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Tradeoffs of Collaborative/Progressive Public-Private Partnerships (P3s)

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16. Abstract

Progressive Public-Private Partnerships (P3s) have received considerable attention recently as a potential strategy to address issues such as inappropriate risk allocation in conventional P3s. Progressive P3s allow greater collaboration between a public agency and a developer to enhance a project's feasibility, but they introduce potential tradeoffs such as the loss of competitive tension or market forces found in more conventional procurements. Consequently, this report further explores progressive P3s by identifying the characteristics of collaborative/progressive delivery methods, completing cases studies of two progressive P3 initiatives, the Major Bridges P3 Program in Pennsylvania and the Op Lanes in Maryland, and conducting interviews with subject matter experts (SMEs). The findings indicate that progressive P3s should be among the options considered in the spectrum of project delivery methods. They are particularly suitable for complex transportation projects with high levels of uncertainty where the early involvement of a developer or contractor can allow collaboration between the public and private entities to shape the scope of a project, collect additional information about a project's conditions and environment and develop better risk management strategies. However, progressive approaches introduce both challenges and key considerations for public agencies and private developers and contractors. For instance, pricing an evolving scope of work has proven difficult and this approach does not relieve a public agency from performing reasonable due diligence and project preparation before selecting a private partner. Future research can further examine strategies or methods that mitigate the challenges of progressive P3s and enhance their strengths.

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CHAPTER 1

Introduction

BACKGROUND

Over roughly the last two decades, a number of public transportation agencies in the US have planned and implemented public-private partnerships (P3s) to accelerate project delivery, capitalize on private sector efficiencies, access private sources of financing (particularly private equity), improve lifecycle performance, and transfer risks to the private sector.

One of the principal potential benefits of P3s is the integration of project delivery. P3s typically bundle design, construction, financing, operations, and maintenance into a single contract. Key performance indicators (KPIs) stipulate the DOT's desired performance characteristics, including budget and schedule, as well as construction, maintenance, and operating standards.

An additional integration benefit for large/mega-projects is that a single P3 contract can encompass the full scope of the project. Conventional procurement, on the other hand, has to grapple with the capacity of a state's local contracting community to absorb the design and construction risk for a project. This often leads to megaprojects being broken up into multiple contracts. Virginia Springfield Interchange, at the interchange between the Washington Beltway and I-95, was broken up into several separate contracts because the overall value of the complete project was simply too large for the contractors operating in that market. This left the DOT holding the integration risk, that is, the need to coordinate all of the separate contracts.

P3s have followed a variety of approaches for procurement, funding, risk allocation and performance measurement (Garvin 2010). Indeed, the literature has examined many facets of P3s (Antillon et al. 2018; Kwak et al. 2009; Li et al. 2005) with the subject of risk receiving significant attention. Risk transfer is generally considered a central tenet of the value proposition for P3s. Moreover, risk allocation is likely a critical factor for P3 success or failure (Nguyen et al. 2018).

Past work has emphasized the optimal allocation of risks in P3s (Hardcastle and Boothroyd 2003). This principle is illustrated effectively in Figure 1 that captures the essence of the challenge in employing P3s; projects must provide a balanced risk/reward profile, where the level of risk assumed by both the public agency and the private sector and the required private-sector returns, as well as the public sector costs, are acceptable to both parties.

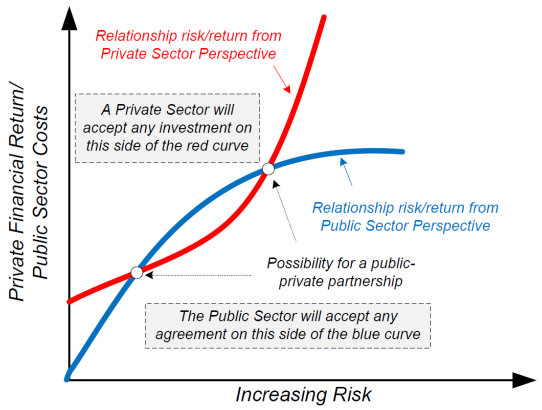

Figure 1. Region of Optimal Risk Allocation in P3s
(Adapted from FHWA 2014)

Conceptually, this is clear, but in practice it has proven to be a challenge. Past research has demonstrated that the inappropriate allocation of risks can lead to project management inefficiency, high transaction costs (Dudkin and Välilä 2006), high frequency of disputes (Bing et al. 2005), and can reduce participation of the private sector in P3s (Chou and Pramudawardhani 2015).

