ..... Design-Build

D-B-B ..... Design-Bid-Build

DBF ..... Design-Build-Finance

DBFM ..... Design-Build-Finance-Maintain

DBFO ..... Design-Build-Finance-Operate

DBFOM ..... Design-Build-Finance-Operate-Maintain

DBM ..... Design-Build-Maintain

DEN ..... Denver International Airport (Official FAA designation)

DEN P3 ..... Denver International Airport Great Hall Public-Private Partnership

DOT ..... Department of Transportation

DSBO ..... Division of Small Business Opportunity

FAA ..... Federal Aviation Administration

FAW ..... Ferrovial Agroman West

FHWA ..... Federal Highway Administration

GAO ..... Government Accountability Office

GC ..... General Contractor

GHB ..... Great Hall Builders (Ferrovial Agroman West and Saunders Construction)

GHP ..... Great Hall Partners, LLC (Ferrovial Airports, Saunders Concessions, and JLC Infrastructure)

LL ..... Lessons Learned

M/WBE ..... Minority- and Women-Owned Business Enterprises

NCPPP ..... National Council for Public-Private Partnerships

NTP ..... Notice to Proceed

O&D ..... Origin and Destination

O&M ..... Operations and Maintenance

P3 or PPP ..... Public-Private Partnership

RFP ..... Request for Proposal

RFQ ..... Request for Qualifications

ROW ..... Right-of-Way

T&C ..... Terms and Conditions

TSA ..... Transportation Security Administration

VfM ..... Value for Money

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BACKGROUND/OVERVIEW

Denver International Airport (DEN), opened February 28, 1995, is one of the nation's newest airports. When originally constructed, DEN was intended to handle up to 50 million travelers each year, but by 2014 that number was being regularly exceeded. Its Jeppesen Terminal, containing the Great Hall, was designed before 9/11 and so didn't have spaces for the kinds of security currently required. The Great Hall project includes the first purpose-built post-9/11 security space.

Additionally, the origination and destination (O&D) portion of passenger traffic through the Jeppesen Terminal was much greater than originally anticipated, putting additional strain on the Great Hall as a passenger processing terminal. In 2014, DEN was the world's 17th busiest airport and the 5th-busiest airport in the United States. More than 53 million passengers passed through DEN in 2014. In 2019, 69,015,703 passengers traveled through DEN.

To better accommodate the increasing number of travelers, improve traffic flow through check-in areas and security, and enhance the safety of passengers in the secured or sterile areas of the Great Hall, in 2017 the City and County of Denver (the City) entered into a renovation and expansion of DEN's Great Hall.

PROCUREMENT/DELIVERY STRATEGY

Public-Private Partnerships (P3) as a method of delivering major infrastructure projects such as DEN's Great Hall project are widely used, varied in application and scope, and found with increasing frequency across the globe. Some P3s perform well; others do not. Given that the Denver Metro area had previous successful experience with a P3 procurement, choosing the P3 approach for the Great Hall project was a reasonable approach considering some of the potential benefits of P3s.

DEN considered both traditional construction methods and the P3 delivery method when rapidly rising airport passenger traffic levels and general security issues indicated a need to expand and modernize airport check-in and security screening areas. By the mid-2010s, passenger levels were well above the capacity of 50 million passengers for which DEN was designed.

As part of the assessment of the P3 approach as the project delivery method, DEN performed a Value for Money (VfM) analysis. This VfM analysis compared several options [P3, design-build (D-B), design- bid-build (D-B-B), and construction manager/general contractor (CM/GC)] to deliver the Great Hall program to determine which method was most likely to meet the requirements and objectives at the best cost over the project's life.

The VfM analysis did not come out in particular favor of one approach over another. There was not a strong case for choosing or not choosing the P3 project delivery approach. However, since all four primary delivery methods were more or less equal, DEN chose to use the P3 approach. DEN's intent by choosing the design-build-finance-operate-maintain (DBFOM) approach to deliver the Great Hall project was to bring in a highly qualified, internationally recognized architect/design firm with airport construction experience and construction partner with local experience to implement DEN's vision.

The chosen Developer, Ferrovial Airports [Denver Great Hall LLC, commonly called Great Hall Partners (GHP)], with its partners (Saunders Concessions and JLC Infrastructure), would oversee their chosen construction team [Great Hall Builders (GHB)]. In this way, DEN would only manage one contract with a single point of contact (GHP). In addition, the P3 project delivery approach was intended to minimize design and scope "creep" and the resulting change orders (CO). This single-source contracting approach is a key difference between DBFOM and more traditional approaches. The culture of collaboration inherent in the DBFOM approach is critical to a project's success.

PROJECT IMPLEMENTATION

The P3 approach to project delivery needs to be very carefully weighed against traditional (D-B, D-B-B, and CM/GC) project delivery methods. In particular, industry examples and experience suggest that when the VfM analysis doesn't indicate at least a 10% potential cost savings and/or a significant reduction in the anticipated time to complete the project, traditional means may be more suitable.

The role of the owner (DEN) in the Great Hall project was to be far more limited than in any other project the DEN construction management and other project personnel had ever managed. Instead of detailed, hands-on control and decision-making authority, DEN was to transfer most of these actions and roles to GHP who would then collaborate with GHB, keeping DEN informed.

The fast pace of a P3 is one of its main virtues; to take advantage of this virtue requires a careful balance between owner control and input and Developer control and COs. Despite the fact that DEN allotted significant control to GHP, some DEN staff had a conflicting reluctance (in many instances) to relinquish this control, leading to delays and conflicts. Often, it appeared DEN gave up control in the P3 but then wanted to keep it. In many ways, the Great Hall project appears to have been managed on DEN's part like a traditional D-B-B project, and on GHP/GHB's part like a P3 where it was also the owner, not just the Developer and constructor. Passenger levels continued to accelerate during the construction period causing further tensions with being hands off.

DEN didn't have direct contract authority over GHB. Under the Development Agreement (DA) (the DEN- GHP master agreement), GHP managed and controlled design and construction. GHP subcontracted design and construction to FAW who subcontracted those efforts to GHB. DEN had approval authority over some design matters and limited authority over some construction activities. As a traditional owner would, DEN also had financial approval authority in that it had to approve COs and invoices for design and construction costs.

COMMUNICATIONS

DEN, GHP, GHB, and the various team members were co-located in a facility at the airport, only a short distance from the Jeppesen Terminal. Theoretically, communications should have been simple and ongoing; in reality, the various entities tended to communicate amongst themselves or with one other entity rather than the entire team.

Working with a European designer/developer (Ferrovial Airports) and its construction sibling (Ferrovial Agroman with its subsidiary FAW) presented unique challenges. Ferrovial Airports does not have corporate control over Ferrovial Agroman and did not during the Great Hall project. Culturally, processes, procedures, and expectations between U.S. and global entities are simply not the same.

Although team-building activities were conducted, these activities were limited in scope and insufficient to manage the realities of actually working together.

Expectations on the part of GHP and GHB in terms of level of completeness of the design and applicability of COs were very different. GHB insisted the design was "frozen" at the 30% design provided by DEN at the start of the project, and any changes or updates to the design necessitated COs. GHB's resulting COs were often vague and open-ended, causing confusion and schedule delays.

The DA gave DEN authority over certain design decisions and there were direct meetings between DEN and the designer, Louis Vidal. DEN also had some decision making or approval authority in construction, including over COs. In many ways, DEN continued to try and function as if the contract were a D-B-B or CM/GC rather than a DBFOM. Sometimes, GHP/GHB had a hard time reaching the DEN decision-makers, potentially leading to cascading schedule and other delays.

UNIQUE CONSIDERATIONS AND ISSUES

Renovating an existing passenger facility while ensuring minimal impact to the traveling public and ongoing airport operations proved to be a major challenge. The selected Developer, GHP, had P3 experience, and GHP had actual airport P3 experience, but in a very different environment than that which they encountered at DEN.

GHP's airport P3 experience was primarily at London Heathrow, initially with the demolition and reconstruction of Terminal 5 and more recently with the demolition and reconstruction of Terminal 2. As one of the owners of these terminals, along with an international consortium of investors, Ferrovial Airports worked in an environment where there were few COs with cost impacts—any changes were originated by, approved by, funded by, and implemented by them. As both owner and constructor, Ferrovial had great freedom of action and near total decision-making and cost allocation authority.

Additionally, the affected terminals at Heathrow were not in operation during the P3 project—they were total rebuilds with no passenger traffic or ongoing airport operations. The most significant impacts to airport operations at Heathrow concerned ensuring construction did not impact vehicular traffic across and around the airport.

Due to ongoing passenger and other activities during the Great Hall reconstruction, safety was of paramount concern. Activities, such as welding, had to be conducted in active areas of the terminal, requiring special care to protect the traveling public and airport staff from showering sparks and debris. At one point, GHB's lack of adequate attention to safety considerations resulted in a fire in one of the escalators and passengers being exposed to sparks from welding or similar operations.

SUMMARY OF LESSONS

Lesson 1: Delivery Approach: Why P3?

In retrospect, the Great Hall project may have been better served as a D-B-B or CM/GC. The current contract is a competitively bid CM/GC. DEN's experience with D-B-B and GM/GC left it well-positioned to manage that type of contract; the transfer of many aspects of control under a P3 DBFOM contract was something DEN had great difficulty with. A VfM analysis should be updated as the contract and budget change to review the approach.

Lesson 2: Construction Approach Including Change Order Management

The cost estimate reached for the development agreement (DA) was lower than expected based on analysis by outside experts. In a D-B or other fixed price contract, the risk of a low bid belongs to the bidder. DEN included a substantial contingency (~20% of the GHP bid amount). It is reasonable to assume GHP would pass the risk associated with a low bid to GHB (specifically FAW). Since GHP did not have direct control over GHB/FAW, it is possible GHB/FAW rejected the cost risk. Either way, the Great Hall project was subject to numerous COs potentially amounting to hundreds of millions of dollars. The contract provided detailed specifications. Section 1.7 of the DA included the statement that "Developer shall use reasonable care to identify any provisions in the Technical Requirements that are erroneous, create a potentially unsafe condition, or are or become inconsistent with Good Industry Practice or applicable Law." However, the specifications provided as part of the DA did not state that all of them were subject to U.S. airport-specific requirements. Consequently, GHB acquired finishes, equipment, and other materials that were not suitable, had replacement parts not available in the US and had to be replaced, in the form of COs. The specifications in the DA were extensive, but still inadequate, particularly in light of the different frames of reference brought to the Great Hall project by DEN and GHP/GHB. There were times when the language in the DA should have been focused on rules and consequences—using the restrictive "must/shall" rather than the permissive "may," as an example.

Lesson 3: Financial/Financing

Determine, and validate, cost "reasonableness" and "constructability" prior to accepting the cost estimate of the selected contractor.

Ensure the DA includes milestones and details regarding deliverables. Without these guardrails, the P3 contractor is able to take unacceptable liberties with COs, making virtually every modification or minor change a CO.

Financial issues are more "known" when using traditional methods of procurement: D-B, D-B-B, and CM/GC. The owner has far more control over and discretion with decision-making and often more ability to manage and control costs and schedule. For the Great Hall project, DEN approved all pay applications to ensure they reflected work acceptably completed. DEN also had to approve submittals requiring owner approval and had review and comment powers over other submittals as defined in the DA. Certain design matters were also subject to a DEN Executive Design Review as defined in the DA.

When the P3 method is chosen, it is a major paradigm shift for project owners. The tendency on the part of the owner is to continue to act and react as if the project were a traditional D-B with its associated level of control, decision-making authority, and

CO origination and management roles. At the same time, the contract stated DEN was able to make changes to the scope of design and construction. The contingency was intended, in part, to cover these changes.

GHP maintained the design was "frozen" at the 30% design level, but the DA explicitly stated otherwise.

Lesson 4: Airline Interfaces

When a major relocation of any facet of airline operations is contemplated, it is essential to have and maintain close coordination with and buy-in from the airlines.

Coordination between owner and airlines is essential. Airlines do not have a direct contractual relationship with the developer, so channeling inputs through the owner is essential. However, the owner can allow the airlines to discuss concerns and coordinate directly with the designer and contractor.

While each P3 developer/designer has a unique background and project management approach, the airlines prefer a consultative, rather than directive, form of communication for major projects that significantly impact their operations.

Note that airline needs vary from airport to airport.

Lesson 5: Operations, Terminal, and Security

As a 24/7/365 operation with multiple stakeholders and priorities, a project needs to consider a wide variety of impacts to a large and diverse group of users and stakeholders. Gaining the support and understanding of these groups can be greatly enhanced through effective modeling of proposed or planned changes, upgrades, consolidations, relocations, and concessions, along with integrated plans that ensure work sequences are viable, realistic, and minimally disruptive to these various users and stakeholders. The DA required GHP to schedule and manage design and construction work in accordance with the Transition and Phasing Plan to minimize impacts to adjacent businesses or operations.

Lesson 6: Project Management

In a P3 approach where the future concessionaire is also the owner, the situation is "simple"—they can do pretty much whatever they want, without involving COs that might be disputed by the owner.

However, when the P3 approach involves a project owner and a developer who is responsible for the entire DBFOM, issues are certain to arise concerning who is responsible for what, COs with costs and impacts to schedule, and how the developer's team interacts with the owner's team.

Project management, coordination of roles and responsibilities, and identification of key personnel are critical to a successful P3 project delivery. The roles and responsibilities need to be defined, agreed to, and placed in writing (in the DA and other contract documents) prior to starting project delivery. Then these roles, responsibilities, and agreements need to be enforced. The owner needs to understand, and accept, the limitations on their decision-making and management authority.

Ensure very clear lines of control and decision-making authority and communications and have an escalation process for dispute resolution—in writing and signed by all parties.

Take advantage of co-located owner and project teams to facilitate communication, and work to ensure communication happens and concerns are dealt with promptly.

Create, and keep together, a team of legal, technical, and financial advisors to consult on the project from writing of the solicitation, through evaluation of proposals, to project design and construction.

These administrative personnel are the ones who must implement, oversee, and live with the consequences of project activities and issues.

Require the contractor and its partners and subcontractors designate (by name and title), the key personnel on their project management team. Then enforce this requirement.

Lesson 7: Processes and Procedures

One of the most important elements of a successful P3 project is the DA. Equally important is the selection process for the contractors who will be parties to the DA. Finally, since the selected developer/designer and its construction contractor were going to include an international component, processes and procedures are essential for smooth integration of the contractors and the owner's representatives into a true team.

Vet all the potential team members. Check references. Look at each entity's website and then dig into the relevant projects listed. Be concerned if none of the projects listed are relevant to your project. Read through the applicable articles in the entity's hometown news website and the news website for the location where their "past performance" projects are located.

Take the time to do team building before getting to work. Different companies have different values, cultures, experiences, approaches, and so forth. Team building helps establish a common baseline, set of rules, and organized processes and procedures for meeting contract goals. Team building and cultural awareness training can be especially valuable when you are part of an international project delivery team and/or the delivery method is new to the owner and/or the developer/designer/constructor.

Lesson 8: Project Schedule

Having an integrated schedule with milestones and project specifics as part of the DA is one way to alleviate some of the schedule problems.

Ensuring the costs proposed by the developer/designer are actually realistic can serve to preclude the developer and its team from seeking out (non-) issues as a way to generate expensive COs and extended schedule delays.

The DA should have enforceable language ("shall/must") rather than permissive language ("may") and enforceable penalties for non-performance, delays, or other issues.

Ensure a GC with local knowledge maintains the interfaces with local authorities to expedite the process of getting permits and inspections and meeting code requirements.

Lesson 9: Government Interfaces

Require the contractor and/or developer to provide detailed, integrated plans for obtaining permits and inspections, meeting fire codes, and meeting small and disadvantaged business participation requirements either as part of the proposal or early in the pre-development/design phase. Ensure these plans are based on realistic timelines agreed to by the reviewing/approving authority.

Develop an approach to ensure key people and partners proposed for the construction phase of a project are actually present on the project for the duration and used effectively.

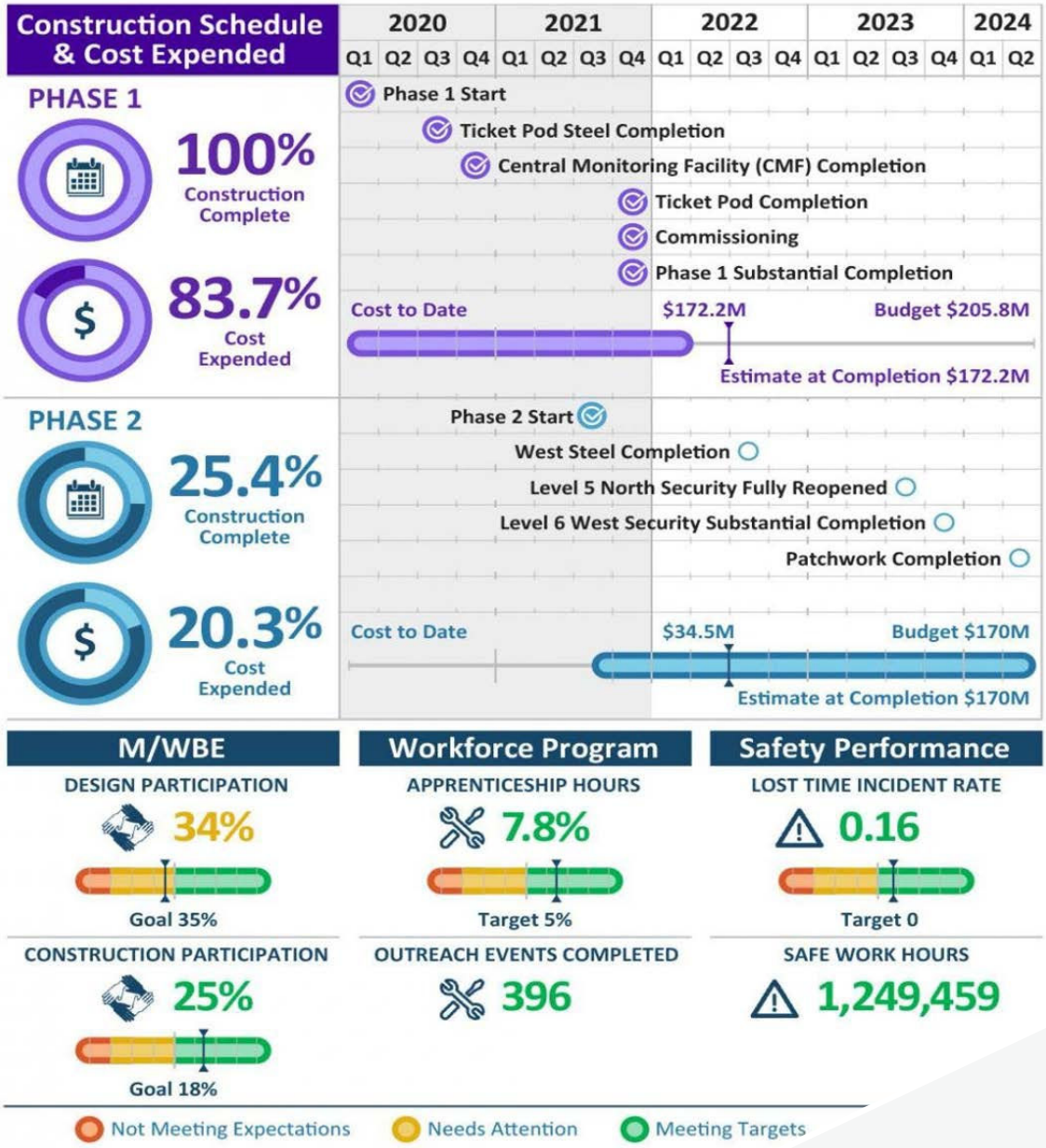
Lesson 10: Public Sector/Traveling Public Impacts

Overall, the experience of the traveling public at DEN during construction was no worse than would be expected during a major renovation project. The biggest issues were (1) the inconvenience of getting accustomed to the reconfigured Transportation Security Administration (TSA) security areas, knowing the change was only temporary, and (2) navigating the ups and downs and all-arounds of the very impactful construction detours.