Recently, inappropriate risk allocation – specifically the transfer of too much risk – has impacted the US P3 market. In 2019, *Engineering News-Record* documented concerns by major industry players such as SNC-Lavalin, Fluor and Granite about the commercial structure of P3s, specifically their pervasive use of fixed-price design-build contracts (Rubin and Powers 2019). A subsequent *Engineering News-Record* article about the troubled Purple Line Rail P3 in Maryland reiterated this issue:

> *Robert Alger, former CEO of Lane Construction, a member of the Fluor-led design-build joint venture Purple Line Construction Partners, told ENR that the "current P3 model based on lump sum turnkey projects is broken. All the risk is being pushed down to the contractor level with no ownership of the risk at the owner or concession level. This is not sustainable. These mega projects are simply too large to price the risk effectively"* (Parsons and Rubin 2020).

Consequently, major industry players have exited this market altogether or they have become far more selective about the sectors or projects that they will pursue.

Progressive P3s – A Solution?

In the US market, P3 procurements have normally followed a "two-step" RFQ and RFP process. In this conventional method, the RFP solicits competitive proposals that ultimately result in contractual commitments to a project's commercial, technical and legal terms. In nearly all cases, design and construction services are provided through a design-build (or turnkey) contract that is a fixed-price, lump sum arrangement. The Purple Line Rail P3 mentioned previously followed this model.

However, market exits by key industry players and lessons learned about delivering major infrastructure projects have caused public agencies to consider more collaborative or progressive approaches for project delivery. This trend has extended into the P3 market where planning and development may take the form of pre-development agreements (PDAs). PDAs offer the benefit of involving private partners in the scoping and structuring of projects before significant commitments are made. Further, this approach provides greater opportunities for dialogue about the allocation and pricing of risks. Often, the private partners receive the first right to develop a project should it proceed.

Clearly, PDAs permit greater interaction between a public agency and a P3 developer, but they introduce potential tradeoffs such as the loss of competitive tension or market forces found in more conventional procurements or the potential for opportunistic behaviors by either party (Casady and Garvin 2022). Advocates view progressive strategies as a more reasoned and fair approach to develop a project that is ideally more "fit for purpose." Skeptics emphasize that such strategies create environments for opportunism and that conventional procurement approaches are not necessarily broken – they simply need more transparency and due diligence.

OBJECTIVES

This project: (1) explored the opportunities and challenges posed by collaborative or progressive P3s, and (2) developed a report that characterizes their benefits and tradeoffs. A prospective project's uncertainty and complexity are often drivers of progressive development strategies; the prevailing expectation is that such an approach will "optimize" transaction costs and lifecycle benefits. Yet, these strategies raise significant concerns about legitimacy, accountability and best value. *This report provides new insights*

about collaborative/progressive P3s that will support public agencies' decision-making about when, why and how to use progressive P3s. Moreover, it starts to address concerns about inappropriate risk transfer that has caused major industry players to exit the market and how progressive delivery approaches can address or mitigate such concerns.

DATA AND DATA STRUCTURES

All relevant data utilized in this research is included in this report.

CHAPTER 2

Methodology

INTRODUCTION

To accomplish the project's objectives, multiple tasks were conducted.

Task 1 – Identification and Synthesis of Relevant Literature

Conducted a desk-top review of literature, reports and case studies about collaborative or progressive project delivery approaches in the US and internationally to develop a summary of literature and reports that address collaborative project delivery generally and in P3s specifically.

Task 2 – Development of a Framework that Characterizes Collaborative Project Delivery

Building from Task 1, this task developed a framework that describes the characteristics of collaborative project delivery approaches.

Task 3 – Conduct In-Depth Case Studies

Two progressive P3s in the United States were selected for in-depth case studies: MBP3 in Pennsylvania and OP Lanes in Maryland. Several participants in these projects were interviewed to gain their perspectives of the opportunities and challenges afforded by progressive/collaborative approaches.

Task 4 – Engage Practitioners for Input

A total of 15 subject matter experts were engaged to gain their perspectives of the opportunities and challenges afforded by progressive/collaborative approaches.

Task 5 – Produce Report and Disseminate Findings

A report encompassing the subsquent tasks was developed.