WAY AHEAD

DEN has continued the process of renovating the Great Hall. The new contract was awarded competitively to Hensel Phelps (CM/GC) and Stantec (designer of record) in late 2019. DEN is on time and within its new budget and contract milestones. The new CM/GC delivery model was chosen to provide flexibility because the design was in progress and work needed to be arranged around the terminal's operations. While there have been complaints about wayfinding and passenger difficulty, the number and severity of complaints is much better than with GHP. DEN has adjusted the work to impact passengers, airlines, and others less.

The June 2022 dashboard is shown in the figure that follows.



Introduction

DEN GREAT HALL PUBLIC-PRIVATE PARTNERSHIP (P3) PROJECT OVERVIEW AND BACKGROUND

Why was Denver International Airport (DEN) built in the first place? The concept of an international airport to replace the aging, space-limited Stapleton International Airport first came about in the early 1980s. Being bound by its Denver Metro area location and relatively small size (approximately 7.3 square miles), Stapleton was not able to handle the increasingly large aircraft entering the passenger and commercial travel industries. The airport location also presented significant noise-related issues and potential safety hazards for a significant portion of the Denver Metro population.

To address the preceding issues and concerns, a tract of approximately 52.4 square miles northeast of Denver was identified and acquired. This 7.5-fold increase in land area enabled the construction of multiple runways, with the sixth (most recent) runway being the longest in North America at over three miles in length. DEN was originally scheduled to open in October 1993, but construction delays and cost overruns pushed the opening date by 16 months.

DEN, opened February 28, 1995, is the nation's latest totally new airport. When originally constructed, DEN was intended to handle up to 50 million travelers each year, but by 2014 that number was being regularly exceeded. Additionally, the origination and destination (O&D) portion of passenger traffic through the Jeppesen Terminal was much greater than originally anticipated, putting additional strain on the Great Hall as a passenger processing terminal. In 2014, DEN was the world's 17th busiest airport and the 5th-busiest airport in the United States. More than 53 million passengers passed through DEN in 2014. In 2019, the last year before the COVID pandemic caused passenger levels to crater, 69,015,703 passengers traveled through DEN, according to an airport press release. That passenger level shattered the previous record of 64,494,613. By 2021, total passenger volume recovered to nearly 59 million— almost back to pre-pandemic levels and well above the original design specifications.

Table 1 is a summary table of milestones in the history of DEN.

Table 1: Milestones in the History of DEN

Feb. 27, 1995	The last flight, Continental Flight 34 to London, departed Stapleton International Airport
Feb. 28, 1995	Denver International Airport opens for business
1998	DEN draws almost 37 million passengers
1999	DEN draws 38 million passengers
Apr. 2001	The Federal Aviation Administration (FAA) says adding a sixth runway should ensure DEN can handle capacity over the next 10 years
2004	DEN exceeds 42 million passengers
Jul. 2006	Nearly 4.6 million passengers passed through DEN—the busiest month since the airport's opening
2007	DEN draws just under 50 million passengers—49.8 million
2008	DEN continues to set passenger records, with over 51 million travelers
Jul. 2010	The design for the South Terminal expansion, with the concept for a hotel, is revealed
Dec. 2010	Business Traveler Magazine names DEN the "Best Airport in North America" for the sixth straight year
Apr. 2012	Travel + Leisure ranks DEN number 9 out of 22 major U.S. airports
2013	DEN draws 52.56 million passengers—the sixth year in a row exceeding 50 million passengers per year
2014	DEN sets a new passenger record of over 53.47 million travelers
2016	DEN sets yet another passenger record of 58.3 travelers
Aug. 2017	The 34-year contract to design, build, finance, operate, and maintain the Great Hall renovation is signed
2018	DEN ranks as the top U.S. airport by the Wall Street Journal 2018

To better accommodate the increasing number of travelers, improve traffic flow through check-in areas and security, and enhance the safety of passengers in the secured or sterile areas of the Great Hall, in 2017 the City and County of Denver (the City) entered into a renovation and expansion of DEN's Great Hall.

The contract to design, build, finance, operate, and maintain (DBFOM) the DEN Great Hall reconstruction was awarded to Denver Great Hall LLC, also called Great Hall Partners or GHP. GHP was to be responsible for the operations and maintenance of a portion of the renovated Great Hall—the portion involving the concessions located inside the secured area. The primary shareholders of GHP were the Spanish construction company Ferrovial Airports (Ferrovial) (70% equity partner) with 20% for local company Saunders Concessions (Saunders) and the balance for JLC Infrastructure (financing entity). The initial partnership share (in GHP) for Saunders was significantly larger and they were planned to be the general contractor (GC), but Saunders' membership interest was reduced to 1% because they lacked the necessary capital to meet their financing obligations. Their limited later roles resulted from this change. GHP contracted the design and construction-related obligations to Ferrovial Agroman West (FAW), which in turn subcontracted the efforts to Great Hall Builders (GHB), a consortium of FAW and Saunders Construction.

However, Saunders maintained their role on the project, keeping several management-level staff on site through GHP's termination, but their original roles and responsibilities were taken over by FAW.

The roles of each partner are briefly summarized in Table 2.

Table 2: Roles of Each Partner in the Great Hall Project

PARTNER	ROLE/STAKE
GHP	
Ferrovial Airports	Lead partner. Responsible for overall project management, project design, CO management, financial management, relationships between partners and with DEN management, and future airport concessions, maintenance, and operations (30-year obligation from completion of renovation).
Saunders Concessions	Minority partner.
JLC Infrastructure	Equity investor.
GHB	
FAW	Design and construction lead. FAW already had control of design and construction before Saunders' role was reduced because of the contract structure. The GHP -> FAW prime contract for design/construction put FAW in control. FAW took over more construction and related operations in early 2019 as Saunders Construction's role was scaled back.
Saunders Construction	Original design and construction partner with FAW. Saunders was a key member since they brought vertical construction experience, local knowledge and experience and had contacts with the Minority- and Women-Owned Business Enterprises (M/WBE) community to aid in meeting the M/WBE contract requirements.

MAJOR PLANS, EVENTS, AND SCHEDULE IMPACTS DURING PRECONSTRUCTION AND PHASE 1 CONSTRUCTION

Table 3 summarizes a number of significant events—primarily those that negatively impacted the Great Hall Project construction schedule.

Table 3: Significant Events During GHP Contract

Jul. 2015 to Feb. 2016	City and Proposers engaged in a comprehensive, interactive discussion process to determine the appropriate scope of services and commercial structure for the Project
Feb. 24, 2016	City published a Request for Proposals (RFP) for Great Hall reconstruction design and construction
Jun. 2016	GHP selected as the P3 contractor for the Great Hall renovation
Aug. 2016	Entered into a pre-development contract to provide time to negotiate terms and refine the scope of work
Jul. 2017 to Jul. 2018	Pre-development activities including preliminary design
Aug. 2017	Development Agreement approved and executed
Jul. 2018	Design continues and demolition/construction starts
Feb. 2019	A monthly report from GHP indicated a 10-month delay for the project, bringing the estimated completion date from November 3, 2021 to August 30, 2022. At the time, GHP said concrete samples from the Jeppesen Terminal floor tested weaker than expected.
Apr. 2019	Another report from GHP said the issues with the concrete floor could delay the project for 18 months, meaning the anticipated finish date was projected to be May 2023.

Table 3: Significant Events During GHP Contract | CONTINUED

Jun. 2019	GHP issued another report stating the Great Hall project would likely be finished 2.5 years behind schedule, in May 2024. GHP said it was having trouble securing permits in a timely manner, and once again mentioned what it said was weak concrete. DEN investigated, and its engineers and consultant found the concrete could in fact support the construction.
Jul. 23, 2019	DEN sent GHP a letter re: Workplace Concerns regarding unacceptable behavior on the part of a GHP staffer toward a DEN staffer.
Jul. 24, 2019	DEN sent GHP a letter re: Developer's Request to Work without a Permit and Violate City Law when GHP asked (on behalf of GHB) (at a Terminal Code Analysis and Life Safety meeting on Jul. 23) how much work could be done without a permit.
Jul. 24, 2019	DEN sent GHP a letter re: Developer Intentional Interference with Airport Activities since GHB refused to remove temporary construction walls in a timely manner, precluding DEN's largest carrier from using two baggage claim carousels for 25 weeks after completion of work.
Jul. 24, 2019	DEN sent GHP a letter re: Notice of Non-Compliance with M/WBE Commitments since GHP had met less than 8% of its M/WBE design commitments and GHB less than 3% of its construction commitments.
Jul. 24, 2019	DEN sent GHP a letter re: Developer Interference with Airport Activities since GHB had a series of safety violations and hazardous situations impacting passenger and staff safety going back to early February 2019.
Jul. 24, 2019	DEN sent GHP a letter re: Initial Breach Notice: Developer Intentional Interference with Airport Activities addressing a litany of schedule, safety, and non-compliance issues.
Jul. 26, 2019	DEN sent GHP a letter re: Developer's Failure to Adhere to Project Schedules addressing a variety of areas of lateness and/or non-compliance.
Jul. 26, 2019	Representatives for DEN sent GHP a letter stating that GHP breached its contract, and that GHP needed to address concerns including fire-damaged escalators caused by demolition, cleaning delays, and concerns about M/WBE utilization. A number of other issues were also raised at this time.
Jul. 29, 2019	DEN sent GHP a letter re: Safety Audit Findings – Developer's High-Risk Safety Hazards including: Fall hazards, Struck-by hazards, Electrocution hazards and Housekeeping (general waste management) perpetuated by GHB.
Aug. 2, 2019	A safety audit found that the GHB construction zones had places with incomplete guardrails, holes in scaffolding and missing toe boards. In some areas, operated by GHB, the audit stated passengers could be hit on the head with falling debris, and that in some places, wires dangled from the ceiling – increasing the risk of electrocution.
Aug. 12, 2019	DEN stated the concrete issues were not significant enough to account for delays in the project, rejecting GHP's claim (made on behalf of GHB) outright, saying it would not allow GHP to receive a deadline extension or the compensation it asked for.
Aug. 12, 2019	DEN notified GHP by letter that it was terminating the contract with Great Hall Partners. DEN said it would complete design, construction, and operation of the Great Hall using a new construction manager/general contractor (CM/GC).

The first phase of the project was to include:

- Completing demolition in the center of the Great Hall on Level 6
- Constructing new airline ticket counters in the center of Level 6
- Adding two new restrooms on both the east and west sides
- Upgrades to existing mechanical, electrical, and plumbing infrastructure

Following the termination of its contract with GHP, and a competitive procurement, the City contracted with Hensel Phelps to complete the initial phase of work, the expansion and renovation of ticketing counters in the center of the terminal. The City then amended its contract twice more, to define and contract for the two subsequent phases (phase two and the completion phase). Additional planned construction includes new and renovated spaces on Levels 4, 5, and 6 within the 1.5 million-square-foot Jeppesen Terminal (the Great Hall), additional work curbside and construction of the Center of Excellence and Equity in Aviation on Level 4 of the Hotel. The Great Hall project will relocate TSA screening checkpoints from Level 5 to Level 6, increasing passenger throughput by an estimated 50 to 70 percent. The project is planned to include up to 42 automated screening lanes, increasing passenger throughput.

To date, Hensel Phelps has completed its work ahead of schedule and under budget.

The project is expected to streamline airline ticket space while increasing check-in counter space. Plans also include improvements to food and retail offerings in the terminal; creation of a new greeting area at the south end of the terminal; creation of a new international passenger welcome center with seating, food, and retail options; and other upgrades.

RECAP OF THE DEVELOPMENT AGREEMENT

DEN didn't have direct contract authority over GHB. Under the Development Agreement (DA) (the DEN- GHP master agreement), GHP managed and controlled design and construction. GHP subcontracted design and construction to FAW who subcontracted those efforts to GHB. The contract provided for Executive Design Review for certain design matters which required DEN's approval. DEN also had limited authority over some construction activities.

Figure 1 depicts the relationships between DEN, GHP, GHB, and the various stakeholders.

Figure 1: Great Hall Project Organization

The DEN Great Hall Project was planned as a $650 million renovation of the main public areas of the Jeppesen Terminal. The P3 design and construction contract amount was $650 million, and DEN held a separate $120 million allowance/contingency to cover items DEN might have wanted to address outside of the DA's original scope. The contract, structured as a P3/DBFOM, was awarded to GHP in August 2017 and terminated November 12, 2019. Great Hall Partners made an initial investment of $258 million that would be repaid by DEN and GHP's concessions income over time. GHP, as airport concessionaire, would receive an uncapped 20% share of concession revenues from new shops and restaurants.

Following the completion of all three design and construction phases of the project, GHP would be responsible for 30 years of operations and maintenance for specific parts of the airport. This contract had a maximum contract amount of $1.8 billion.

As issues and disagreements mounted between DEN and GHP, DEN decided to terminate the contract, with notice of termination sent in August 2019. In November 2019, GHP formally handed over the project site to DEN. In March 2020, DEN made a final payment of $55.5 million to GHP as part of the termination process, which brought the total termination payments to $183.6 million. The additional

$128.1 million covered GHP's equity investment (which was used, in part, to pay for GHP's portion of the design and construction costs), materials already procured but not yet used, work as of the date of contract termination, and authorized work performed during the transition of the project to DEN. There were no penalties assessed against DEN for the GHP contract termination.

This document is intended as a "lessons learned" (LL) analysis of the DEN GHP P3/DBFOM project's challenges, successes, and issues. The series of individual LLs that follow this section provide more details about:

- What was done
- What could have been done better or differently
- How the lessons DEN learned may or will be applied to future projects

PROJECT TIMELINE AND MILESTONES

TIMELINE

The DEN Great Hall project was comprised of a four-year schedule for design and construction, scheduled for completion by November 3, 2021, followed by a 30-year operations and maintenance (O&M) agreement with GHP, with GHP retaining 20% of revenues from applicable its concessions operations.

During the two years following Notice to Proceed (NTP), a variety of issues arose. Some of the most significant issues are briefly presented in Table 4.

Table 4 summarizes the DEN Great Hall project's original timeline from inception through termination of GHP and selection of a new design and construction team.

Table 4: Great Hall Project Timeline from NTP Through GHP Termination

Aug. 2017	Denver City Council gives Great Hall project the go-ahead: Pre-construction/design activities begin
Aug. 2017	Pre-development activities begin
Jul. 2018	Construction begins: DEN travelers start to notice the construction project
Feb. 2019	Monthly report from GHP reveals a 10-month project completion delay
Apr. 2019	The 10-month delay grows to 18 months
Jun. 2019	Mediation attempted between GHP and DEN
Jul. 2019	DEN reports 6 million travelers passing through the Great Hall in May 2019
Jul. 26, 2019	Representatives for DEN sent GHP a letter alleging that GHP breached its contract
Aug. 2, 2019	Outside safety audit cites safety hazards within the GHP project area at DEN
Aug. 12, 2019	DEN declines to compensate GHP for a claimed concrete issue
Aug. 13, 2019	DEN notifies GHP it is terminating the contract
Oct. 18, 2019	Hensel Phelps Construction competitively selected as Great Hall Project preferred CM/GC and Stantec as preferred lead design firm
Nov. 12, 2019	Termination was effective and GHP handed over the DEN Great Hall Project to DEN
Nov. 13, 2019	Hensel Phelps Construction and Stantec begin assessment of the DEN Great Hall Project, ending the role of GHP
Mar. 2020	Final construction and termination payment made to GHP

MILESTONES

The Great Hall reconstruction project officially commenced in August 2017 with a one-year pre- development/design period. Following completion of this effort, the design and construction contract began in July 2018.

Initially, the monthly reports from GHP did not indicate any anticipated or actual delays or issues. However, by February 2019 the monthly report revealed a 10-month project completion delay, pushing the Phase 1 completion date to approximately February/ March 2020. A subsequent monthly report, in April 2019, pushed out the expected Phase 1 completion date by an additional eight months. During this period, contention between the owner (DEN), Developer (GHP), and designer/builder (GHB) escalated, with numerous issues, particularly related to potentially defective concrete and safety, being surfaced and contested. The issue surfacing and escalation continued with a safety audit in August 2019 raising safety hazard concerns on GHB's construction site. DEN retained

outside specialty firms to assess the extent of some of the potential safety issues—particularly the concrete concerns—but the parties could not resolve their differences despite mediation efforts that began in June 2019.

By August 2019 it was clear DEN and GHP were at an impasse, so DEN decided to terminate GHP's contract for convenience and sent GHP notice of the termination.

In order to keep Phase 1 progressing, stay within the original budget, and avoid additional delays, the scope of the project was reduced. A new contract was competitively awarded to Hensel Phelps under a CM/GC arrangement. DEN became the operator, owner, maintainer, and financier for the project.

Hensel Phelps became the CM/GC. Stantec was engaged as the designer of record.

In March 2020 a final payment was made by DEN covering construction completed prior to termination, materials and supplies acquired by GHP and left on site, and settlement of outstanding claims by GHP.

CURRENT PROJECT STATUS

Phase 1 of the Great Hall renovation project, rescoped and rephased under the Hensel Phelps contract, was completed on October 27, 2021 by Hensel Phelps and Stantec following Hensel Phelps' selection as CM/GC and Stantec's selection as designer of record. The anticipated completion date of Phase 2 is mid- 2024. The anticipated completion date for the entire project is between Spring 2027 and Summer 2028.

Security checkpoint in Jeppesen Terminal

DELIVERY ASSUMPTIONS:
WHY P3?

Overview

Public-Private Partnerships as a method of delivering major infrastructure projects such as DEN's Great Hall project are widely used, varied in application and scope, and found with increasing frequency across the globe. Some P3s perform well; others do not.

Just how long have P3s been around? Figure 2 is a brief history of P3s from a transportation perspective.

Figure 2: Historical Perspective of P3s

What We Can Learn from the U.S. Railroad Project (1850s to 1890s)

When did the concept of a P3 originate? No one really knows, but the role of the private sector in providing aspects of government services may date back over 2,000 years.

Some of the earliest documented examples of P3s are the 19th century railroad projects. These projects, designed to connect the various commerce and farming centers across the United States, could not have been funded by the U.S. government alone. The role of the government in granting land and right-of-way (ROW) to private entities was a critical element of those P3s. The private sector brought the capital, building skills, development expertise, and commercial components. By combining forces, the public sector, the general public, and the private sector "won." The public sector shifted almost all the construction and financial risks to the private sector in exchange for granting land and ROW the private sector could not otherwise obtain. The private sector provided the cost-related components and building expertise in exchange for valuable land and ROW and government permission to build across contiguous stretches of land. The government did not have to issue bonds to raise capital—the private sector took on that role.

The end result was two-fold: farms and towns—the centers of commerce—were connected to markets by a near doubling of railroad trackage from about 53,000 to over 93,000 miles during the 1870s, and the so-called robber barons who owned the railroad companies became extremely wealthy.