CHAPTER 3

Synthesis of Literature & Collaborative Project Delivery Framework

INTRODUCTION

The construction and infrastructure sectors traditionally utilize Design-Bid-Build (DBB) and Design-Build (DB) for project delivery, with Public-Private Partnerships (P3s) also playing a significant role. The DBB method, known for its sequential steps, contrasts with the DB approach, which combines design and construction services under one contract, gaining legal support from the Clinger-Cohen Act of 1996 (Songer et al. 2012). Research indicates DB projects tend to be more cost-effective, though DBB can offer advantages in project duration (Chen and Zhang 2013). P3s, involving collaborations between public entities and private companies, have emerged as a method to leverage private sector involvement in public infrastructure projects (AGC 2023a). Recognizing the limitations of traditional methods, such as their sequential nature leading to potential delays (Amelie 2021) and minimal collaboration (Otwell 2021), the industry is shifting towards more collaborative project delivery strategies, aiming to enhance flexibility, collaboration, and risk distribution.

Collaborative project delivery methods like Project Alliancing, Integrated Project Delivery, Progressive Design Build and Progressive P3 are being adopted by the industry. These methods, recognized for enhancing efficiency, creativity, and risk management, are suited for complex projects, complementing rather than replacing traditional methods. Although not replacing the traditional delivery methods, they offer unique features and benefits (Alinezhad et al. 2020; Alleman and Tran 2021; Casady and Garvin 2022; Gransberg et al. 2015) that are particularly suited for specific types of projects, offering more efficient, creative, and risk balanced solutions to address the increasing complexity of modern projects. These characteristics include the involvement of key stakeholders at an early stage, collaborative planning, shared design and control, collective decision-making, transparency in cost management through open-book methods, a dedication to equitable sharing of both risks and rewards, fostering relationships built on trust, open and effective communication, and the establishment of agreements involving multiple parties (Moradi et al. 2022). Table 1 summarizes the key features of collaborative delivery methods as well as literature that has cited these characteristics.

Table 1. Key Features of Collaborative Project Delivery Methods

Key Features	References
Cooperation & Collaboration	(Bellini et al. 2016; Doloi 2013; Ling Florence Y. Y. et al. 2020; Nevstad et al. 2018; Young et al. 2016)
Trust between stakeholders	(Bellini et al. 2016; Doloi 2013; Nevstad et al. 2018; Raslim and Mustaffa 2017; Whang et al. 2019)
Equality and mutual respect	(Daniel and Pasquire 2019; Gomez et al. 2018; Kent and Becerik 2010; Lichtig 2005; Raslim and Mustaffa 2017)
Open communication	(Bellini et al. 2016; Doloi 2013; Kent and Becerik 2010; Nevstad et al. 2018; Raslim and Mustaffa 2017; Wang Tengfei et al. 2016; Young et al. 2016)

Key Features	References
Team integration	(Franz et al. 2017; Ibrahim et al. 2015; Lee et al. 2013; Lichtig 2005)

Collaborative project delivery methods diverge from traditional approaches by emphasizing the production system and joint design of product and process. They prioritize task completion based on readiness rather than urgency, utilize contingency reserves for reducing system variability, support unanimous decision-making, encourage continuous learning, and align stakeholder interests (Ballard and Howell 2003; Moradi 2021). This shift necessitates a change in mindset towards cooperation, mutual trust, and shared goals, moving away from adversarial relationships towards a more cooperative, integrated team approach, highlighting the importance of open communication, respect, and equality (Moradi et al. 2022).

Hence, the subsequent sections examine collaborative project delivery further by conducting a literature about predominant collaborative delivery methods and synthesizing this information into a framework that characterizes collaborative project delivery.

LITERATURE REVIEW

An extensive desktop review was conducted to identify relevant literature, reports, and case studies about collaborative or progressive project delivery approaches in the United States and internationally. Particular attention was given to regions like Australia, New Zealand, Europe, and Canada, which have more experience with collaborative project delivery in general and in public-private partnerships (P3s) specifically.

Approach

The literature review was conducted through a structured three-step process aimed at identifying significant scholarly articles that discuss collaborative project delivery methods. Initially, a comprehensive keyword search was formulated to explore the existing academic discussions in databases such as Scopus and the American Society of Civil Engineers (ASCE) Library. This search was guided by keywords directly linked to collaborative methods, project delivery, and team integration within construction and engineering projects. An initial pool of over 200 papers was identified through this method, demonstrating the breadth of academic interest in these topics.

In the second stage, a more detailed selection process was implemented. The focus was on papers that specifically addressed the use of collaborative methods in project delivery, excluding those that did not provide a clear connection to the core themes of the research. This step involved a meticulous review of titles, abstracts, and keywords to ensure relevance to the study's objectives. Non-relevant papers, such as those focusing solely on theoretical aspects or those from unrelated disciplines, were systematically excluded. This refined filtering process resulted in a condensed list of 25 key papers, which were deemed highly relevant and formed the foundation for an in-depth analysis.