The premises behind P3s were validated and solidified during the 1870s railroad growth explosion and are still valid today. The public sector still wants to provide public services and benefits at the lowest possible cost and the private sector wants to maximize profits and shareholder value. In order for P3s to succeed, you need:

- Public support for the project
- Reasonable but not excessive profits for the private sector
- A competitive (but often qualified) bidding process
- Equitable risk sharing between the public and private partners
- Viable projects that can be financed at a reasonable cost

THE POTENTIAL VALUE OF A P3 APPROACH TO PROJECT DELIVERY

Due to limited funding and increasing constraints, many government agencies and other public entities are looking into different models of P3 as a means of maintaining updated infrastructure without having to make large upfront investments.

Public-private partnerships help fill the void between typical annual government accounting and capital budgeting. The private markets know the benefits of capital budgeting and are investing heavily in U.S. capital infrastructure.[i]

On the other hand, the private sector can assume more risk (and generally higher potential returns) by financing the project directly, in addition to taking on any, or all, of the previously discussed functions.

These privately financed P3 concessions are known as design-build-finance-maintain (DBFM) or [...] DBFOM arrangements.[ii]

Much confusion exists about P3s, in part because the term is used to describe a variety of arrangements—privatization, outsourcing, grants, leases, asset sales, and others—between governments and private sector organizations.[iii]

> *"P3 procurement and contracting processes are complex. Only a limited number of bidders/ providers may be interested in a particular P3. The shared decision-making associated with P3s reduces local government flexibility. Citizens [and their elected representatives] do not understand P3s, and many projects are criticized for a lack of transparency."*[iv]

A simple case study points out some of the risks of the P3 approach:

"In 2018 Carillion collapsed in the UK. Carillion was a constructor and facilities operator that had been involved in the delivery of many of the UK's PFI (PPP) contracts. Inquests into the collapse of Carillion have suggested that underbidding and inappropriate risk transfer contributed to the company's collapse. The infrastructure market has responded to this collapse with a reduced appetite to bid on risky fixed price PPP contracts."[v]

DEFINING P3

There is no single definition of a P3. The U.S. Government Accountability Office (GAO) defines a public- private partnership as "a contractual arrangement that is formed between public and private-sector partners. These arrangements typically involve a government agency contracting with a private partner to renovate, construct, operate, maintain, and/or manage a facility or system, in whole or in part, that provides a public service.

Under these arrangements, the agency may retain ownership of the public facility or system, but the private party generally invests its own capital to design and develop the properties. Typically, each partner shares in income resulting from the partnership. Such a venture, although a contractual arrangement, differs from typical service contracting in that the private-sector partner usually makes a substantial cash, at-risk, equity investment in the project, and the public sector gains access to new revenue or service delivery capacity without having to pay the private-sector partner."

The National Council for Public-Private Partnerships (NCPPP) defines a P3 as "a contractual agreement between a public agency (federal, state, or local) and a private sector entity. Through this agreement, the skills, and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility."[vi]

"One commonality among the different types of PPPs is a need for a dedicated revenue stream. Often the private entity will provide all or some of the upfront funding for the building or improving of a facility, but there must be a method of repayment over the duration of the partnership. The revenue stream can be derived from a number of different sources, including fees, tolls, shadow tolls, availability payments, and local taxation."[vii]

The P3 procurement approach therefore differs substantially from more traditional delivery methods such as Design-Build (D-B), Design-Bid-Build (D-B-B), or CM/GC. Table 5 summarizes the relevant aspects of the most common types of traditional and P3 procurement approaches.

Table 5: Main Characteristics of Various Project Delivery Methods

PROJECT DELIVERY METHOD	CHARACTERISTICS
Traditional	
CM/GC	The project owner hires a contractor to provide feedback during the design phase before the start of construction. Once the design phase is complete, the contractor and project owner negotiate on the price for the construction contract and construction takes place.
D-B	The project owner hires one design-build team under a single contract to provide design and construction services. There is one entity, one contract, one unified flow of work from initial concept through completion.
D-B-B	The project owner contracts designers and builders separately 100% complete design documents are prepared though a design contract. Then the owner solicits bids from contractors to perform the documented scope of work.
P3 (PPP)	
DBFOM The procurement/ project delivery method originally chosen by DEN	Design, construction, maintenance, and operations are bundled into the procurement with some, or all, of the financing provided by the contractor/ concessionaire (private entity). The project may be owned by the public entity or the concessionaire (or possibly others or joint ownership).
Design-Build-Finance-Operate (DBFO)	Design, construction, and operations are all part of the procurement. The contractor/concessionaire provides all (or at least a large part) of the financing. The project is owned by the public entity and the public entity is responsible for maintenance.
Design-Build-Maintain (DBM)	Design, construction, and maintenance are all part of the procurement and are provided by the contractor/concessionaire. The public entity finances, owns, and operates the project.
DBFM	Design, construction, and maintenance are all part of the procurement and are provided by the contractor/concessionaire. The private entity finances and maintains the project; the public entity owns the project.
Design-Build-Finance (DBF)	Design and construction are part of the procurement and are provided by the contractor/concessionaire. The private entity finances the project; the public entity owns, operates, and maintains the project.

Background

To date, the number of transportation P3s in the United States is relatively small and almost entirely focused on civil (horizontal) rather than vertical projects. The amount of long-term private financing provided is still very low. Among the reasons for this are the:

- Availability to state and local governments of tax-preferred municipal bonds.
- Need for a revenue stream, such as concessions, user fees, tolls, fares, or taxes, to provide funding.
- Fact that many public entities, private organizations, and funders have very limited experience with P3s. Most transportation P3s to date have been toll-based highways, light or commuter rail, or marine cargo terminals; very few have involved public transportation, intercity passenger rail, or airports.

The P3 method of project delivery is not new in the Denver Metro area. The Regional Transportation District (RTD) used a P3 procurement for its East and Gold Line Extension (Eagle) commuter rail project in the 2010s. However, there were key differences between the Eagle project and the DEN P3 such as:

- Eagle was a civil (horizontal) project whereas the Great Hall Project was a vertical construction project.
- As a vertical construction project in an enclosed and operating space, the DEN P3 faced many restrictions and limitations in its design and construction.

Growing demands on the country's transportation system and constraints on public resources have led to calls for more private sector involvement in the provision of transportation infrastructure through P3s. As defined by the U.S. Department of Transportation (DOT), "public-private partnerships (P3s) are contractual agreements between a public agency and a private sector entity that allow for greater private sector participation in the delivery of transportation projects."

With traditional methods of providing transportation infrastructure, the public sector is in charge of designing, building, financing, operating, and maintaining a facility, highway, or other infrastructure. Construction and other activities are typically contracted out to the private sector. By contrast, a P3 may involve private sector participation in any or all phases of development and operation of a new facility or the operation and maintenance of an existing facility. The DEN P3 project was a full DBFOM project, with four years of construction, followed by a long-term (30-year) concession agreement, involving the ongoing participation of a private partner, called the concessionaire, in managing the concessions in the Great Hall as a business.

POTENTIAL BENEFITS OF P3 PROJECT DELIVERY

There are many potential benefits to the P3 procurement approach, and many negative aspects.

Given that the Denver Metro area had previous successful experience with a P3 procurement, choosing the P3 approach for the Great Hall project was a reasonable

approach considering some of the potential benefits of P3s.

To paraphrase information from numerous sources (see the included reference list), some of the more frequently cited benefits include:

- Being able to spread the cost of a project over an extended period of time, often running to decades, rather than using "pay-as-you-go" as would be the case for traditional methods of infrastructure procurement.
- Spreading investment costs over the entire construction period and subsequent O&M period of the contract. This cost-spreading often enables infrastructure projects to be initiated and completed years sooner than if traditional pay-as-you-go is used.
- On-time and on-budget delivery of many P3s, especially in European environments where the concessionaire is also part of a consortium that owns the project (such as London Heathrow's Terminal 2).
- Transferring certain risks to the private sector and providing incentives for assets to be properly maintained.
- Potentially lowering the cost of infrastructure to the public entity by reducing both construction costs and overall life-cycle costs.
- Encouraging a strong customer service orientation by including "customer satisfaction metrics" in the contract.
- Making the end result, not the path taken to get there, the theme around which a project is built, enabling the private sector to focus on outcome-based public value.

Figure 3 is a simplified allocation of the risk shifting and control for the P3 and most frequently used traditional project delivery approaches.

Figure 3: Risk Allocations for Project Delivery Approaches

Attachment 1 includes a more detailed table comparing the pros and cons of various P3 and traditional procurement approaches.

DEN chose the P3 method of procurement for a number of reasons, explained in Section C.

Sub-topics/details

DEN considered both traditional construction methods and the P3 delivery method when rapidly rising airport passenger traffic levels and general security issues indicated a need to expand and modernize airport check-in and security screening areas. By the mid-2010s, passenger levels were well above the capacity of 50 million passengers for which DEN was designed.

The $1.8 billion contract maximum contained in the DA included all payments to be made by DEN under the agreement, including design and construction, and the 30-year O&M phase of the contract. From these payments and its own income from the project, GHP was intended to repay the debt issued to design/construct.

As part of the assessment of the P3 approach as the project delivery method, DEN performed a VfM analysis. This VfM analysis compared several options (P3, D-B, D-B-B, and CM/GC) to deliver the Great Hall Project to determine which method was most likely to meet the requirements and objectives at the best cost over the Project's life. Reasons for performing the VfM analysis included:

- Helping DEN—the public owner—decide on the most suitable delivery method.
- Generating political support and understanding of the project delivery approach and stakeholder consensus for chosen delivery method, through systematic and transparent use.
- Increasing DEN and other public entities' understanding of full project life cycle costs early in life of project.

As part of the VfM analysis, DEN considered DEN Great Hall project renovation factors including:

- The large scale and long-term duration of the overall Great Hall project—not just the construction phase.
- The extent and complexity of the risks associated with the project.
- The potential for innovation, particularly in the concession revenue area.
- The potential efficiencies of including the entire 34-year scope—four years of planned construction and 30 years of planned concessions O&M—in a single contract.
- The benefits of shifting large portions of the project's risks to the private concessionaire.
- The expertise of private developers in delivering innovative P3 projects and providing a significant portion of project financing.
- The suitability of applying performance- or outcome-based specifications.

The VfM analysis did not come out in particular favor of one approach over another. There was not a strong case for choosing or not choosing the P3 project delivery approach. However, since all four primary delivery methods were more or less equal, DEN chose to use the P3 approach. Aside from the VfM analysis, several factors favored the P3 project delivery approach over tradition deliver methods:

- DEN could shift a major portion of the Great Hall project risks, from both construction and long- term concession O&M perspectives, to the developer/ designer and its construction team.
- DEN could retain (1) a significant portion of the fees it collected and (2) its cash reserves to use for other projects.
- Validating the P3 approach on a vertical construction project would support the use of P3 on other vertical projects, complementing the experience gained (via the Regional Transportation District—RTD) on the Eagle P3 procurement earlier in the decade.

The main reasons DEN chose the P3 delivery method, in no particular order, were:

1. Risk reduction, avoidance, and mitigation
2. Substantial cost/financing transfer to the private sector
3. Transfer of O&M for concessions and the concession area to the private sector
4. Reduced need for project management staff

1. Risk Reduction, Avoidance, and Mitigation

Table 6 summarizes traditional construction project risk allocations compared to the allocations of a P3 delivery method.

Table 6: Typical Risk Allocation Between Public and Private Partners**

TYPE OF RISK	DESIGN-BID-BUILD	DESIGN-BUILD	P3/DBFOM
Change in Scope/Change Orders	Public	Public	Public
Permits	Public	Public	**Shared**
Utilities	Public	Shared	**Shared**
Design	Public	Private	**Private**
Construction	Private	Private	Private
Quality Assurance/Quality Control	Public	Shared	**Private**
Final Acceptance	Public	Private	**Private**
Operations and Maintenance	Public	Public	**Private**
Financing	Public	Public	**Private**

***Modified from the Congressional Research Service's "Public-Private Partnerships (P3s) in Transportation"*

Items under the P3/DBFOM column indicate the areas where DEN anticipated transferring many of the risks normally associated with typical construction contracts (also including the current CM/GC approach) to GHP. Financing and demand/revenue risk were shared. Under the contract, both DEN and GHP had risk. On the construction side, at a minimum, in a contract that allows for COs for items not solely controlled by the owner, there is risk to the owner.

At the time the Great Hall project was being contemplated, the City had other construction projects ongoing or starting soon. As a result, DEN's resources for construction management were maxed out.

2. Cost/Financing Transfer to Private Sector

The exploration of options for the Great Hall project started in 2013. DEN did industry outreach to potential P3 developers and experts, and based on the feedback received, decided to use a P3. Value for money analyses indicated the P3 approach was not necessarily beneficial to DEN since the likely cost savings was well below the 10% factor normally used to justify P3 over traditional procurement, but the idea of transferring much of the risk associated with complex construction projects (for example the balcony extension on Level 6 and impacts on the airport operating environment) to a private developer held great appeal. Traditional methods of procurement also had risks, especially in terms of schedule (as seen in the DEN hotel/transit center construction). DEN and the City wanted the private sector to take on the majority of the construction risk.

3. Transfer of O&M for Concessions to the Private Sector (Concessionaire)

DEN wanted to fashion the Great Hall into a retail and restaurant space on par with international airports around the world. One of the major components of "world-class" international airports is the extensive retail and food operations the passengers must transit between completing security screening and reaching their departure gates. As part of the selection processes, DEN staff visited a number of international airports to see the approach GHP brought to other airports.

The revenue split for the concessions was intended to be 80% to DEN and 20% to GHP. The GHP team would handle the O&M for the Great Hall for the 30 years following completion of the Great Hall renovation. GHP made an initial investment of $258 million that would be repaid over time through a combination of installments from DEN and a 20% (uncapped) share of the concession revenues from new shops and restaurants. GHP would also invest additional funds over time for renewal and replacement. DEN was to reimburse GHP for operating and maintenance costs over the 30-year O&M period. DEN would pay the remainder of the construction cost and retain 80% of concessions revenue and 100% of other revenues derived from the terminal spaces the airport will operate.

4. Reduced Need for Project Management Staff

At the time the DEN Great Hall project was being procured, the Denver Metro area had a significant number of other ongoing or soon-to-begin projects which placed heavy demands on available project management as employees or consultants, and other staff

required to run a large project. By transferring much of the construction responsibilities and management to GHP and GHB, DEN anticipated being able to avoid assembling a large staff to manage the design and construction aspects of the project.

In addition, the large volume of concurrent projects in the Denver Metro area could have negatively impacted the availability of contractor resources and staff.

Representative projects during the 2016-2021 timeframe included:

- Other DEN projects (the concourse expansion project was getting started during the time and DEN does substantial other work including work to the aprons outside the concourses and annual pavement work both airside and landside)
- The National Western Center
- Ongoing development of the Colorado Convention Center expansion
- The City's Elevate Denver bond package, worth $937 million. The first projects from that long- term program got underway by 2019, including several separate big arts/cultural projects that the bond program supported, including the Art Museum renovation and new building, a new building at the Botanic Gardens, and the renovation of the Denver Center for the Performing Arts Bonfils theatre complex.
- Colorado Department of Transportation (CDOT) ramped up its I-25 South Gap widening project
- CDOT's Central 70 project

The Lessons

WHAT WAS DONE WELL

DEN went through an extensive analysis of procurement options. The process was reasonably thorough but limited by lack of experience with vertical P3 major infrastructure projects.

In late 2018, DEN brought in a new project leadership team to address the decision-making issues and try to manage the relationship with GHP and GHB more effectively and productively.

DEN leadership and GHP/GHB were co-located at WorldPort (a short drive from the Terminal) to support ease of access and coordination between each entity's management and staff.

Once the decision was reached to terminate GHP's contract, the termination process was handled quickly and effectively. DEN took immediate action to competitively procure a qualified CM/GC with local experience and a designer of record to rapidly clean up issues from the GHP contract and get the Great Hall project on track to meet the revised schedule and original budget.

The termination clauses initially presented to DEN in the DA would have favored the contractor (these clauses are why many owners never terminate despite that being the best choice). DEN negotiated and insisted on clauses that would ensure it paid primarily for the value it received if it ever had to terminate the deal. This paid off when the decision was made to terminate because of the change in how the fees were to be calculated and the debt to be handled. Had these changes not been made there is a high probability it would not have been financially or politically feasible for DEN to terminate.

The procurement process provided valuable experience and processes to implement in the event DEN or other public entities want to consider a P3 for future projects.

WHAT COULD HAVE BEEN DONE BETTER OR DIFFERENTLY

The P3 approach to project delivery needs to be very carefully weighed against traditional (D-B, D-B-B, and CM/GC) project delivery methods. In particular, industry examples and experience suggest that when the VfM analysis doesn't indicate at least a 10% potential cost savings and/or a significant reduction in the anticipated time to complete the project, traditional means may be more suitable.

A shortfall in project management or other staff could be mitigated by hiring outside financial, legal, and technical advisors or employees with extensive experience even if they had to bring staff from other locations. DEN's project management contracts require the contractor to act as DEN's representatives so they would still be contractually obligated to align themselves with DEN, but this did not always happen. Given some of the other lessons that follow, an outside management company might also be better equipped and positioned to handle conflicts between the owner and the private partners.

Engaging and maintaining continuity of the legal/technical/financial advisors would have improved project outcomes.

The selection of the P3 method of project delivery was not compelled by a need for financing. GHP was hired because of its perceived expertise in undertaking such a massive project (Terminal 2) without disrupting airport operations any more than necessary, the quality and diversity of the concessions at a number of their airport projects visited by DEN, overall pricing, the innovative design at these airports, and the anticipated value added by having a local partner (Saunders Construction).

The fast pace of a P3 is one of its main virtues; to take advantage of this virtue requires a careful balance between owner control and input and developer/designer control and COs. Despite the fact that DEN allotted significant control to GHP, some DEN staff had a conflicting reluctance (in many instances) to relinquish this control, leading to delays and conflicts. In many ways, the Great Hall project appears to have been managed on DEN's part like a traditional D-B-B project, and on GHP's part like a P3 where GHP was also the owner, not just the Developer.

Comparing "apples to apples" when selecting a P3 contractor and its team members is essential. While there are many similarities between various P3 projects, there are also significant differences between civil and vertical projects. Overall management approaches may have areas of commonality, but the fast-paced features that can make a P3 project delivery approach appealing also mean the developer/designer and its construction team need to have as much directly relevant experience as possible. The Developer (GHP) contracted both design and construction to FAW and GHB; both had limited to no experience with vertical P3s or airport projects, especially in North America.

Too often, when first implementing a new contracting approach such as P3, you "don't know what you don't know," making the right questions difficult to formulate.

A checklist, similar to the ones from the Federal Highway Administration's (FHWA) Office of Program Delivery and Washington State's Project Delivery Selection Matrix, combined with a detailed VfM analysis, would be a valuable tool for making the P3 go/no-go choice. Creating a VfM checklist would be a useful exercise with for any application going forward.

> ***"Good decisions come from experience, and experience comes from bad decisions."*** – UNKNOWN
>
> ***"Do you know the difference between education and experience? Education is [what you get] when you read the fine print; experience is what you get when you don't."*** – PETE SEEGER

Construction during the P3

CONSTRUCTION APPROACH

INCLUDING CHANGE ORDER MANAGEMENT

Overview

DEN's intent by choosing the DBFOM approach to deliver the Great Hall project was to bring in a highly qualified, internationally recognized architect/design firm with airport construction experience and a local construction partner to implement DEN's vision. The chosen firm, Ferrovial Airports, with its partners (Saunders Concessions and JLC Infrastructure), would oversee their chosen construction team (GHB). In this way, DEN would only manage one contract with a single point of contact (GHP). In addition, the P3 project delivery approach was intended to minimize design and scope "creep" and resulting COs. This single-source contracting approach is a key difference between DBFOM and more traditional approaches. The culture of collaboration inherent in the DBFOM approach is critical to a project's success.

The Developer (GHP) and contractor (GHB) were to work as a team, providing unified project recommendations to fit DEN's schedule and budget. Under the contracts, GHB was also responsible for the design, but GHP had some design control and so did DEN. In addition, the inclusion of a contractor with local project, permitting, regulatory, code, and compliance requirements was considered by DEN an essential component for successful delivery of the Great Hall project.

While a certain number and value of COs is normal on a project of the size and scope of the Great Hall project, the manner in which many COs were originated and addressed led to problems with schedule and cost. GHB often presented COs without the input of the entire team or sufficient information to make a decision, reducing opportunities for innovative design and facilities and collaborative problem- solving, resulting instead in excuses and finger-pointing. The COs originated by GHB and presented by GHP to DEN were often open-ended and vague.

In theory, the DBFOM method of project delivery should have minimized COs since the architect was working from a 30% design document agreed between GHP and DEN as part of the pre-DA and a detailed list, with a range of allowances, required materials, finishes, and other construction elements that had been agreed to as part of the DA. The presence of a strong owner's representative (DEN) with knowledge of P3 project delivery would facilitate problem resolution and avoidance. In addition, given their previous airport terminal construction experience, DEN expected GHP and GHB would understand requirements for materials, finishes, and so forth that met airport standards, such as those sufficient to withstand use by 69 million passengers annually. Unfortunately, the GHP/GHB team apparently considered the 30% design to be the final, "frozen" design, leading to numerous CO requests and conflicts.

There was minimal discussion about the validation of GHP's plan among DEN's technical experts during the proposal phase or subsequently. This lack of discussion meant there was no milestone development and a project design that was basically not constructable in the contracted timeframe and for the proposed price.

The role of the owner (DEN) in the Great Hall project was to be far more limited than in any other project the DEN construction management and other project personnel had ever managed. Instead of detailed, hands-on control and decision-making authority, DEN was to transfer most of these actions and roles to GHP who would then collaborate with GHB, keeping DEN informed.

Another part of the DA, specific to construction, materials, and other finishes was the inclusion of a range of options with an "allowance" for each item. In theory, as long as the owner made timely decisions and stayed with the range of the allowances, there should have been minimal or no COs unless unexpected circumstances were encountered during construction.

As the Great Hall project moved from development and design to demolition and construction, GHB began to surface potentially major schedule and cost issues, particularly with respect to concrete strength issues. DEN engaged forensic experts to review GHB's claims, and they found that the claimed cost and delays exceeded those needed based on the claimed concrete issues and, in any event, and the concrete strength claim was unsubstantiated. At the same time, DEN maintained that GHB was not adhering to safety and fire code regulations. A series of letters were exchanged between the two sides (see table 3) as the COs and costs claimed by GHP and GHB mounted, and schedule delays increased. By February 2019 it was becoming clear GHP/GHB may have vastly underbid the project. GHP/GHB was incurring delays and costs they tried to recoup or justify through vague and open-ended COs.

DEN had expected a far more substantial role for Saunders Construction. The reality proved to be far different. At the time the award decision was made, the presence and anticipated active role of Saunders Construction was portrayed by GHP as a significant "value-added" and part of the justification for awarding the Great Hall P3 contract to GHP and its team. Saunders Construction indicated to GHP that they brought deep experience managing the processes of obtaining permits, scheduling and passing inspections, meeting fire and other codes, and fulfilling contractual requirements for M/WBE participation.

Saunders Concessions was initially a fairly significant financial partner in GHP. Saunders Construction was to be the GC on the Great Hall project. However, Saunders Concessions' equity stake was reduced to a token 1% when it became clear that it could not meet the capital requirements for the planned investment. At the same time, while Saunders Construction staff was present on the design and construction through termination and the first Construction Manager was an employee, FAW assumed most decision-making authority.

As early as 2017, before construction started, GHB was minimizing Saunders' participation, and much of the construction responsibility passed to FAW—a U.S. arm of Ferrovial Agroman. However, FAW lacked the local and airport experience Saunders Construction was supposed to bring to the project and the airport construction experience of Ferrovial Agroman.

Background

Localities and agencies have different requirements and processes for managing construction-related activities. Adherence to these requirements is critical to keeping a project on schedule and within budget. DEN placed great emphasis on selecting a P3 contractor for the Great Hall project that would bring a team with the ability to understand and handle overall construction management and meet local requirements—both aspects are essential to keeping a project moving along and ensuring proper sequencing of construction activities. Having an experienced GC, knowledgeable about local construction requirements, to run the day-to-day construction activities on a project can be very useful.

The team and key personnel proposed by GHP included (1) a project Executive Director from Ferrovial Airports, with airport terminal construction experience and (2) a construction manager who brought local GC experience and then a team of vetted M/WBE companies, and staff with extensive experience dealing with the permitting, inspections, fire code, safety, and other requirements in the City.

As the project progressed, GHB replaced key personnel specified in the proposal with other personnel who lacked the experience with vertical P3 construction projects. GHB began to minimize the role of Saunders Construction. GHB's lack of understanding of the local construction requirements led to:

- Conflicts and delays in the permitting and inspection processes
- Inadequate use of M/WBE contractors
- Violations of fire code and safety requirements inside the Great Hall, resulting in a fire in an escalator while passengers were present
- Designs for the concession area inside the secured area of the terminal that were not in compliance with fire codes
- Requests to ignore code requirements in order to move construction forward

GHP and GHB disputed many of DEN's safety claims. During an exchange of letters between DEN and GHP/GHB (see Table 3), GHP/GHB maintained DEN meant to distract from the project's costly disputes, which centered on about 20 unresolved COs and a concrete issue that stalled a large portion of the Great Hall project for months. DEN brought in an outside specialist to assess the concrete issue. While a few minor areas of weakened concrete were found, these areas were deemed not to be central to the Great Hall project construction. To continue construction and attempt to minimize schedule delays, spider cranes — a type of crane that distributes weight better — were brought in to set steel.

Note that when DEN finally brought on a GM/GC (Hensel Phelps) to perform the Great Hall renovation, the same steel erector (Derr & Gruenewald) engaged by GHB was used and spider cranes performed the work with no concrete issues or delays.

Throughout the project, GHP and GHB contended that DEN made changes in design, materials, and other elements whose cost went well beyond the allowances provided as part of the DA. DEN contended that selections made or offered by GHP did not meet standard airport quality parameters and GHP should have known this given its recent experience with the reconstruction of Terminal 2 at London's Heathrow Airport.

DEN's lack of experience with the P3 method of procurement contributed to delays. The DEN team wanted more input into the overall decision-making process, despite the provisions in the DA. At least initially, DEN's decision-maker(s) could not be reached in a timely manner, impacting other aspects of the project. Communication in general between DEN, GHB, and GHP was limited and not well- coordinated. In 2018, the owner's management team was changed to improve decision making and communication, including having executive sponsors work with the co-located DEN, GHP, and GHB staffs at WorldPort.

Sub-topics/details

The interfaces between GHB and local authorities were extremely problematic. GHB did not have local experience or an understanding of how regulatory processes work, leading to delays and confusion in the process of getting the approvals needed for construction to progress. Saunders Construction had been included on the GHB team to provide this experience and interfacing, but its role was quickly and drastically reduced, contributing to major delays, misunderstandings on the part of GHB about regulations and code requirements, and difficulties getting the needed authorizations and approvals to begin and then continue construction activities. Saunders remained on the project, but in a substantially reduced capacity.

The Great Hall project was lacking milestones and other performance metrics on the project side. As a result, it was difficult to hold GHP to specific measures of progress, even as it became increasing apparent GHB construction activities were behind schedule and they were using COs as a means to recoup costs and justify delays.

There was not clarity in the roles for each aspect of the DBFOM in the contract which led to many of the Great Hall project's contract and risk allocation problems.

GHP placed too much reliance on DEN for determining materials, products, and finishes, despite the inclusion of significant details and allowances in the DA. Every time GHB, through GHP, sought a decision from DEN on something proposed by GHB, GHB generated a CO, no matter how minor the change.

Choosing options at the higher end, which often happened, resulted in costs that exceeded the amounts priced in the GHP proposal. Consequently, many seemingly reasonable design choices resulted in cost increases, and modifications or other changes to the actual design further compounded the cost increases, resulting in an increasing number of COs.

Due to performance or other minimum requirements, GHB would present DEN with project materials that were not appropriate for airport use and impose an additional charge for every change to these inappropriate materials to bring them to airport standards. As an example, the toilets proposed by GHB did not work with the DEN plumbing system and had parts sourced from Italy and not available in the

U.S. To resolve this issue—which should not have arisen in the first place—GHB submitted a CO.

On the other side, GHP/GHB had significant difficulties getting design decisions from DEN management. Decision-making authority was limited to a very small group of people at DEN. Often, there was no one available for several days, or longer, to make a time- or schedule- critical design decisions. The resulting "ripple effect" impacted broad aspects of construction. DEN resolved much of this issue by bringing in a new management team in early 2019 but this did not resolve the other issues, such as the concrete and other issues that formed the basis of many of GHB and GHP's claims.

There are significant differences between vertical/airport construction and civil/highway construction, FAW's expertise. Ferrovial Airports, the principal partner in GHP, should have been aware of these differences, having recently completed the Heathrow Terminal 2 demolition and reconstruction. To reassure DEN of their commitment and understanding of the Great Hall project's needs, GHP included, as the Executive Director on the project, the person who oversaw completion of the Terminal 2 project. Once the DA was signed, this promised person was present at DEN for a few weeks, and then left, and was replaced by someone without this experience.

The DEN team worked well together. There was a high level of trust between team members. They took steps to test information they were receiving from GHP. Ultimately, the information from GHP seemed designed to make excuses for GHP's lack of staffing, replacement of key staff, and resulting project delays.

The DEN team attempted to keep working with GHP/GHB to keep the project moving forward, enduring public pressure, while questioning the information GHB was providing. At the same time, DEN, had a very difficult time stepping back from the design details, decisions, and day-to-day project management activities. DEN needed to ensure that decision-makers were available in a timely manner. When decisions were made, the choices were often outside the contractual allowances.

The Lessons

THE KEY LESSONS

- Ensure the owner understands the differences in its decision-making role on traditional project versus a P3, capturing key responsibilities in the DA.
- Owner's management and project team needs to adjust its decision making to the scope and its obligations under the contract to ensure timely decisions are made and do not affect the overall progress of the project.

- Ensure the design and construction contractor understands the level of design they are provided and that the owner has authorization to make changes and modifications, not all of which are out-of-scope.
- Have a solid assessment of the technical approach that informs milestones in the contract.
- Ensure financial/technical/legal advisors are present for the duration of the project and consult with them on a regular basis.
- Clarify the roles for each of the five components of the DBFOM. Ensure the resultant risk allocations are properly allocated.
- Have a DA that, when appropriate, uses the required "shall" or "must," not the permissive "may." Without hard requirements, contractors may be able to take too many liberties with COs. The DA needs to protect the owner's rights and place enforceable requirements and obligations on the contractor. Without enforceable language and provisions, the owner may be left with no path forward other than lawsuits.
- Ensure the DA and other contract documents require the developer and contractor to comply with key personnel and team members it stated in its proposal. Include remedies to the owner if those personnel and/or team members are not on the contract. Having the "right" key personnel—those with directly-related experience—is essential to managing construction and other project aspects to achieve the specified goals and schedule.
- Have a qualified, experienced, empowered GC or team member with local construction experience to smooth the process. In addition, this GC or team member should have demonstrated successful experience with similar projects. If a GC is not empowered to act, their value to the project is very limited. Contractors from other parts of the country or international contractors may lack the necessary experience dealing with regulatory, permitting, inspection, safety, fire code, and other essential project elements.
- Include milestones in the DA specifying when work is to be completed.
- Include specifications for products, materials, finishes, and so forth that ensure the selections meet airport standards, material/grade, and usage requirements.
- *Note any agreed "allowances" for materials, finishes, and so forth, and stay within these allowances to avoid COs covering cost increases. This can be even more important if the changes impact other areas of the project in terms of materials, costs, or schedule since these impacts lead to the "ripple effect."*
- Incorporate reasonable required—not permissive—dispute resolution provisions.
- Coordinate between the owner, developer, designer, and construction team members to ensure each entity understands its roles across the project, who is the decision-maker, and what timeframe is needed to ensure the decision-making process doesn't slow down the project. Each team member must have clear roles and responsibilities. Clear lines of communication, ensuring involvement of all parties, are also essential.
- Include specific requirements in the DA for materials and design elements that are owner requirements.

FINANCIAL/ FINANCING

Overview

As explained in Lesson 1, DEN choose the P3 method of procurement after evaluating the option of using traditional procurement approaches and drawing entirely on airport revenues and reserves versus transferring some of the costs, and associated risks and financial rewards to a developer and its partners and subcontractors via a P3 procurement approach.

The Great Hall project was a 34-year contract worth $1.8 billion, with an initial contract payment to GHP for Great Hall renovations accounting for $650 million. This $650 million for the capital program may not have been the full cost of the renovation. Developers frequently plan to recoup initial capital costs during operations. The $120 million contingency was owner-controlled and not part of the DA/Schedule of Values for design and construction, so GHP/GHB did not have access to it unless DEN spent it, for example via COs incorporating work outside the DA.

DEN intended to pay its share with revenues, including airline fees. The cost split between DEN and GHP for the design and construction was approximately 27% GHP and 73% DEN. GHP was to make an initial investment of $258 million to cover costs including its 27% share and that would be repaid, in part, by payments from DEN to GHP. GHP, as airport concessionaire, would receive an uncapped 20% share of concession revenues from new shops and restaurants for the 30-year operate-maintain period. DEN would receive the remaining 80% from the concessions and retain responsibility for other airport operations and maintenance costs. During this 30-year period, DEN would pay an estimated $30 million to GHP each year for maintenance and repayment of GHP's project financing costs.

The expectation was for DEN to put up about $400 million of the upfront renovation costs and gain approximately $5.0 million in annual revenue from the expanded concessions.

The total cost to DEN was estimated to be between $1.0 billion and $1.3 billion, with a $1.8 billion contract maximum over the 34-year life of the contract.

From a payment process perspective, GHB invoiced FAW and, in turn, FAW invoiced GHP. Then, GHP would send the invoice to DEN for DEN's review and, if DEN approved the invoice, DEN would pay GHP DEN's portion of the costs. Then, GHP would pay the invoice amount.

By February 2019 it was clear the Great Hall project was experiencing schedule and cost difficulties, and the situation continued to worsen, reaching at least 18 months of anticipated delays and $300 million of claimed cost overruns. These overruns included agreed cost increases and the claims filed by GHP related to other increased costs. DEN terminated the contract for convenience, before those claims were litigated, so the actual amount was never finalized.

DEN and GHP turned to mediation, but by August 2019 it was clear the two parties were at an impasse.

Background

DEN sought proposals when the Great Hall project was still at the conceptual stage. Initially there were four teams shortlisted, but one dropped out prior to submitting a bid. A second team dropped out before bids were evaluated. The proposal review process then considered the two remaining bidders whose proposals were based on a design completed to approximately the 30% level. DEN chose GHP, only negotiating the design and cost details with GHP's bidding team after they were identified as the preferred bidder, basing its decision on a combination of qualifications, airport P3 experience, and team members (specifically Saunders Construction) with local experience.

DEN issued the RFP at the 30% design stage to pick a partner with which to further the design and negotiate price by using the pre-DA approach, giving DEN the opportunity to decline to enter into a DA if the pre-DA process did not produce the desired end result. This was the approach recommended by the external P3 consultant teams.

As a result of this bid evaluation/selection process, the GHP bid was based on a preliminary or conceptual (30%) design level, with many details still to be determined. The 30% design did include significant design details, but most of the specifics for materials and other items were in the form of a range of options, or allowances (see Lesson 2 for details).

As issues regarding COs arose, including COs tied to design selections and those tied to construction issues like the concrete, and the need for cost and/or scope reductions became clear, GHP warned that it might not be able to finish the Great Hall project until as late as 2025 instead of the November 2021 date in the contract. GHB also projected costs associated with ~20 major COs and a number of minor COs could soar by more than $300 million. At the same time, DEN personnel indicated they were now expecting to have to use up to $120 million—the entire contingency fund—to keep the project moving along (1) without adding to the original budget and (2) very likely decreasing the scope by limiting the contract to the Great Hall construction component and retaining the future concession area under DEN management and control.

Areas of contention included two key issues (see Table 3):

- Potential weakness in the concrete of the Great Hall floor, which GHB maintained was not strong enough for the 'spider' cranes originally planned to do the work. This "weakness" in the concrete was presented to DEN as a major CO and schedule impact. DEN had outside experts assess the concrete strength. While a few minor areas of weakened concrete were found, these were in peripheral areas and did not impact overall concrete strength or safety. When DEN finally had its new CM/GC perform the work, the spider cranes were used as planned and there were no significant concrete issues.
- GHB's safety measures associated with welding and other hazardous activities were insufficient, putting the traveling public, DEN workers, and contractors at risk from fire and other dangers. During the course of GHB's participation in the Great Hall project there was at least one fire caused by welding or similar activities in the area of the escalators. The resulting fire impacted escalator availability as well as passenger safety.

Sub-topics/details

The DA gave DEN approval power over COs including for scope changes, cost additions, and schedule extensions. From the GHP perspective, DEN was very unwilling to compromise on means to manage and mitigate changes and cost increases. From DEN's perspective, GHP's requests for additional compensation or time were not justified. When GHP would finally submit CO pricing from GHB, there was always a statement on the CO noting the price would be subject to extended general conditions once fully determined (at some unspecified "later date").

DEN often ignored or rejected these compensation requests. Neither entity had the final decision- making power, leaving the owner (DEN) and Developer (GHP) few options. After attempting mediation, GHP sent formal claims to be decided by the contractual Dispute Resolution Panel. DEN terminated the contract for convenience before these claims were determined. DEN chose to terminate the contract for convenience rather than for cause or some other reason. Termination for convenience was considered to be a less disruptive and less expensive way to get the Great Hall project moving again.

Table 7 is a top-level summary of the termination settlement costs.

Table 7: Summary of Termination Settlement Costs

CATEGORY	AMOUNT*
Net Lender's Liability	$90.4 Million
Equity/Return on Investment	$37.7 Million
Breakage & Settlement Costs	$55.5 Million
Total	$183.6 Million

**Amounts rounded*

In March 2020, DEN made its final payment, bringing the total termination cost required by the DA to $183.6 million. Of this amount, $55.5 million was for breakage, termination, and settlement of outstanding claims and costs. The airport received the value back in the form of completed work, supplies and materials on hand, etc. in exchange for the termination payment. The additional $128.1 million reimbursed GHP for its equity investment and net lender's liability to repay its bonds. This amount also included work performed because GHP paid for some of the design and construction costs and had its own operating costs.

During the termination process, DEN discovered that GHP/GHB had not been paying their contractors, resulting in the incorporation of significant additional costs into the termination payment.

The Lessons

Having a project contract/DA with step-in rights for the developer's lender is a double-edged sword. It provides protection from the lender, and a lender may require it, but getting the project developer's lender(s) involved has many risks to the owner and few upsides since the owner may have no say in what company is ultimately selected to finish the project if the step-in rights are invoked. Lenders are very reluctant to waive this provision. A later project in Metro Denver (the National Western Center) sought to provide more options for the owner.