The final step involved a thorough content analysis of the selected papers to distill the key practices and outcomes associated with collaborative project delivery methods. Each paper was evaluated for its contributions towards understanding how different collaborative project delivery methods work in project settings. The emphasis was on identifying practices that are explicitly linked to enhancing project outcomes through these delivery methods. This careful analysis helped in pinpointing critical themes and practices recurrent across the literature, providing a robust basis for discussing the implications and recommendations for future project delivery frameworks.

Building on the structured literature review, the study transitions to a detailed examination of various collaborative project delivery methods that have been identified as significant in the field. The key papers from the review have provided a robust foundation to synthesize key aspects and practical implications of

four specific methods: Alliancing, Integrated Project Delivery (IPD), Progressive Design Build (PDB), and Progressive Public-Private Partnerships (P3) / Pre-Development Agreements (PDAs). Each of these methods represents a unique approach to enhancing collaboration among project stakeholders, aiming to improve project outcomes through integrated practices and shared objectives. The discussion will outline the fundamental principles of each method, explore their practical applications, evaluate the outcomes reported, and challenges associated with these delivery methods identified in the literature.

Project Alliancing

Introduction to Project Alliancing

Often simply referred to as "alliancing," project alliancing (PA) or alliance contracting is a deeply collaborative and highly integrated project delivery method. This method is characterized by its emphasis on teamwork, shared goals, and collective decision-making. Project Alliancing (PA) traces its origins back to sectors outside of construction. In 1992, British Petroleum initiated a collaborative process for an oil project in the North Sea, marking the beginning of the PA evolution (Knott 1996). Now it is predominantly used in Australia, New Zealand, and Europe (Gransberg et al. 2016) for the execution of complex infrastructure projects.

Alliancing is defined by the Australian Department of Infrastructure and Transport as: “the principal or government agency collaborates with one or more non-owner parties (for example, the designer and constructor) to share the risks and responsibilities in the construction phase” (ADIT 2012). Following this definition, it is clear that alliancing is fundamentally about shared responsibility and risk. This collaborative approach is not just about dividing tasks, but about creating a unified team that works together to achieve the project's objectives. This approach brings about high levels of innovation, best possible solution when the scope is unclear, and the owner can be involved closely to add value (FHWA 2018).

In an alliance, the principal or government agency doesn't just delegate tasks to the non-owner parties such as the designer and constructor. Instead, they collaborate as a united team jointly bearing the risks and enjoying the benefits associated with the project. This shared burden and accountability is a characteristic of alliancing making it especially effective for projects that entail high levels of unpredictability and necessitate flexibility. Within an alliance, participants are collectively and individually committed to the successful delivery of the project, rather than focusing solely on their individual team performance. The overall performance of the project determines whether participants share in the gains or share the pains, a characteristic feature of Project Alliancing (Walker and Jacobsson 2014). This approach significantly influences the way participants collaborate, fostering a more unified and cooperative team dynamic. It also removes the courts as the final solution for dispute resolution, including what amounts to a “no sue” clause in the alliance contract. The alliance contract has been crafted in a manner to maintain the interests of each party but also secures a commitment to rely on the alliance members to resolve disputes without resorting to the courts (Van Den Berg and Kamminga 2006).

Success Stories in Project Alliancing

Gransberg et al. (2016) conducted various case studies on Project Alliancing (PA) implemented by different agencies across the globe. The projects range from highway construction to infrastructure repair and dredging, with project values ranging from US$30.9 million to US$1.1 billion. The agencies involved include the New Zealand Transport Agency (NZTA), the Ministry of Traffic Utrecht in the Netherlands, the Queensland Department of Transport and Main Roads (QDTMR) in Australia, The Highways Agency in the UK, the Port of Melbourne in Australia, and the Washington State Department of Transportation (WSDOT) in the United States. The outcomes of these projects have been largely positive, with many

projects coming in under budget and ahead of schedule, and no residual disputes reported. For example, the Northern Gateway Toll road project in Northland, New Zealand, managed by NZTA, was completed $7.5 million under budget and ahead of schedule. Similarly, the Origin Alliance project in Goodna, Australia, managed by QDTMR, was completed 10% under budget and 6 months ahead of schedule.

Alliancing takes many forms and is flexible enough to permit public transportation agencies to tailor the method to fit the unique requirements of a project. A very interesting approach that can be utilized to deliver projects is a project alliance within a public private partnership, which Walker and Jacobsson (2014) reference as a SOCK (as fitted inside the PPP "BOOT") Alliance. Walker and Jacobsson conducted a case study of one of Australia's largest infrastructure projects, the Airport Link Brisbane, an AUD4.8 billion 6.7-kilometer dual tunnel road. The design & construct phase of the project was set up as a project alliance within an overall Public Private Partnership (Walker and Jacobsson 2013). The study employed an open interview process, where participants were asked broad questions to share their perspectives on the events, processes, and reasons behind them. The two main reasons for choosing the SOCK Alliance approach were sustaining technical quality and past experience (Walker and Jacobsson 2013). Considering the complexities and challenges related to uncertainty, trust, and the difficulty in establishing cause-effect relationships, a transition was made from conventional competitive methods to a cooperative strategy. This resulted in the creation of an alliance that distributed the work among three participants, enabling collective action, adaptability in task allocation, and improved workflow and risk management (Walker and Jacobsson 2013). Previous experiences also were pivotal to selecting an alliance contract. The involved parties had collaborated on similar projects before, some leading to strained relationships due to information and power disparities. The alliance approach rectified these imbalances, fostering improved collaboration and flexibility (Walker and Jacobsson 2013).

The success of Project Alliancing (PA) on the international stage makes it an attractive option to explore as a project delivery method in the United States. Project alliancing (PA) can be implemented in the United States quite successfully with 14 operating features that have been identified, and all but two are available in the US construction industry (Gransberg et al. 2016). Table 2 summarize these features:

Table 2. Features of Alliance Contracts versus Other Project Delivery Methods
(adapted from Gransberg et al. 2016)

Alliance Contract Principle	Operational Feature	DBB w/ partnering	CMGC w/ partnering	DB w/ partnering	P3 w/ partnering
Team Selection	Focus on competence, reputation and attitude		Evaluation of qualifications	Evaluation of qualifications	Evaluation of qualifications
	Select personnel on a 'best for project' basis				
Project Proposal Development	Develop the project proposal by alliance partners with the owner's cooperation and involvement			Limited if ATCs are used	Concession Agreement
	Determine the performance targets and commercial arrangements on a negotiation basis		GMP negotiations		Concession Agreement
Risk and reward	Share risks and rewards collectively	Nonbinding charter	GMP negotiations		Concession Agreement

Alliance Contract Principle	Operational Feature	DBB w/ partnering	CMGC w/ partnering	DB w/ partnering	P3 w/ partnering
allocation	Create win–win or lose–lose situation through a risk/reward regime				
	Align the owner's project objectives with partners' commercial objectives	Nonbinding charter	Proposal Evaluation	Proposal Evaluation	Proposal Evaluation
Governance and Management	Make project decisions collectively and unanimously		Decision can be collective		Decision can be collective
	Share information and knowledge	Nonbinding charter	GMP negotiations		Concession Agreement
	Commit to 'open book' in terms of cost data, documentation and reporting		GMP negotiations		Concession Agreement
Principles of Conduct	Make decisions and act in a 'best for project' manner	Nonbinding charter	Nonbinding charter	Nonbinding charter	Nonbinding charter
	Act fairly and reasonably instead of reaping self-interests at the expense of other partners	Nonbinding charter	Nonbinding charter	Nonbinding charter	Nonbinding charter
Dispute Resolution	Commit to 'no fault-no blame' culture in relation to errors, mistakes or poor performance	Nonbinding charter	Nonbinding charter	Nonbinding charter	Nonbinding charter
	Resolve all conflicts and disputes internally and agree not to litigate or arbitrate				

Table 2 illustrates that alliancing principles are a part of the US construction industry in a variety of existing delivery methods. Work needs to be done to address the challenges of selecting a partner based on the specific requirements of a project and introducing a "no litigation clause" in practice. In a country where $1.6 billion annually is spent on construction related litigation (Gebken and Gibson 2006), this will be a pivotal point in the US industry where solving disputes internally will be a part of the formal contract.