Only negotiating with a single proposer is not uncommon, but it has risks. Choosing to negotiate with only one of the remaining bidders left DEN with limited means to determine cost "reasonableness" and "constructability" of the GHP proposal. This limitation remained, even though DEN used the services of several "P3 consultants" and a major financial/accounting firm to help vet the cost evaluation. Cost evaluation of a project and proposals when the design being used is only at the conceptual or 30% design level is extremely risky—there are simply too many unknowns at that point. The lack of competition during price evaluation and negotiation requires that the DA be written to minimize future misunderstandings between owner and developer about scope, design, and cost.

The underlying DA was not advantageous to DEN as it lacked milestones and details regarding deliverables. This shortcoming enabled GHP/GHB to take unreasonable liberties with COs without penalty. The DA also failed to provide an enforceable path forward for dispute resolution other than lawsuits. While the DA had dispute resolution language, it was the permissive "may" not the required "must" or "shall." This DA language was fairly common in P3 deals at the time (but no longer) and needs to be modified to protect owners like DEN. Every avenue open to or closed off to DEN in dealing with GHP came down to the DA. The DA did not provide the rights to DEN nor the obligations on GHP that it should have. DEN hired experienced outside legal counsel to assist with drafting and negotiating the DA. Extremely complex contracts like the DA require specialized legal and other expert assistance to ensure that the DA meets the owner's needs.

Another potential approach to reducing the risk of financial/cost surprises and ensure competitive pricing is to use some of the approaches found in D-B-B or CM/GC delivered projects. These delivery methods don't have a final construction cost when contracted [and usually are procured by RFP or Request for Quote/Quotation (RFQ)]. One approach requires the selected contractor to bid out subcontracted work once the design is sufficiently developed. The GC doesn't come to the contract with its subcontractors but runs a bidding process for each type of work and then picks the lowest qualified bidder. The GC's primary costs are for paying subcontractors actually doing the work. The City also uses this method – it's currently being used on the Great Hall CM/GC project with Hensel Phelps and on the Concourse Expansion. This approach has other benefits, including giving more subcontractors a shot at the work.

The P3 procurement approach was, and still is, relatively untested in the United States (and the rest of North America). Consequently, calculating costs and determining "cost reasonableness" is a serious challenge for all sides if the design is not complete or closer than 30% to complete. The majority of U.S.- based P3 procurements to date have been for civil/horizontal projects rather than more complex vertical projects such as the Great Hall renovation. While there are common elements, the differences in construction and resulting costs are stark, as the issues, overruns, and delays with the DEN project showed.

Financial issues are more "known" when using traditional methods of procurement: D-B, D-B-B, and CM/GC. The owner has far more control over and discretion with decision-making and often more ability to manage and control costs and schedule.

When the P3 method is chosen, it is a major paradigm shift for project owners. DEN retained significant decision-making authority, as well as control over the project contingency funds. However, under a DBFOM/P3, the owner does not retain the full scope of authority of a traditional project with its associated level of control, decision-making authority, and CO origination and management roles. If the owner asserts authority outside its role in the DA, expensive COs may result. These COs become both a financial and a project management issue. In addition, insistence on involvement at a very granular level in the decision-making process (for example, in selection of materials and fixtures) runs a number of risks. Chief among these risks is (1) delays in decision-making when the owner's representative(s) is/are not available in a timely manner, impacting many interdependent areas of project schedule and (2) making materials or other selections that are outside the cost range of the allowances the developer/designer used in their price proposal. The net results are COs; finger-pointing; cascading delays; and cost escalation.

The P3 procurement approach is likely to be used in more vertical projects (witness the recently completed project at LaGuardia Airport and the upcoming one at JFK Airport). However, non-road P3 projects to date are something of a "mixed bag." Skanska's losses with mega P3 projects (including LaGuardia) prompted it to leave the P3 industry. The DC Metro's DC Purple Line had significant difficulties and the Developer terminated the contract after delays continued to accumulate.

With practice and more experience, cost and schedule management, and coordination between owner and developer and its team will likely improve. Until that time, however, roles and expectations between owner and developer (and by extension their designer, constructor, subcontractors, and other partners) need to be very clearly defined and agreed to (in writing, with the required "must" or "shall" rather than "may") during all phases of the procurement and project delivery, starting at the proposal stage.

Newly renovated ticketing and baggage drop locations by DEN in fall 2021

AIRLINE INTERFACES

Overview

The DEN Great Hall project involved consolidating airline check-in from occupying the majority of Level 6 of the Great Hall to sharing that same area with the relocated TSA security checkpoints. A key justification for this change, and its reduced area, was the ability to automate and cluster most of the check-in and related activities to save space and expedite the check-in process. Reducing the space available to the airlines had the potential to impact passenger services, but the new check-in space has been configured to handle more passengers than the old space. Rather than a capacity reduction, the new check-in area has been designed to handle DEN's anticipated passenger growth. DEN is adding 39 gates at the same time the check-in capabilities are being redesigned. Passenger levels continue to grow, approaching 70 million passengers annually.

Through ongoing coordination with the airlines, DEN has been able to mitigate or resolve the concerns addressed in this lesson.

Background

There were several reasons for consolidating the airline check-in areas.

First, automation and self-service capabilities enhance the ease of passenger check-in with less reliance on customer service/ramp agent assistance and the counter space required for their services. They also increase capacity, meaning that more passengers can be served faster and in a smaller space.

Second, a significant percentage of airline passengers use online check-in and outside or self-service baggage check/drop facilities, further reducing the need for direct interaction with a customer service agent. Using these two features, passengers are able to bypass the check-in area entirely, and head straight to the TSA checkpoints.

Third, there are several proposed and existing baggage drop areas, including one at the commuter rail airport terminal, reducing the need for passengers to go to the ticketing/check-in areas at all.

Fourth, and potentially most significant, consolidating the check-in and security checkpoint areas on Level 6 of the Great Hall reduced potential security issues in the terminal, such as the breach that took place at Los Angeles International Airport in February 2013.

An additional consideration was freeing a significant portion of Level 5 of the Great Hall—the existing TSA security area—for additional concessions (restaurants and shopping) in support of the revenue sharing between DEN and GHP. Upon completing TSA security checks, passengers would descend to Level 5, passing through the upgraded concession area, on their way to the trains to the concourses (on Level 4). Once through TSA security screening, passengers would also be able to use the sky bridge to Concourse A.

As the DA made its way through the City's approval process, the major airlines at DEN objected to TSA security screening relocation plans, overall costs, and other aspects of

the 34-year P3 arrangement, including its duration. They requested a four-month delay in the awarding of the contract, but this request was not accepted by DEN, City Council, and city personnel. The DEN standing Airlines Airport Affairs Committee (DENAAAC) sent a series of three letters to DEN, starting in 2015 (pre-solicitation/pre- award) and continuing into June 2017. These letters questioned whether the new, relocated security checkpoints would work as advertised. They indicated the consolidation of ticket counters on the south end of Level 6 could result in a space crunch for airlines as passenger traffic continues to grow. Another concern was whether adding extensive concession space on Level 5 of the Great Hall — past security, but before passengers take trains to the concourses — even made sense. As noted, the concessions are no longer inside the secured area.

After discussions between DEN and airline officials, the preceding issues have been resolved to the satisfaction of all parties.

Sub-topics/details

The accelerated timeframe for completing the Great Hall project concerned the airlines on both financial and operational fronts. The various concerns were presented to the City Council in several letters, starting prior to choosing the concessionaire. The letters generated were signed by the nine carriers that make up the standing DENAAAC.

During the pre-development and initial design phase (mid-2017 through mid-2018), the airlines felt they were often kept at distance. The airlines felt coordination in terms of space, ticketing areas, joint use spaces, and passenger traffic flows was often lacking. The coordination that was done occurred after the DA was signed and so often ended up as COs to the design and construction contract.

A significant area of concern was the project structure that precluded the airlines from speaking directly with GHB and GHP. This lack of direct communication led to a number of misunderstandings and inability on the part of the airlines to anticipate potential problems, deal with issues as they arose, and mitigate impacts to airline customer service operations.

To mitigate these concerns, DEN and airline officials conducted discussions which led to resolution of issues and agreement on the changes. When DEN took over the project, it allowed Hensel Phelps and other contractors to communicate directly with the airlines.

Some of the actual and potential problems arising from inadequate communication and coordination included:

- Construction walls appearing "overnight" during the weekend with no warning to the airlines. These walls, constructed by GHB, impeded access to operations areas, check-in areas, and areas of passenger circulation.
- Long-term closure of several baggage carousels, performed by GHB.

- GHB's attempts to shut down the trains providing the sole means of moving large numbers of people to the B and C concourses and moving most people to the A concourse.
- GHB considering closing the bridge connecting the Great Hall to concourse A.

Relocating the TSA security area was generally not the approach the airlines would have preferred. Instead, they wanted DEN to install bulletproof glass and similar materials to shield the Level 5 security screening area from potential security threats or swapping the location of the airline check-in area and the TSA screening area. Alternatively, they might have supported a relocation of their check-in and other operations areas to Level 5, leaving all of Level 6 for TSA security screening.

The airline representatives were rarely, if ever, in the same room with GHB, and GHP. Meetings were almost exclusively with only one of those entities at a time if a meeting was held at all.

The overall feeling on the part of the airlines was that they had much to offer to make the design more effective and the construction and implementation more efficient, but too often this potential input was not sought by DEN, GHP, or GHB.

The Lessons

When a major relocation of any facet of airline operations is contemplated, it is essential to have and maintain close coordination with and buy-in from the airlines.

Coordination between owner and airlines is essential. Airlines do not have a direct contractual relationship with the developer, so channeling inputs through the owner is essential.

A P3 contractor (GHB) who is not familiar with airport operations, FAA requirements, and fire or other codes and procedures may not understand the needs of the airlines, particularly when contemplating shutting down portions of the passenger transport operations (the trains to the concourses) or abruptly putting up barrier walls without prior notice and coordination with the owner and the airlines.

While each P3 developer/designer has a unique background and project management approach, the airlines prefer a consultative, rather than directive, form of communication for major projects that significantly impact their operations. Going forward, the airlines have been able to engage with the replacement CM/GC, ensuring the airlines' concerns and needs are more directly addressed and actions impacting the airlines' ability to accommodate disruption is greatly enhanced.

Despite all the construction, consolidation, and occasional confusion, the 2018 J.D. Power North American Airport Satisfaction Survey ranked Denver fourth out of 20 "mega" airports with a score of 711 out of a possible 1,000.[viii] However, the effects of the construction were evident in the decrease in DEN's score from the same survey in 2017 (763/1,000). The J.D. Power score rebounded for 2019, reaching 793/1,000. The airlines place great emphasis on these statistics and related "net promoter" scores to evaluate how well they are doing in the opinion of their most valuable resource—their passengers.

Jeppesen Terminal, before phase 1 renovation and P3

OPERATIONS, TERMINAL, AND SECURITY

Overview

An important consideration in the decision to relocate certain Great Hall facilities and operations was the need for increased security in the areas outside the TSA screening area and in the screening area itself. The events of November 1, 2013 at the Los Angeles International Airport brought to the fore the need to prevent security issues in crowded airports. A second reason was to consolidate and streamline the process of moving from the ticketing areas to the screening areas by co-locating the two areas and putting them both on the top level (Level 6) of the Great Hall. A third reason was to expand the concessions available to passengers (and possibly families and friends) as a means to improve passenger experiences and increase DEN revenues. A fourth reason was that the Atrium of the Great Hall was never intended to be a "sea" of security checkpoints when DEN opened in 1995. The events of 9/11 required implementation of security screening checkpoints in a space that was not designed or constructed for that use.

Construction in a facility, such as the Great Hall, that is in active use 24/7/365 is inherently disruptive. The series of closures and barricades planned by GHP was shorter than what is now in place, but far more invasive from a disruption perspective, since the GHP plan included shutting down the train to the concourses for an extended period of time. The train is the only way to reach Concourses B and C. The bridge to Concourse A would have been slow and crowded if all passengers headed to that concourse had to use that access method. Busing as an alternative would have been extremely slow and therefore would have seriously impacted DEN operations. Additionally, buses introduce additional security risks since screened passengers are "out in the open" and potentially vulnerable, as is the case in the pre-P3 TSA security screening area.

Background

In May 2017, DEN performed an operational simulation to validate the need for the planned operational, terminal, and security area updates; remodeling; and improvements. The modeling looked at the impact of the Great Hall project on the ticketing lobby, baggage operations, and security queuing.

The plans for the Great Hall project included a 31,000-square foot mezzanine for Level 6. This expansion would accommodate the relocation of the TSA security screening area from Level 5 to Level 6, adjoining the remodeled and relocated check-in counters. The processes for security screening were to be streamlined, using "pods" each holding about 30 people, to enable these small groups to prepare for, and proceed through, security screening in a rapid manner. Additionally, these pods, along with the effective enclosing of the security screening area, would greatly enhance passenger security and safety while they were inside the screening area.

Another major feature of the project was to greatly expand and enhance the food, beverage, and shopping concessions inside the secure portion of the airport, enabling both departing and arriving passengers to access these facilities. Enhanced concessions are a major feature of most international airports; with the increasing number of international flights at DEN, the need for "better" services and facilities for passengers awaiting flights was a significant consideration, especially when choosing a P3 developer/designer who would later operate and maintain those facilities.

Sub-topics/details

Operational aspects that impacted airport operations included the shutdown of some baggage carousels by GHB, lasting for several months.

The scope of work included new flooring in the baggage claim area and other minor "refreshing" of the ceiling, lighting, and paint. None of this work was sufficient to justify the lengthy shutdown of several baggage carousels for months. GHB removed access to two baggage carousels and built construction walls overnight shutting down airline operations/check-in areas; these were surprises to DEN, the airlines, and other stakeholders. GHB's actions causing unannounced and lengthy shutdowns were an unfortunate symptom of the continually deteriorating relationship between DEN and GHP/GHB.

The relocation of the TSA security screening area to the uppermost level of the Great Hall was, according to letters exchanged between DEN and the DENAAAC in June 2017, to "address ...current vulnerabilities created by the exposed TSA checkpoints..." (per DEN's letter to DENAAAC).

The airlines expressed concern that the modeling of the relocated and updated security checkpoints would not meet the anticipated passenger throughput of up to 300 passengers per lane per hour, or approximately 10,200 passengers per hour.

If there is an unusually high passenger queue awaiting screening, the old configuration allowed the lines to back-up into the baggage claim area. Under the new layout, these lines have sufficient queuing space. In the event of a backup, the passenger queue will run along the Level 6 balcony, not interfering with the ticketing and check-in areas.

The Lessons

As a 24/7/365 operation with multiple stakeholders and priorities, a project needs to consider a wide variety of impacts to a large and diverse group of users and stakeholders. Gaining the support and understanding of these groups can be greatly enhanced through effective modeling of proposed or planned changes, upgrades, consolidations, relocations, and concessions, along with integrated plans that ensure work sequences are viable, realistic, and minimally disruptive to these various users and stakeholders.

- Some of the potential disruption to operations, passenger access to concourses, and impacts to airline operations could be reduced by changing and integrating work sequences to be less disruptive for passengers, stakeholders, and overall airport operations.
- Modeling the potential impacts, benefits, and shortfalls of a proposed project is a viable approach, especially when dealing with the unknowns of relocation of major operations, additions of new facilities and services in different locations (e.g., the location of the expanded concessions and the relocation of security screening), and new footprints for operational activities such as airline check-in counters or baggage handling. For any model to be truly valuable it needs to reflect the needs and concerns of all stakeholders accurately and adequately in order to gain the greatest buy-in and support from a diverse group of impacted users.
- An integrated plan with construction and other activities clearly defined and allocated to milestones would reduce disruptions by increasing the likelihood activities would progress as intended, in a logical order. For example, the "concrete issues" and resultant disagreement between DEN and GHP/GHB caused major delays to the construction of the planned 31,000- square foot mezzanine/expansion for Level 6. This expansion, which should have been completed well before DEN terminated the P3 contract, was less than 1% complete at time of GHP's termination. As a result, impacts to users and stakeholders continued long past the originally anticipated date.
- The visions of the owner and the future concessionaire, along with the realities of airport passenger "types" and facility operations, need to drive the choice of P3 contractor and type and level of facilities provided. While DEN is one of the busiest airports in the world, it has limited international passenger traffic (ending or originating at DEN). An airport such as London's Heathrow (specifically Terminal 2—the one used by GHP as a basis for its proposal for DEN) has international passenger levels that exceed 95%; DEN international travelers currently represent less than 5% of passengers. International travelers often have lots of time to wait before they can go to their gates, so expansive concessions inside the secure area are very desirable. Domestic passengers, at least in the U.S., seem to have far less interest in high-end or other shopping or dining experiences while waiting for their flights. They simply want to get to the gate areas on the concourses as quickly as possible.

- Another issue with locating concessions is ensuring their footprint meets fire and other safety codes. The layouts that are allowable at other international airports, where passengers weave between numerous shops and dining opportunities, are generally not allowable under U.S. fire codes.
- At the time of Phase 1 construction, DEN was employing a concessions strategy—major concessions inside a secured area—that was unproven in the United States. Implementing such approaches may result in issues and conflicts between the owner and the Developer. The new Great Hall plan does not include concessions inside security.
- Knowing the customer, codes and regulations, and shopping habits is an important consideration, especially for a DBFOM P3 where the developer and owner anticipate significant revenue from concessions. Putting the concessions in the "wrong" place, and/or choosing concessions that do not align with passenger buying habits or interests, can seriously impact financial goals stated in the contract or other agreements.

Construction during the P3

PROJECT MANAGEMENT

Overview

Project management for traditional methods of construction (CM/GC, D-B, D-B-B) is relatively straightforward. The P3 method of procuring a project is most likely to be suitable when the owner wants to be less "hands-on" and complete the project in a short timeframe. Project management for P3s is inherently more complicated, with many non-traditional relationships, especially since the owner normally "gives up" much of the project management role.

In a P3 approach where the future concessionaire is also the owner, the situation is "simple"—they can do pretty much whatever they want, without significant disputes over COs. However, when the P3 approach involves an owner and a developer who is responsible for the entire DBFOM, issues are certain to arise concerning who is responsible for what, COs with costs and impacts to schedule, and how the Developer's team interacts with the owner's team.

A significant consideration when choosing the P3 method of project procurement is the reduction of project and construction management roles and obligations for the project owner. Selecting the P3 approach should be contingent on how the project will be designed and constructed. Some of the main considerations, from a project management perspective, for the owner are:

- Tolerance for risk
- Schedule
- Local market knowledge
- Desired level of involvement
- Owner's resources and capabilities
- Lack of control

Prior to selecting P3 as the delivery method for the Great Hall project, DEN staff had very limited, if any, experience with the P3 method of project delivery. Choosing a hands-off delivery method is difficult to implement even when the owner has this type of project experience. Using it for the first time certainly proved to be a challenge.

Background

DEN chose the P3 project delivery approach for several reasons, as explained in Lesson 1: Why P3. Vetting and analysis were performed prior to actually selecting GHP as the developer, designer, project and construction manager, and future concessionaire.