Challenges in Project Alliancing

Project alliancing due to its collaborative approach offers numerous advantages in the construction industry; however, it does have its limitations. Ross (2003) identifies significant limitations in adopting alliance contracts for projects. Success in project alliances necessitates a high level of involvement and commitment from owner personnel and senior management, demanding full dedication to the process. Additionally, the perception of cost uncertainty arises, especially when cost overruns transition entirely to the owner at a certain point, potentially impacting project financing. Furthermore, substantial costs are incurred in establishing the alliance and fostering a collaborative culture, requiring a notable shift from adversarial approaches (Ross 2003). Alliance contracts can be loosely drafted and lack clear risk allocation that ultimately leads to disputes (Forrest and Jaques 2009). It is important when using an alliance that both

parties are willing and capable of working in a co-operative manner and clearly understand their obligations as outlined in the contract to minimize the risk of litigation. This barrier is also highlighted by Lahdenpera (2017), who reports that establishing open and trustful relations can be challenging, particularly for parties accustomed to a traditional competitive mindset. In project alliancing, liabilities are shared equally among participants, regardless of fault, potentially leading to professional indemnity insurance complications meaning that one party may be liable for faults caused by an underperforming party (Frame et al. 2019). While project alliancing offers a collaborative approach that can yield substantial benefits in the construction industry, it is essential for stakeholders to navigate the inherent challenges, such as commitment, cost uncertainty, and risk allocation, to ensure the successful implementation of this innovative project delivery method.

Integrated Project Delivery

Introduction to Integrated Project Delivery

Integrated Project Delivery (IPD) is a collaborative approach to project delivery that fully integrates project teams to maximize the project outcome. It is considered the highest form of collaboration as it aligns all three key parties involved in a project – the owner, the designer, and the constructor – under a single contract (AGC 2023b). This delivery methodology leverages the knowledge and expertise of all team members, fostering a cooperative and synergistic working relationship.

The genesis of IPD can be traced back to the early 2000s (Ashcraft 2022). This was a time when there was a growing sense of dissatisfaction with project outcomes and the prevailing systems that seemed to fall short in optimizing cost, schedule, and quality (Ashcraft 2022). The need for a more efficient and effective approach was palpable, and this led to the exploration of alternatives to the existing project delivery systems. Among those who embarked on this journey of exploration were a group of lean construction proponents (Ashcraft 2022). Their primary objective was to enhance project value. However, as they delved deeper into the process, they encountered a significant hurdle. They found that the level of deep collaboration required among key project participants to implement lean construction principles was difficult to achieve using traditional project delivery methods (Ashcraft 2022). This realization led them to think outside the box (Ashcraft 2022). They understood that to overcome the limitations of the traditional methods, they needed to devise a new approach. This led to the creation of a multi-party agreement and in this innovative arrangement, the key parties agreed to pool their proposed profit and also decided to manage the project jointly through consensus (Ashcraft 2022) these features are fundamental features of IPD.

Achieving Favorable Outcomes with IPD

The use of IPD is becoming increasingly popular in the United States, with many leading construction firms adopting this approach for building construction work. It is seen as a way to improve efficiency, reduce waste, and increase value for all stakeholders involved in a project. The development and implementation of IPD have been the subject of various studies. Initial case studies, commissioned by the American Institute of Architects (AIA), focused on six ongoing IPD projects and reported favorable outcomes, despite the projects being in progress (Cohen 2010). The research conducted by Cohen (2010) also provides valuable insights into the practical application of IPD in the construction industry. Through a series of case studies, Cohen demonstrates that IPD can effectively meet or exceed owner expectations in terms of budget, schedule, design quality, sustainability, and financial performance for both designers and builders. This innovative approach aligns the goals and responsibilities of all principal parties involved, reducing risks, and increasing project certainty.

Cheng (2012) expanded on this initial research by including an additional example, offering more detailed information, and incorporating survey data. The survey data revealed that participants were highly satisfied with the design quality and efficiency of the IPD projects. While Cheng's conclusions were positive, she acknowledged the limited sample size of the study (Ashcraft 2022). This recognition of the need for a broader sample size was a crucial step towards more comprehensive research on IPD. In a subsequent study, the same research group significantly expanded their survey and provided detailed information on each project (Allison and Cheng 2015). Participants in this study compared their experiences with IPD projects to their experiences with other project delivery methods. They evaluated various aspects, including schedule predictability, cost and budget control, building quality, change quantity, change handling, morale, and overall value delivered (Ashcraft 2022). The results were quite revealing. Approximately 85 percent of the respondents found schedule predictability and cost control to be better or significantly better in IPD projects (Ashcraft 2022). An impressive 90 percent felt that the overall value delivered was better or significantly better (Allison and Cheng 2015). Other researchers have also used case studies to explore the reasons behind the success of IPD (Tillmann et al. 2012). A study conducted by Bilbo et al. (2014) showed that IPD projects demonstrated significantly higher cost savings (a decrease of 10.27% from the budget) compared to the Construction Manager at Risk (CMR) approach (a decrease of 3.13%), however, it experienced more schedule growth (an increase of 16.63%) compared to CMR (a decrease of 1.72%). It is unclear why this schedule growth took place, but Bilbo and colleagues suggest that it might be because of external factors like weather or permit delays rather than project performance (Bilbo et al. 2014). These studies have contributed to a growing body of evidence supporting the effectiveness of IPD as a project delivery method. They have also highlighted the need for ongoing research to further understand and optimize the implementation of IPD.

IPD has been found to result in greater efficiencies. The United Kingdom's Office of Government Commerce (UKOGC) estimates that integrated teams can achieve up to 30% savings in construction costs through continuous improvement over a series of construction projects. For single projects employing integrated supply teams, the UKOGC estimated savings of 2-10% in construction costs as highlighted in a procurement guide published by Office of Government Commerce, UK (AIA 2007). Integrated delivery serves as a beneficial approach for all key stakeholders in a project. For owners, it allows for effective balancing of project options, enhancing cost control, and increasing the likelihood of achieving project goals, including schedule, life cycle costs, quality, and sustainability (AIA 2007). Constructors benefit from early involvement in the design process, which improves project quality and financial performance, enables effective pre-construction planning, and increases the probability of achieving project goals (AIA 2007). Designers, too, find value in the integrated delivery process, as it allows them to leverage constructors' expertise early on, reducing documentation time, and improving cost control, thereby increasing the likelihood of achieving project goals. This collaborative and integrated approach ensures a professional, efficient, and goal-oriented project execution (AIA 2007).

Challenges of Integrated Project Delivery

Despite its potential advantages and promising features, IPD also presents several challenges that demand close attention for its success. Rodrigues and Lindhard (2021) identified several challenges through case studies that include:

- Involving too many participants too early in the project.
- Adapting national standards and laws to fit with the IPD method.
- Difficulty in determining realistic cost estimates in the early project phases.
- Establishing true joint project control, which requires the owner to relinquish decision-making power and developing common project targets, often hindered by conflicting objectives among project participants.

IPD disrupts traditional contractual roles in project delivery methods, necessitating a restructuring of contractual relationships, each with varying levels of risk and reward. Unique legal concerns also arise including defining roles, assuming expanded liability, and establishing financial incentives and dispute resolution procedures (Ciotti 2017). Owners and other parties must recognize that IPD has distinct benefits and risks compared to traditional methods. Drafting tailored agreements is essential, even if using standard contracts as a foundation (Ciotti 2017).

Progressive Design Build

Introduction to Progressive Design-Build

Progressive Design-Build (PDB), which combines flexibility, cooperation, and openness, is an innovative and dynamic method to project delivery. In contrast to conventional approaches, PDB promotes collaborative interaction between the owner and design and construction team from the start of the project. When the design and construction phases overlap, this method enables progressive development where decisions evolve as the project develops. In addition to improving efficiency and creativity, it also gives clients the chance to make informed decisions, ensuring that the final result is in line with their goals and vision. As a result, PDB is becoming a popular option for many companies in building, airport, transit, and water infrastructure sectors (Tran and Alleman 2020), providing a simplified route to the timely, cost-efficient, and high-quality completion of projects (DBIA 2018).

PDB uses a qualifications-based or best value selection, followed by a process whereby the owner then "progresses" towards a design and contract price with the team (thus the term "Progressive") (DBIA 2018). The Initial Phase, also referred to as Preliminary or Preconstruction Services, sees the design-builder collaborating closely with the owner and their consultants to define or validate the project's design needs and programming needs. The design-builder then enhances this design, considering aspects such as cost, timeline, quality, functionality, and lifecycle (DBIA 2018). Throughout this stage, the design-builder consistently provides cost projections to ensure the project aligns with the owner's financial constraints. When the design achieves a level of clarity that satisfies the owner's specifications, the design-builder presents a formal proposal for the Second Phase services. This usually occurs when the design is about 40 to 60 percent finalized, but can take place at any point, depending on the owner's preference for control over the design. The second phase, also known as the Final Design and Construction Services, commences when the owner and design-builder reach a consensus on the project's cost and timeline. The design-builder then finalizes the design and constructs the facility in accordance with these agreed terms. The design-builder also undertakes any agreed-upon testing, commissioning, and other services. If the parties fail to agree on the terms for the Second Phase, the owner has the alternative to utilize the design and continue with the project using a different contractual approach, referred to as the "off-ramp" option. A PDB relationship can be formed through two separate contracts for each work phase, or a single contract that encompasses both phases. While there's a distinct separation between the Initial and Second Phase services, practical needs often require some Second Phase work to commence before the commercial proposal is agreed upon. As a result, many PDB projects permit the design-builder to initiate "early work" packages for distinct elements of the physical work prior to the second phase authorization. Figure 2 shows a visual representation of the two phases, which is adapted from Gransberg and Molenaar (2019).