The majority partner in GHP, Ferrovial Airports, had significant expertise in the design and architectural aspects of P3 procurement and the management of airport P3 projects. Specific experience that led DEN to favorably consider GHP was the successful delivery of London Heathrow's Terminal 2 project using a P3/DBFOM. The GHP construction team including Ferrovial Agroman (not FAW), had worked with Ferrovial Airports to deliver Terminal 2. In addition, to provide smooth management and

government interfaces for the DEN Great Hall project, the Project team included a local construction company to facilitate the local compliance requirements and act as the GC on the Great Hall project. DEN's expectation was for the local construction company to bring local market knowledge, local project management experience, and access to M/WBEs to meet contract requirements since they (Saunders) had worked on other significant projects, such as the Westin Hotel, at DEN.

The intent of the P3 was to shift some of the risk to GHP and free-up DEN project and construction management resources, without having to draw on outside consultants for this support. Using the resources of GHP under a P3 procurement was supposed to make the best use of the owner's (DEN) resources and capabilities.

The Great Hall project also included an ambitious timeframe for completion of each phase. One of the main advantages of a P3 was supposed to be using the resources of a qualified, experienced P3 contractor (and ultimate concessionaire), with a stake in the successful outcome of the project, to accelerate the delivery and provide project management and oversight.

Given the makeup of GHB, DEN was confident GHP was bringing qualified resources to the Great Hall project—a team with significant overall P3 experience, airport terminal P3 experience, and Denver Metro area governmental and regulatory experience. However, the actual GHB team used on the project had little input from the local partner, Saunders, and Ferrovial Agroman West was a subsidiary of Ferrovial Agroman, which was bid on the project. The construction manager, a key person who worked for Saunders, left the project in 2018. Although Saunders was "at the table" for project discussions, their contribution was reduced in favor of FAW employees, who were more experienced in civil construction.

From the outset it seemed clear DEN and GHP had different perspectives on how to manage a P3 project delivery. DEN was accustomed to a hand-on approach with significant input into project management and other project aspects. GHP/GHB appeared to want minimal owner involvement and DEN believed that they intended to use COs as a mechanism to recoup cost overruns and justify schedule delays. As a result, conflicts between DEN and GHP/GHB arose almost from the outset of the Great Hall project.

Sub-topics/details

DEN had a streamlined project management team on the Great Hall project. Initially, it was difficult to coordinate between DEN and GHP during design and preliminary construction, especially when GHB was involved. Many necessary meetings were held on a bi-lateral basis rather than as multi-lateral meetings, despite the co-location of DEN, GHP, and GHB, and not all of the decision makers were present. DEN made changes to the project management in 2018 and 2019 in an effort to improve decision making and re-start the relationship. These changes were successful at improving decision-making, even if the relationship between DEN and GHB did not improve as disputes over items like the concrete continued.

The DEN project management team had little or no management level input into the Developer selection process. However, the team was involved from the perspective that various subject matter expert groups were included in the selection process to review the portions of the bids related to their specific role. They provided their opinions, recommendations, and items the selection panel should further investigate. As the group that would ultimately coordinate with the selected contractor, additional input could have been very valuable, especially in terms of questions to ask and areas to vet.

Two key personnel left early in the project and were replaced with less experienced personnel. Of particular concern was the departure of the GHP Executive Director—he left immediately after the design process began. He was the person with specific Terminal 2 P3 experience. The GHB Construction Manager, who was from Saunders and had local experience, retired in 2018 and was replaced by someone from FAW who had civil (toll road) but not vertical experience.

In most cases, the replacement personnel did not have vertical construction experience, airport experience, or a P3 background. As consequence of this turnover, there were delays in requests from GHB, rushed requirements, vague COs, and schedule delays. As discussed in *Lesson 2: Construction Approach and Change Order Management* and listed in Table 3, these issues had a major impact on the project and generated approximately 20 major, and a number of minor, COs.

The Lessons

Project management, coordination of roles and responsibilities, and identification of key personnel are critical to a successful P3 project delivery. The roles and responsibilities need to be defined, agreed to, and placed in writing (in the DA and other contract documents) prior to starting project delivery. Then these roles, responsibilities, and agreements need to be enforced. The key lessons from DEN's project management experience on the Great Hall project P3 include:

- Empower the entire project team rather than just top management. Include intended members of the project team in the entire procurement process, including evaluation of proposals.
- Beware of the temptation to micro-manage or retain too much control. At the same time, regular interaction, especially with construction project manager(s) is essential.
- Ensure very clear lines of control and decision-making authority and communications and have an escalation process for dispute resolution—in writing and signed by all parties.

- Co-locate the owner and project teams to facilitate communication, and then work to ensure communication happens and concerns are dealt with promptly.
- Create, and keep together a team of legal, technical, and financial advisors to consult on the project from writing of the solicitation, through evaluation of proposals, to project design and construction. These administrative personnel are the ones who must implement, oversee, and live with the consequences of project activities and issues.
- Require the contractor and its partners and subcontractors designate (by name and title), the key personnel on their project management team. Then enforce this requirement.
- Include, at the DA or similar level, a requirement for a milestone-based schedule that integrates all aspects of design, construction, oversight, and other project and construction management.
- Have a qualified, properly empowered project management team to assist with in developing a project and making the decisions on project details. This expertise could come from internal staff or an independent third-party provider.

PROCESSES AND PROCEDURES

Overview

Coordinating a P3 project with a variety of domestic and international team members and experience levels is a complicated process. This coordination process is made even more complex when the project owner has not previously implemented a P3 project delivery. A structured, detail-oriented approach to a P3 project needs to begin during the developer/designer and construction contractor selection and development process. Effective project processes and procedures ensure a team that works smoothly, understands the other members, and knows how to handle contract obligations and responsibilities.

One of the most important elements of a successful P3 project is the DA. Equally important is the selection process for the contractors who will be parties to the DA. Finally, since the selected developer and its team were going to include an international component, processes and procedures are essential for smooth integration of the contractors and the owner's representatives into a true team.

Background

During the selection process for the developer/designer and their chosen construction team, DEN placed great emphasis on the credentials and qualifications of the team and the make-up of the members of the team. Since DEN did not have P3 experience, they sought out a team with significant, directly relevant experience in airport P3 construction projects. However, construction firms with P3 experience are in very short supply in the United States. While Saunders brought local experience to the Great Hall project, they did not have the requisite financial depth to meet their initial commitment to GHP.

For the reasons outlined in *Lesson 1: Why P3*, DEN chose to retain ownership but use a DBFOM approach with a developer who would continue to operate and maintain the concessions in the Great Hall for 30 years following completion of construction.

The selection process included evaluations by various experts including technical teams, legal specialists with P3 experience, and financial experts to evaluate cost reasonableness and VfM. In addition, members of DEN's executive team personally inspected and assessed samples of the potential contractor's P3 project(s), including site visits to Terminal 2 at London's Heathrow airport in the United Kingdom, facilities in Spain, and international airports (primarily in Asia).

After discussions with Ferrovial Airports and the other potential contractors, completion of the site visits, and detailed reviews and assessments by the aforementioned experts, DEN selected Ferrovial Airports' GHP as the contractor and future concessionaire for the Great Hall project. Both GHP and its sister construction entity, Ferrovial Agroman, had P3 contract delivery experience, most notably with Terminal 2 at London's Heathrow Airport. The various experts considered the proposed approach, based on the 30% design provided by DEN, and the anticipated costs, based on a lengthy set of specifications, to be reasonable.

The DA and other contract documents contained a number of provisions, most notably those related to M/WBE participation and obtaining permits, inspections, licenses, and other regulatory or compliance requirements. DEN's expectation was that the inclusion of Saunders Construction as a key member of the construction team—GHB—would smooth the way to meeting these requirements.

Sub-topics/details

A number of processes and procedures either were not in place or were followed loosely or not at all. If processes and procedures were fully implemented, many of the problems encountered on the Great Hall project would likely have been avoided or significantly minimized.

VETTING POTENTIAL DEVELOPMENT/DESIGN AND CONSTRUCTION CONTRACTORS

DEN met with representatives of GHP during the selection and DA process. A team of technical, financial, and legal experts reviewed agreements and GHP's cost estimate and deemed everything to be reasonable. Key staff from DEN visited a number of international airports that had been constructed by the bidders and/or using the P3 contract delivery method (or both) to view the results.

The proposed team from GHP, with its primary construction entity Ferrovial Agroman, appeared quite strong on paper. Ferrovial Airports and Ferrovial Agroman had recently completed a major demolition and reconstruction project (Heathrow Terminal 2) under a P3 procurement with outstanding results. However, closer vetting of this process, and direct calls to references, would have revealed a number of problematic areas. A few of the main concerns:

- Terminal 2 at Heathrow Airport is not owned by the City of London. It is owned and financed by a consortium of investors (~75% owners) and Ferrovial Airports (~25% owner). This ownership structure is not inherently a problem, but as a basis for evaluation, comparing "apples to apples," it raises a "red flag." As an owner and controlling partner in the venture that built and now operates and maintains Terminal 2, Ferrovial Airports did not have to contend with a separate owner for scope or design "creep," cost overruns, design changes, or COs. Any of the preceding issues were internal problems to be resolved within its ownership group (Ferrovial S.A.).
- Not so with the Great Hall project. GHP and GHB could treat even minor changes, or changes to meet airport requirements, as out-of-scope and then generate a CO to cover costs.
- Terminal 2 had some challenges since it was part of an active airport. However, aside from some issues with ensuring access roads were not blocked, Ferrovial Airports and its team were able to operate without having to consider the need

to keep the terminal operating (at full or any capacity) during demolition and construction. Terminal 2 was empty. It was razed to the ground and completely rebuilt. There were no passengers and no operations at T2 during demolition and construction. While not having the use of that terminal was an inconvenience to passengers, not completing work on the planned schedule was not the problem construction delays would present at DEN.

REPLACING TEAM MEMBERS AND/OR KEY PERSONNEL

The DA used for the Great Hall P3 project left many openings for friction between GHP/GHB and DEN. The language in the DA often used the permissive "may" rather than "shall/must" to indicate something is required.

As a result of this language and other DA provisions, GHP was able to change personnel early in the project, for example by replacing a project manager who delivered the Terminal 2 P3 with someone who had little or no airport or vertical P3 project experience. In addition, GHB was able to reduce the role of the local GC, Saunders Construction, without approval from, or justification to, DEN or GHP.

PERMITS, INSPECTIONS, FIRE CODES, AND SAFETY

As outlined in *Lesson 9: Government Interfaces,* airport construction required following numerous policies and procedures for obtaining regulatory- and compliance-related approvals and permissions. Once Saunders Construction was effectively precluded from handling these interfaces, GHB did not understand the processes and procedures required to gain these vital approvals and permissions. This lack of experience led to cascading delays since one permit and its associated inspection(s) drives the process for another permit, and so forth.

MINORITY AND WOMEN'S BUSINESS ENTERPRISE UTILIZATION

City and County of Denver projects, such as at DEN, have a significant M/WBE participation requirement. In the case of the Great Hall project, these requirements were 33% of the contract amount during the development/design phase and 17% during the construction phase. As with other contractors, the work of M/WBE vendors needs to be incorporated into project and milestone schedules. Bringing these vendors in ad hoc is not feasible or effective. Without an identification and on-boarding process, it was difficult to meet the M/WBE participation requirements. GHB's minimizing of Saunders affected GHB's performance meeting M/WBE requirements. Specific details about this utilization shortfall are provided in *Lesson 8: Project Schedule*.

TEAM BUILDING

The DEN Great Hall project brought together team members from very diverse backgrounds and cultures. The experience level of various members in terms of similar projects, P3 experience, local experience, and so forth was quite disparate.

The DEN and GHP/GHB teams did a limited amount of team building, but a much greater investment in this activity at the outset of the project was likely warranted.

MANAGING AND MINIMIZING CHANGE ORDERS

Lesson 2: Construction Approach Including Change Order Management addressed many of the issues that caused the 20+ major COs during Phase 1 of the Great Hall project, prior to termination of GHP/GHB.

DEN did not anticipate, and perhaps did not fully understand, the potential cost and schedule impacts of its design decisions and delays in accessing decision makers. In some respects, this was because GHB's COs sometimes didn't include the cost or time involved with the proposed change, making it hard for DEN to evaluate the impacts. The DA gave DEN significant input into design and other decisions, but DEN was responsible for exercising this authority in an efficient and effective manner. They could have provided detailed specifications to GHP, along with an explanation of U.S. airport standards for construction, design, materials, and so forth, and allowed the designers to proceed. Including milestones and other schedule details as a required deliverable is an important part of the process for reducing, if not eliminating, COs.

At the same time, GHP/GHB insisted the design had to be based on the level of detail provided at the 30% design level, despite the detailed specifications included in the DA. Consequently, GHP was continually presented with COs from GHB. These COs were often vague or unjustified. No allowance was made for handling or managing COs.

The Lessons

When implementing a new project delivery method and bringing on an international team, processes and procedures are essential to ensure everyone is working to the same set of requirements and goals with the same expectations. Every project has different needs and goals, and different jurisdictions have their own regulations and compliance requirements. Having clearly defined processes and procedures in place to facilitate understanding and meeting these needs, goals, and requirements is essential to effective project delivery—especially for a P3 with an owner that does not have P3 experience. The key takeaways from this lesson are:

- Vet all the potential team members. Check references. Look at each entity's website and then dig into the relevant projects listed. Be concerned if none of the projects listed are relevant to your project. Read through the applicable articles in the entity's hometown news website and the news website for the location where their "past performance" projects are located. As an example, there are literally hundreds of articles in The Denver Post about the renovation of the Great Hall and other airport projects. These articles often include links to

specific documents such as construction reports published by the contractors (*see the examples in Attachment 1: References and Reading*) and letters exchanged between owners, stakeholders, contractors, and other parties. This vetting process is time well-spent. Develop a checklist and make this both a process and a standard procedure on future procurements of any type.

- Local jurisdictions have detailed requirements for obtaining permits, getting inspections, resubmitting requests, meeting fire codes, and so forth. Many cities' building permit departments have very well-organized, step-by-step processes for wending through what can be a difficult process. Turn their materials into a checklist and use that going forward.
- Consider requiring a GC with local experience as part of the team, and then require the team use the contacts, personnel, and capabilities of that GC. Permitting and other processes are much simpler, and the government staffers involved easier to deal with, if you have someone who has "been there, done that, got the permit, and passed the inspection." Going in to the permitting and related processes without your own plans in place can make for a very frustrating project.
- Many governments, at all levels, require some level of M/WBE and/or other small/disadvantaged business participation in their contracts. A local partner with contacts in this community can greatly enhance the process of identifying and contacting suitable M/WBE or other partners and vetting them.
- Take the time to do team building before getting to work. Different companies have different values, cultures, experiences, approaches, and so forth. Team building helps establish a common baseline, set of rules, and organized processes and procedures for meeting contract goals. Team building and cultural awareness training can be especially valuable when you are part of an international project delivery team and/or the contract delivery method is new to the owner and/or the developer/designer/constructor.

Jeppesen Terminal, after phase 1 renovation, completed by DEN after terminating the P3

PROJECT SCHEDULE

Overview

The Great Hall project started with a pre-DA in mid-2016. After a year of negotiations, the DA was executed in August 2017. In July 2018, construction began and was supposed to be finished by 2021 at a cost of ~$650 million. The project had issues and problems from the outset. Concerns about the strength of the concrete in the terminal, coupled with COs from GHP based on DEN modifications and slow decision-making, caused GHP/GHB to project a $311 million cost overrun and a projected delay of as much as three years. From the outset, there were questions from stakeholders and others about the feasibility of the planned schedule for the Great Hall project. Questions were raised about the level of staffing for DEN's team, as well as for the GHP/GHB team.

"Moody's said the failed relationship between DEN and Great Hall highlights the risk inherent in using public-private partnerships (P3) for some projects, especially those with the relatively higher risk of 'designing for and building in a dynamic operating environment,' such as the airport, which has remained open during the project[...] Moody's added that P3 projects for construction of new assets are likely to see more success."[ix] A major risk, as DEN and GHP/GHB discovered, was schedule impacts due to unexpected construction issues, large numbers of COs, safety concerns, and insufficient staffing levels on the part of each team member.

Background

DEN and Denver's government felt the time was right to try a P3 procurement when the need to expand capacity and enhance safety at Denver's airport became increasing apparent. The airport was opened in 1995 with an initial annual passenger volume of 25 million people and a design meant to handle up to 50 million passengers per year. However, passenger levels by the 2010s were exceeding 50 million per year, and as recently as 2021 were close to 70 million.

From mid-2015 to early 2016, DEN and proposers engaged in discussions to determine the scope of services to be included in the Great Hall project and the contract delivery method, ultimately settling on the P3 DBFOM. The solicitation was released, and proposals prepared and received following these discussions.

Sub-topics/details

Pre-development activities, including preliminary design, took place from August 2017 to July 2018. Design activities continued and construction started in July 2018. By February 2019, a monthly report from GHP showed there would be a 10-month delay on the project, extending the completion date from November 3, 2021 to August 30, 2022. This delay was attributed to concrete samples from the Great Hall floor that seemed to show unacceptable weakness. By April 2019, GHP indicated the concrete issues could

delay the project an additional eight months, pushing completion to May 2023. The June 2019 construction report indicated the Great Hall project would likely be finished at least 2.5 years behind schedule (May 2024). DEN investigated the concrete issues, and its engineers and consultant found the floor could support the weight of the construction materials. In July 2019 DEN sent a letter asserting that GHP breached their contract and stated GHP needs to address concerns including fire- damaged escalators caused by GHB's demolition, cleaning delays, and concerns about M/WBE compliance (see Table 3). A large number of other issues were also raised at this time. In August 2019, a safety audit found that GHB's construction zones had places with incomplete guardrails, holes in scaffolding, and missing toe boards. In some areas, controlled by GHP, the audit stated passengers could be hit on the head with falling debris, and that in some places, wires dangled from the ceiling, presenting a risk of electrocution.

In addition to the construction-related delays, GHB was well behind the required M/WBE contracting levels. A letter from DEN indicated that of the $50.6 million GHB had paid in professional services costs, only $4 million had gone to minority- and women-owned firms. At eight %, that amount was well short of the 33% contractual goal for the design and development portion when GHP bid for the project. GHB had only paid $3.0 million of out of the $105 million it committed to paying M/WBEs for construction work.

DEN conducted a six-month investigation into GHP/GHB's claims about weakened concrete; the end result was a determination the concrete was adequate and that additional risk mitigation, by using spider cranes instead of traditional cranes to set steel, would further alleviate concerns about the concrete.

DEN also indicated current staffing levels at GHB were not sufficient to meet the Great Hall project schedule.

The construction contractor, GHB, did not take much, if any advantage of the contacts, experience, and capabilities of its local GC partner (Saunders Construction). This experience could have greatly improved the process of meeting M/WBE participation requirements and obtaining permits and inspections. In addition, GHP would have been made aware early in the project that their proposed design for the concessions inside the secure area of the Great Hall would not be feasible since the design/layout did not meet fire or safety codes. Unique designs and contractors who are unfamiliar with local permitting processes can also impact schedules.

While the contract set the project's completion date in November 2021, GHP had warned that it might not be able to finish the project until as late as mid-2025. GHP also projected costs could soar by more than $300 million.

DEN and GHP attempted mediation but were unable to reach any agreement, so on August 12, 2019, DEN submitted a notice of termination of the GHP contract for DEN's convenience.

Figure 4 is a snapshot of several pages from GHP's April 2019 Construction Report. A link to the full report is provided in the *References and Reading* section.

Great Hall PARTNERS

1 PROJECT SCHEDULE

1.1 Milestone Schedule

Task Name	March Schedule	February Schedule	Initial Baseline Completion
Developer Execution Date	July 26th, 2017	July 26th, 2017	July 26th, 2017
Effective Date / Commercial Close	August 24th, 2017	August 24th, 2017	August 24th, 2017
Financial Close	December 21st, 2017	December 21st, 2017	December 21st, 2017
NTP 1 per DA 5.6 - All Administrative Requirements Due	December 27th, 2017	December 27th, 2017	December 27th, 2017
NTP 2 per DA 5.7 - All Administrative Requirements Due	July 6th, 2018	July 6th, 2018	June 26th, 2018
Construction Commencement	July 11th, 2018	July 11th, 2018	July 30th, 2018
PHASE 1 – MOD 2	March 17th, 2020	March 9th, 2020	May 1st, 2019
PHASE 2 – MOD 3	April 6th, 2021	December 9th, 2020	January 30th, 2020
PHASE 3 – MOD 1	April 20th, 2022	August 26th, 2021	October 23rd, 2020
PHASE 4 – MOD 1&3	May 8th, 2023	September 9th, 2022	November 3rd, 2021

The current forecasted delay, according to the preliminary schedule provided by the D&C Contractor, is 383 Working Days / 551 Calendar Days and does not account for project schedule impacts related to certain compensation events currently being discussed with the Owner (other than Relief Event 6 as noted below).

The projected schedule set forth above represents the D&C Contractor's current preliminary estimates and is subject in all respects to further review, analysis, modification, and investigation of possible mitigation efforts (e.g., sequencing, construction methods) and ongoing discussions with the Owner in respect of the compensation events related thereto.

The Owner, Developer, and D&C Contractor are collaborating in good faith to evaluate the above preliminary schedule impact further.

The addition of 167 Working Days / 241 Calendar Days between the January to February schedules stems from estimated changes in the construction methodology and potential related timing impacts thereof due to Relief Event 6, discussions in respect of which are still ongoing with the Owner and subject to confirmation.

The above preliminary schedule shows the latest information assessed as of today by the D&C Contractor, further assessment is ongoing. In particular, as noted above, the Developer (including involving its D&C Contractor) and Owner are currently in discussions regarding the impact of certain compensation events in addition to Relief Event 06. Once such discussions are finalized, there may be additional impacts on the construction schedule set forth above.

3.4 Compensation Events & Change Directives

As noted in Section 1.1 hereof, the Owner and Developer (including through its D&C Contractor) are currently in discussions to assess and seek a resolution regarding the schedule and monetary impact of Relief Event 6, other Compensation Events, and Change Directives.

As also noted in Section 1.1, the preliminary schedule set forth within this update is the D&C Contractor's current preliminary estimates and is subject in all respects to further assessment, analysis, review, modification, all of which is ongoing, as well as the D&C Contractor's ongoing investigation of possible additional mitigation efforts (e.g., sequencing, construction methods, etc.). In particular, the above preliminary schedule assumes expedited design iterations and Permit approval processes. The achievement of such timeline assumptions, in certain cases, may depend on third party approvals over which the Developer has no control and agreement by the Owner with the proposed mitigation measures necessary to achieve such timing assumptions. If such expedited iterations and permitting processes cannot be achieved within the timeframes assumed by such assumptions, the above schedule will be impacted at least by an additional 160 Working Days / 233 Calendar Days. This additional 233 Calendar Days will impact Phase 1 (120 days), Phase 2 (163 days), Phase 3 (210 days) and Phase 4 (233 days).

Figure 4: Snapshot of GHP April Construction Report

The Lessons

In the case of the Great Hall P3 project, there were too many unknowns since the GHB construction plan was not vetted by DEN or its financial/technical/legal consultants, making the schedule potentially too ambitious, especially with new contractors and an untried procurement approach, particularly in a 24/7/365 operating environment.

Allow extra time for permits for the intended design, especially when using "innovative" designs such as that for the concession area.

Having an integrated schedule with milestones and project specifics as part of the DA is one way to alleviate some of the schedule problems.

Ensuring the costs proposed by the developer and its team are actually realistic can serve to preclude the developer or its team from seeking out (non-) issues as a way to generate expensive COs and extended schedule delays.

The DA should have enforceable language ("shall/must") rather than permissive language ("may") and enforceable penalties for non-performance, delays, or other issues.

Ensure a local GC maintains the interfaces with local authorities to expedite the process of getting permits and inspections.

Jeppesen Terminal, day of termination and handover back to DEN in 2019

GOVERNMENT INTERFACES

Overview

A project of the nature and scope of the DEN P3 required extensive interfacing with local governmental organizations. At the local level there were numerous permitting, inspection, fire, safety, and similar requirements and M/WBE participation requirements. At the federal level there were TSA requirements since the entire security screening area was being relocated and the queuing process for screening was being modified.

Working with partners (GHP and GHB) from an international (European) vertical project delivery background presented unique challenges and perspectives during the permitting and inspection process. To manage these challenges, GHP included Saunders Construction as a key member of the project team. Having design and construction partners who were familiar with these requirements and how to move paperwork smoothly through the system was considered an essential requirement for the success of the Great Hall project.

Most building projects in the Denver Metro require general construction permits as well as trade- specific permits, like electrical, mechanical, and plumbing permits.

Before permits are issued, a plan reviewxi is required to evaluate the project and ensure it will meet building, zoning, and fire codes.

Background

PERMITS, INSPECTION, AND FIRE CODE CONSIDERATIONS

The City has an extensive permitting, inspection, and safety requirements process for major construction and renovation projects. While the requirements are significant, the process is relatively straightforward for companies with experience on projects in the Denver Metro area. The City's permitting and inspection process ranges from about two weeks to over eight weeks for each type of permit required (and much the same again if additional rounds are required), assuming the process was handled properly by a knowledgeable person with a complete package of required and supporting information. Scheduling required inspections adds several more weeks to the process for each permit. The various permit and inspection applications can be made concurrently in many cases. The Denver Building Department suggests allowing at least two to three months for review of a project. Much of the process has been put online, making the process less time-consuming.

Fire code regulations for facilities such as DEN's Great Hall presented a challenge to the developer/designer since much of their approach to generating future concession revenues was based on the European airport approach: extensive shopping and dining opportunities that necessitated the passengers weave through artfully laid out concessions designed to encourage spending both before and after the security screening area. The reality, based on the new location of the security screening area and the safety requirements imposed by Denver Fire Department codes, meant the concessions would have to be located inside the secure portion of DEN and had to allow clear lines of sight to ensure ease of evacuation during a fire or other disaster.

Figure 5 shows the main types of permits required, with the time estimate for one depicted. Using the Denver Building Department's online tool should have enabled GHB to plan an integrated process for obtaining necessary permits and inspections, since many aspects of construction, permits, and inspections are inherently dependent on one another for completion and compliance. Failing to apply for the "right" permits and inspections in a logical, timely manner could have a major impact across all aspects of a project such as the Great Hall renovation.

Figure 5: Sample Denver Plan Review Times

One of the primary perceived strengths of GHP's proposal was the inclusion of Saunders Construction as a member of the GHB team and of Saunders Concessions as a member of the GHP team. As a long-time Denver metro area GC, the Saunders Construction project management staff was expected to bring invaluable experience navigating the permitting and compliance maze and meeting the M/WBE requirements, to the benefit of GHP and GHB, as well as DEN. In retrospect, the potential value of a local GC was outweighed by the value-added a GC with P3 experience, overall greater financial strength, and the ability to work effectively with the project Developer's constructor would have increased the likelihood of successful delivery of the P3.

MINORITY- AND WOMAN-OWNED BUSINESS ENTERPRISE REQUIREMENTS

The City requires significant M/WBE participation on construction contracts such as the Great Hall renovation. The M/WBE participation requirements (percentage of contract value) at the time of contract award were approximately 33% during the pre-development/design phase (mid-2017 to mid- 2018) and 17% during the subsequent construction phase.

The Denver Division of Small Business Opportunity (DSBO) was responsible for assisting GHP and GHB with understanding and meeting the M/WBE requirements on the Great Hall project. DSBO normally assigns someone to the project; this person doesn't co-locate because they are assigned to multiple projects. They monitor participation via subcontracts and payments to subcontractors via DSBO's reporting tool. Contractors on larger projects often hire a consultant as part of their team to do their M/WBE outreach and assist with contracting. DSBO had the resources and M/WBE company information to support GHP and GHB in selecting, vetting, and contracting with suitable M/WBE partners.

GHP and GHB, with the exception of Saunders Construction, did not have any experience with the M/WBE process. GHP was ultimately able to meet its 33% M/WBE participation requirement, but this amount was much smaller in dollar terms than the 17% requirement during the construction phase. GHB did not appear to understand the requirement for M/WBE participation or the role its partner, Sanders Construction, or DSBO could play in bringing suitable M/WBEs to the project to meet the participation goal during construction.

FEDERAL/TSA REQUIREMENTS COMPLIANCE

As discussed in several of the other LLs, safety and security are of primary concern to both TSA and DEN. One of the considerations for moving the security screening area to Level 6 of the Great Hall was to preclude security breach or other incidents. Another consideration was the goal to eliminate long, winding security screening queues by moving groups of passengers awaiting screening into "pods" accommodating approximately 30-40 people to help meet the airport's future growth. The renovated Great Hall layout included space for these pods; this space was not readily available or easily secured with the existing layout.

The Lessons

Meeting permitting, inspections, fire code, M/WBE, and other compliance-related activities are both time-consuming and essential. Working with contractors and their partners that have limited domestic experience and no significant experience with these processes in the Denver Metro area added further complications to the compliance and regulatory processes. Having local partners with hands-on experience and resources can go a long way toward managing compliance activities and avoiding delays, misunderstandings, and omissions, provided the concessionaire and its partners take advantage of these capabilities.

Several considerations to mitigate these compliance (or regulatory) issues on future projects include:

- Require the contractor and/or developer to provide detailed, integrated plans for obtaining permits and inspections, meeting fire codes, and meeting M/WBE or similar small and disadvantaged business participation requirements either as part of the proposal or early in the pre-development/design phase. Ensure these plans are based on realistic timelines agreed to by the reviewing/approving authority. Require the plan in writing—there are so many "moving parts" in a project of the scale and scope of the Great Hall renovation. This plan is especially important when team members are not experienced with Denver Metro (or other metro area) processes and procedures.
- Develop an approach to ensure key people and partners proposed for the construction phase of a project are actually present on the project for the duration and used effectively. Have the developer include a detailed plan for any replacement of key personnel or team members to ensure compliance and regulatory requirements continue to be handled in an appropriate and timely manner.

- Allow extra lead and coordination time since current and recent market conditions have greatly slowed the preceding processes and many of these activities are interlinked. If not familiar with the local permitting process, consider hiring a knowledgeable specialist or work with a local company with experience in the process.
- Have a plan in place to ensure developer/designers/constructors who are not familiar with local M/WBE, or other small/disadvantaged business enterprise requirements are able to understand and meet compliance and participation requirements. Consider a training program for the team members to familiarize them with the intricacies and specifics of these small and disadvantaged business program requirements.
- Consider co-locating DSBO or similar entity with the partners and project management staff for ease of coordination and support.
- Keep in mind international concessionaires and partners, as well as companies from other parts of the U.S., may not have, and therefore may not understand, M/WBE contracting requirements and goals.

Jeppesen Terminal, day of termination and handover back to DEN in 2019

PUBLIC SECTOR/ TRAVELING PUBLIC IMPACTS

Overview

The DEN Great Hall Project, when completed, is intended to provide a smoother, more efficient, safer experience for the traveling public and those picking up/dropping off people at the airport. It is also providing a more robust shopping and dining experience for passengers once they have cleared the TSA security checkpoint.

The first phase of the project renovated the center portion of Jeppesen Terminal—the Great Hall—on Level 6 to create new check-in space for United, Southwest and eventually Frontier Airlines. The renovations created a more modern check-in experience and added more capacity in the terminal, improving operational efficiency.

The completion of Phase 1 brings many features and benefits for passengers including:

- More space: An additional 31,000 square feet of space on Level 6 of the Jeppesen Terminal and approximately 158,500 square feet of renovated space.
- Modernized spaces with flexibility for the future: New ticketing areas at the south end of Level 6 with 86 automated self-bag drop units to streamline the check-in process.
- Better restrooms: Four new restrooms plus upgrades to existing restrooms.

Concurrently, the early bag drop service pioneered at the airport rail line at DEN has been expanded to include two additional bag drops, enabling passengers to check-in their baggage at the points where they first arrive at the Great Hall rather than having to take everything to the Level 6 check-in area.

The TSA screening area is being relocated from Level 5 to Level 6 of DEN and the check-in areas and passenger drop-off remain on Level 6. Level 5 was planned to offer expanded concessions and shopping facilities with a separate area for baggage claim, and meeting and greeting customers. Passenger pick-up areas are outside on Level 4 of DEN. Access to the trains to concourses will be via long escalators to go from Level 6 to Level 5 and on Level 4 (the train level).

Some initial Phase 1 work was performed under the original GHP contract (see Figures 5 and 6). The remainder of Phase 1 has been completed under the contract awarded to Hensel Phelps following termination of the GHP contract. The remaining Phase 2/3 work is beyond the scope of this LL.

Concessions outside the secure areas of DEN are very limited. The original intent of the GHP contract was to greatly expand shopping and restaurant facilities inside the secured areas, with significant retail in particular, but the re-scoping of the Great Hall project subsequent to the termination of the GHP contract has eliminated most, if not all, of the consumer facilities inside the secure areas of DEN. Instead, the majority of concessions will be on Level 5 of the renovated Great Hall, accessible to the general public.

Background

Travelers often had to either walk along the outside of Level 6 or go up and down via escalators to bypass closed curb areas in the Level 6 passenger drop-off area due to construction closures. At any given time, approximately one-third of the curb area was closed. While these detours and options were signposted, the majority of travelers had difficulty navigating the detours. Disabled travelers, in particular, found the detours onerous and strenuous. Other passengers indicated they did not feel safe navigating sometimes irregular or uneven surfaces inside and outside the Great Hall.

Creating a renovated and expanded space inside the existing footprint of the original Great Hall seriously, but not unexpectedly, created inconveniences and disruption for the traveling public. This disruption was unavoidable, regardless of whether the work was performed by the original P3 concessionaire or the current CM/GC. The DEN website, www.flydenver.com, provided construction maps and updates, a newsletter, and various other useful information for passengers. Other large maps showing the closures were printed on construction walls showing the detours. DEN also launched a Great Hall Project Dashboard, subsequent to termination of the GHP contract, to enable passengers to track the status of renovations and construction and better plan their trip to and through DEN.

Snapshots (circa 2019) of the construction and obstructing partitions are shown in Figure 6 (Level 5: security, baggage claim, access to trains to concourses, and arrivals) and Figure 7 (check-in). A snapshot of the March 2022 version of the Dashboard in shown in Figure 8.

World class international airports feature extensive shopping and dining/drinking opportunities both before and after security screening. For the most part, U.S. airports, even those with large international operations, are much more limited in their offerings, particularly in the public, non-secure, side. Since a significant proportion of the U.S. traveling public is the domestic market, the demand for duty-free and luxury goods shopping and fine dining is naturally more limited than in markets such as Europe and Asia. In the case of DEN, there were just over 69 million passengers in 2019, but only 3.2 million (or about 4.6%) were traveling or connecting internationally. However, there was still a large demand for dining options pre-security. The traveling public, their non-traveling companions, and DEN employees expected the offerings that existed before construction started to continue to be available.

Figure 6: Construction and Barriers on Level 5 of DEN

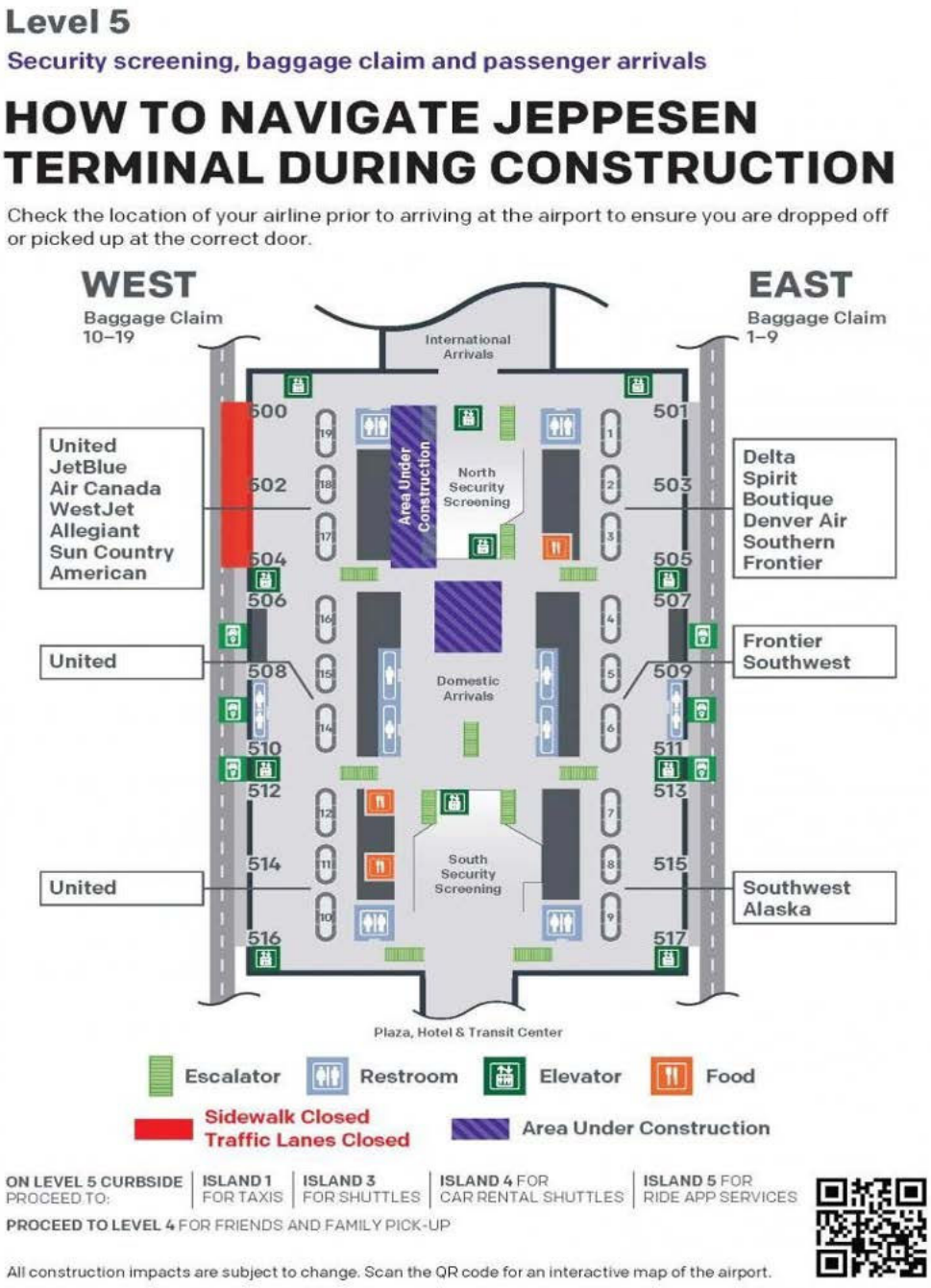


Figure 7: Construction and Barriers on Level 6 of DEN

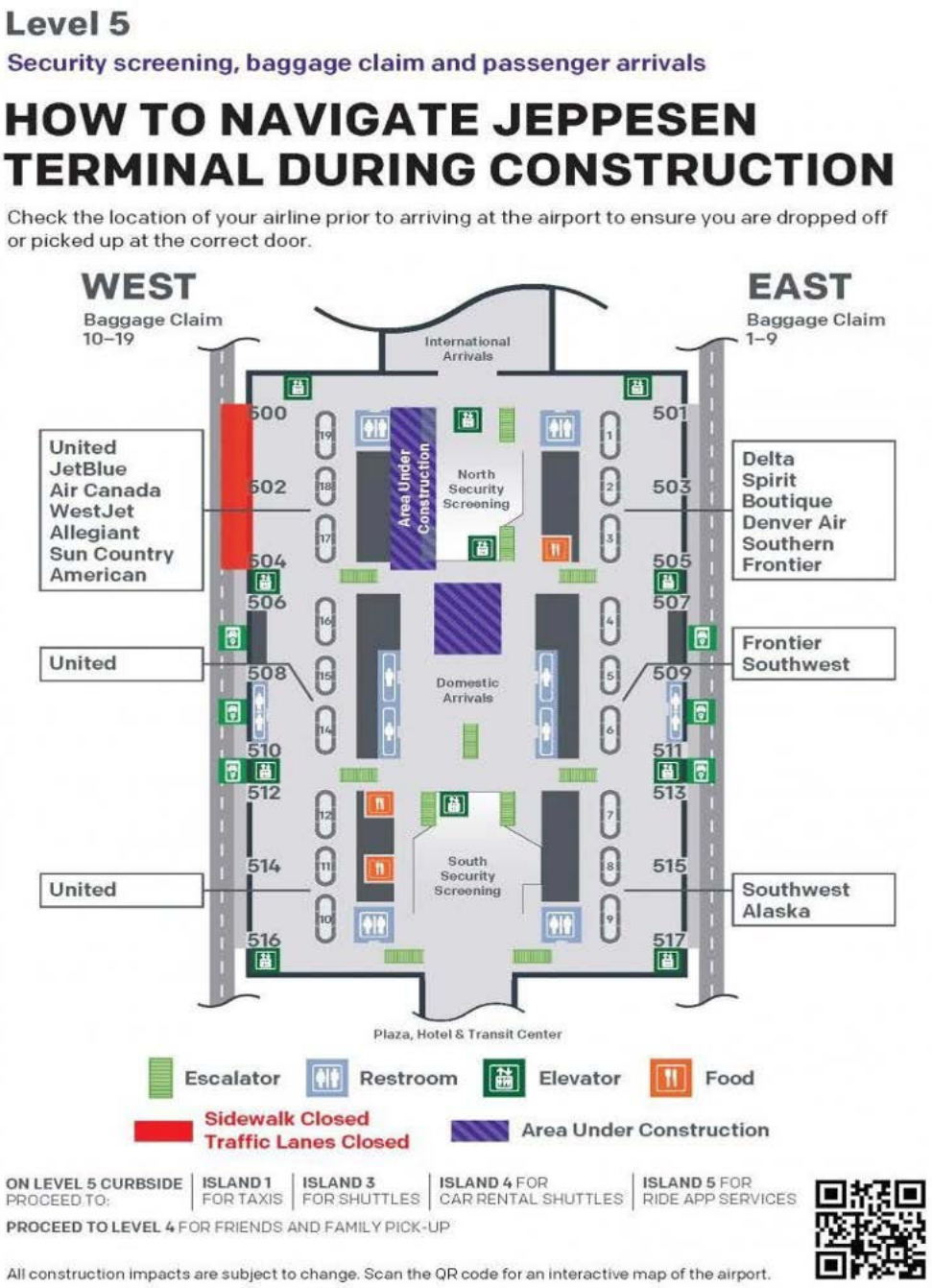
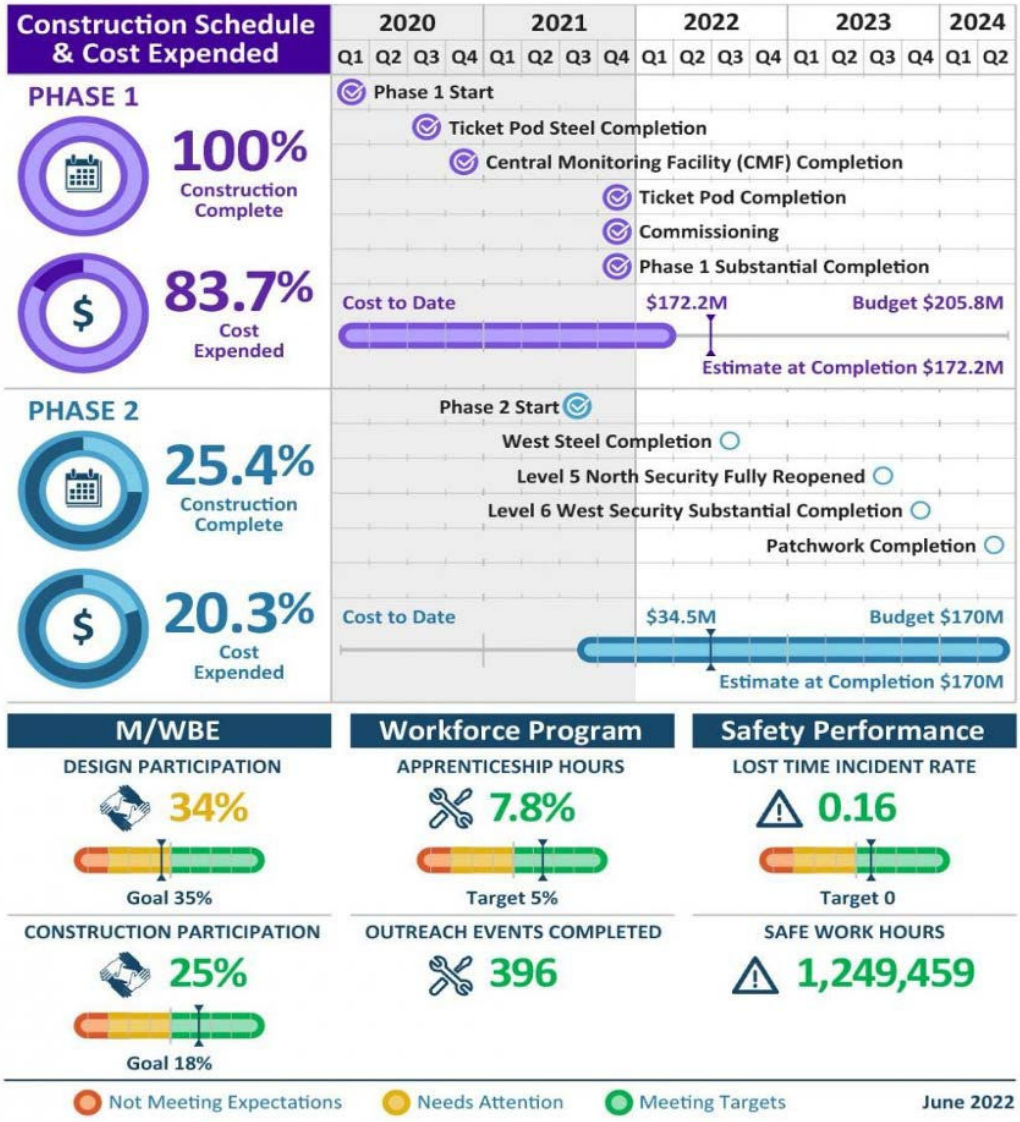


Figure 8: June 2022 DEN Construction and Renovation Dashboard



Sub-topics/details

Inconvenience to the traveling public was anticipated, but the extent of the disruption and potential safety risks appears to have been less severe than expected. One reason for this reduced impact is that DEN offered a program for employees to earn overtime working in a customer service role helping passengers navigate the terminal during the peak travel times. These employees, outfitted in "purple shirts," provided greatly expanded services to assist and direct passengers about ways to get around the construction. Even during the height of construction and its associated inconveniences and hassles, travelers continued to rank DEN as one of the top five mega airports in the U.S., according to annual J.D. Power surveys.

The Lessons

Overall, the experience of the traveling public at DEN during construction was no worse than would be expected during a major renovation project. The biggest issues were (1) the inconvenience of getting accustomed to the reconfigured TSA security areas, knowing the change was only temporary, and (2) navigating the ups and downs and all-arounds of the very impactful construction detours.

Jeppesen Terminal, day of termination and handover back to DEN in 2019

Newly renovated Jeppesen Terminal, completed by DEN

CONCLUSIONS
AND RECOMMENDATIONS

Conclusions

The DEN Great Hall Program may have been better served had it started out using a traditional D-B-B or CM/GC contract delivery approach. DEN had the financial resources and significant experience with both delivery methods; it had little to no experience with delivering a project via a P3 contracting approach. GHP had P3 and airport experience, but not in the environment or under the ownership conditions applicable at DEN. The GHP key person who ended up on the project after the Executive Director in the bid was removed did not have airport P3 experience or vertical construction experience. The initial GHB Construction Manager, who was a key person, also left and the replacement did not have experience with a project like DEN's Great Hall.

The DEN team worked well together. Initially, relationships with GHP were strong and amicable. However, as the project progressed and the involvement of the constructor, GHB, increased, this working relationship deteriorated into a contentious and adversarial one. DEN staff were too controlling, acting more like this was a D-B-B or CM/GC project, with a tendency to micromanage and make changes that were outside the allowances for finishes, materials, and so forth. While the DEN and GHP/GHB teams were co-located, communications were limited. Rather than having group discussions, many discussions and resulting decisions were made unilaterally by DEN or GHP/GHB. After the project leadership changed for DEN in 2018 and 2019, these conversations occurred regularly, but still were strained. Saunders, although a member of GHB, was often excluded from discussions, impacting their ability to function as a GC or interface with local permitting and other authorities.

Nevertheless, once the parties got to termination, they were able to resolve the termination cooperatively and professionally without additional disputes or litigation. This is an important lesson for parties going forward, even in a termination. DEN's transition to an owner-led project that recently delivered Phase 1 ahead of schedule and under budget demonstrates to the industry what a successful post-termination project looks like. DEN's decision to terminate the relationship likely avoided compounding challenges and allowed DEN to continue with the necessary improvements.

The P3 approach to project delivery needs to be very carefully weighed against traditional (D-B, D-B-B, and CM/GC) project delivery methods. In particular, industry examples and experience suggest that when the VfM analysis doesn't indicate at least a 10% potential cost savings and/or a significant reduction in the anticipated time to complete the project, traditional means may be more suitable. The VfM analysis conducted by DEN and its advisors did not favor or reject a P3.

The cost estimates and negotiated cost were not realistic. The technical requirements, particularly in terms of airport-specific requirements, were ill-defined, despite the thousands of pages of specifications included with the DA. DEN staff lacked both the time and the expertise to adequately evaluate the negotiated specifications included with the DA.

One of the main features of a P3 project delivery approach is the transfer of much of the construction risk to the private partner (GHP). This risk transfer was not effective on the Great Hall P3 project.

The entity (GHP) contracted to function as the P3 project Developer and constructor had no experience with U.S. airports, no U.S.-based vertical project experience, and two of its contracting entity's (Ferrovial Agroman West) civil/horizontal P3 projects had significant public difficulties.

The bid evaluation should have included (more) representation from owner personnel who would be responsible for managing and administering the activities under the contract. Additionally, GHP should have been held to maintaining the key personnel contained in their bid. From a construction perspective, Ferrovial Agroman West personnel assigned specifically to GHB were the ones bid on the project—they were the ones with airport P3 experience. With few exceptions, the staff bid on the project were only present for a few weeks after project start. The personnel with airport P3 experience were quickly swapped out for FAW personal with civil (horizontal) P3 experience, and this experience was generally on tollway P3s.

The technical, legal, and financial consultants were not maintained as a unit during the entire contract. The end result was too much freedom on the part of GHP/GHB to make changes that resulted in COs, drove project costs, and created extensive delays.

DEN did not have sufficient staff with the "right" expertise to manage a P3 project. The overall focus of the DEN team was concentrated too heavily on operations and revenue rather than on construction activities. When the Great Hall project was restarted with Hensel Phelps, DEN's staffing was increased, particularly given its new role.

Recommendations

1. Follow the results of the VfM analysis. Validate the analysis using owner resources and independent outside experts.

2. Create, maintain, integrate, and consult with a team of financial, legal, and technical advisors from solicitation preparation, through proposal evaluation and negotiations, to project conclusion.

3. Have a DA that uses the required "must/shall" rather than the permissive "may" to protect the owner's interests and simplify application of contract termination or other clauses.

4. Conduct iterative negotiations with at least two qualified bidders before selecting a contractor and settling on costs.

5. Make sure the specifications included with the DA are clear, appropriate, and acceptable to the owner—then adhere to the allowances in these specifications.

6. Conduct extensive team-building and cultural awareness training when integrating project team members from diverse local and international organizations to build a common frame of reference and set owner expectations.

7. Ensure the owner's staff understands how a P3 differs from a D-B-B or CM/GC—avoid micromanagement, excessive involvement in construction-related and design-related decision- making and associated schedule impacts.

FINAL TAKEAWAYS AND KEY LESSONS

The issues with, and failure of, the Great Hall Program P3 is not a reflection on other potential P3 projects. Assuming the VfM analysis is suitable, and the appropriate contractor team and owner personnel are assembled, P3 remains a viable approach to deliver projects of all sizes. The success of the LaGuardia Airport P3 delivery, soon-to-be started JFK Airport P3, and a number of other civil (horizontal) and vertical projects in the U.S. and Canada bodes well for future P3 contract deliveries.

Be willing to walk away from the contract. Negotiate the contract with benchmarks that enable and support making a termination decision quickly and at the lowest possible cost. The language of the DA needs to be restrictive rather than permissive (must/shall versus may).

The terms and conditions (T&C) section of a P3 contract is critical. Setting out the rules the P3 contractor must follow is essential since the owner is giving significant control over decision-making to the contractor. Remember a P3 DBFOM is not a D-B-B or CM/GC contract, so the ground rules and requirements must be fully determined before work begins on the project.

Attachment 1 and Endnotes

Comparison of Various Traditional and P3 Project Delivery/Procurement Approaches

PROJECT DELIVERY METHOD	PROS	CONS
DBFOM	• Gives the owner the ability to provide a funding option for public entities that may be struggling to identify adequate sources of capital. • May be able to use alternative revenue and funding sources to close a funding gap. • Shifts much of the project risk (cost, schedule, constructability, etc.) to the private partner (concessionaire). • Not subject to capital budget allocations or voter referendums. • Allows use of private-sector efficiencies and innovations in construction, scheduling, and financing. • Often results in efficiencies in long-term operations and maintenance. • Delivery and other considerations are very similar to those for a D-B project. • Transferring of financial risk from taxpayers to investors. Under traditional procurement, a project's risks are entirely shouldered by the taxpayer. If the project experiences cost overruns, change orders, delays, or anything else that increases costs, the public sector—which means taxpayers—foot the bill. The private sector is typically better equipped and more motivated to assume these financial risks since they affect the private partner's bottom line. • Theoretically, the private sector is contractually obligated to deliver the project on-time and on-budget or suffer financial consequences, it has greater incentives to stick to the schedule and budget.	• A very complicated process that needs to be carefully evaluated. • Requires extensive stakeholder and public/elected official education. • Life cycle costs for the owner may be higher than if the owner retained full control post-construction. • A high level of expertise is required to execute a P3 project. • Proposal evaluation may not make valid comparisons of past performance of potential concessionaires with unique requirements of the owner's P3. For example, if the potential concessionaire's constructor does not have vertical experience and the project is vertical construction, problems may arise. Evaluating and validating the capabilities of all team members proposed for both design and construction is essential.
CM/GC	• Fosters innovation by encouraging contractor and project owner to look at all options innovative techniques or approaches that reduce time and cost. • Mitigates risk by establishing a collaborative relationship between the project owner and contractor. Increases owner's understanding of risks. Supports exploration of mitigation options with feedback provided by the contractor.	• Risks with selecting a contractor before the design is complete because the owner doesn't have a firm understanding of the total cost of their project. • Waiting to hire a CM/GC until the drawings are partially complete precludes the benefit of the contractor's expertise during the early design phases. The early design phase is when the CM/GC has the greatest ability to ensure the owner's budget is aligned with

	• Improves design quality since the contractor is able to review the designs and provide feedback, answer designer questions, and provide changes. By including the contractor review, the designer can produce better designs that reduce issues in construction, reducing COs that lead to cost overruns. • Improves cost control since value engineering is part of the CM/GC process so budget shapes the design approaches. With the contractor as part of the design team, the contractor can provide cost estimates for all designs and alternatives during the design phase. The project owner can use the estimates to make informed decisions around costs. • Optimizing scheduling allows the contractor to begin planning the construction schedule during the design phase. By planning during the design phase, the team can view how construction will impact the project. • Allows the owner the freedom to select the contractor with whom they want to work. • Considers the perspective of both the designer (architect) and contractor during the preconstruction phase. • Increases the accuracy of cost opinions and project timelines based on current market conditions.	the intended design. When the budget and design are aligned, costly redesign, COs and design phase schedule delays can be avoided. • Choosing the proper selection of the CM/GC, based on the CM/GC's particular skills and experience, impacts providing the best value to the owner. • The CM/GC provides the owner with professional advisory management assistance during design, but this assistance is not provided during the construction phase since the CM/GC is in an "at-risk" position during construction.
D-B	• The D-B team works together from the beginning, potentially resulting in time and money savings. • Well-suited to conventional projects where project requirements can be clearly defined, and expertise is readily available. • Single point of accountability for design and construction. • Cost efficiencies may be possible since the contractor and designer work together throughout the project. • COs typically are owner-generated rather than contractor-generated.	• Significant loss of control and involvement by the owner and other stakeholders. • Difficult for the owner to verify it is receiving the best value for its money. • Owner must be highly responsive in its decision-making to take full advantage of the speed of D-B. • Owner must consider the effort and completeness behind its initial scope/ preliminary design since they form the basis of its contract with the design-builder. • Owners with specialized needs or limitations may not want to turn over responsibility to an outside D-B team without ensuring adequate levels of oversight, coordination, and communication. • The project team (D-B) is created prior to being selected by the owner. The owner may not be able to ensure the right balance of the D-B team.
D-B-B	• The DBB delivery method has been the standard delivery method for many years. This method gives the owner reliable price	• Typically involves a longer time period to execute, since construction does not begin

	information for the project before construction starts. • Owner maximizes control over design, materials, and content. • With proper design oversight and budgeting of the total project, costs are somewhat predictable for the owner once the bids are received. • Potential to greatly reduce COs. • This method is widely applicable, well understood, and has well-established and clearly defined roles for the parties involved. • The owner has a significant amount of control over the end product, particularly since the facility's features are fully determined and specified prior to selection of the contractor.	until design and procurement phases are complete. • May create adversarial relationships between parties when issues develop, as there is no contractual relationship between the contractor and the designer and no opportunity for collaboration during the design phase. • All design work must be completed prior to solicitation of the construction contract, causing longer project completion times. • Owner has exposure to contractor COs and claims over design and constructability issues since the owner accepts liability for design in its contract with the contractor. • May promote more adversarial relationships rather than cooperation or coordination among the contractor, the designer and the owner. • The contractor may use a lowest-cost technically acceptable approach to completing the project so the owner may receive a reduced scope or lesser quality than expected for the price. • Not having construction input into the project design may impact constructability of the design. Design decisions related to types of materials specified and means, and methods of construction may not have included the construction perspective.

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