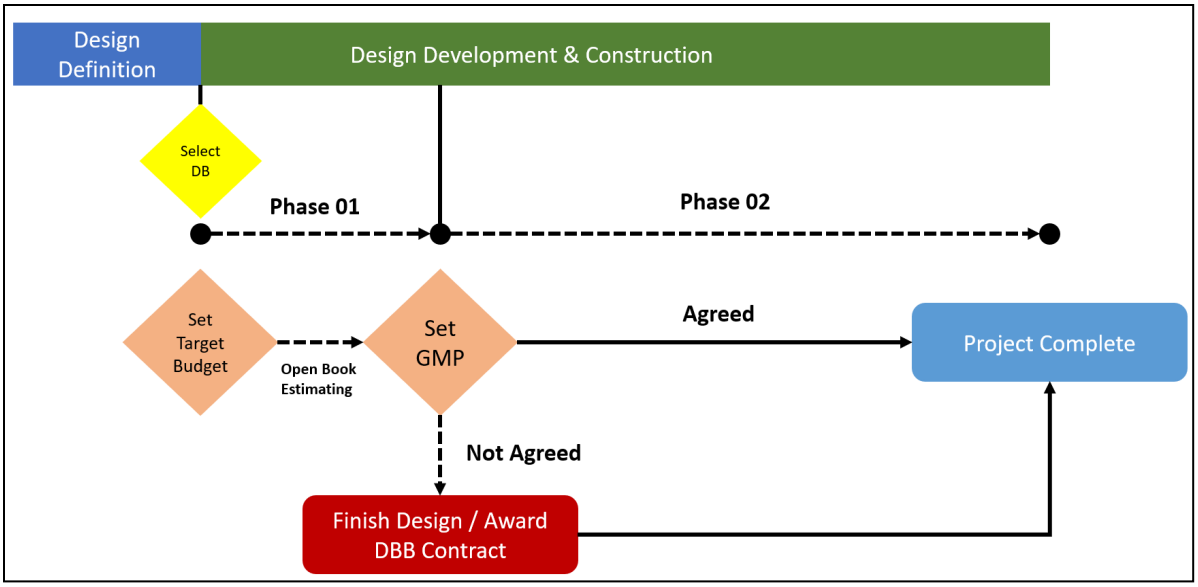

Figure 2. Progressive Design-Build Process
(Gransberg and Molenaar 2019)

It is clearly evident that selection of the project delivery method can have a significant impact on the project's success or its failure. Given that there isn't a one-size-fits-all organizational structure, different mixes of project delivery methods, team selection procedures, and contract types may be suitable for a particular project (Alameri and Esmaeili 2022). As a result, this research carried out by the authors presented a review of existing literature to pinpoint factors influencing the choice of a project delivery method. These factors were presented in a questionnaire to experienced construction industry professionals. The responses were analyzed to determine the relative importance of different delivery methods for various project scenarios (Alameri and Esmaeili 2022). According to Alameri and Esmaeili (2022) the owner's decision to choose PDB is influenced by factors such as flexible project scope, staff engagement in scope advancement, uncertain capital availability, and the need for early procurement of long-lead items. Compared to the Design-Bid (DB) method, PDB allows for greater owner influence on project scope and faster initiation of key activities, making it advantageous for projects with tight schedules and variable funding.

Project Success through Progressive Design Build

PDB has been successful in its implementation. Alameri and Esmaeili (2021) contacted 68 participants, out of which 23 responses were received and information about the PDB projects was shared (Alameri and Esmaeili 2021). Most respondents indicated that despite the high complexity of design and construction in their projects, the projects were highly successful, with 10 being very successful and nine successful. This aligns with expectations as PDB methods are typically employed for complex projects, where owners prioritize quality and early engagement of Design-Build, while negotiating price and commercial terms (Alameri and Esmaeili 2021).

On average, the Guaranteed Maximum Price (GMP) was established when about 64% of the design was complete (median = 60%), although in three projects, this was set when less than half of the design was complete. In 18 projects, a contingency term was included by the design-builder, and in 15 of these, it was part of the GMP. Depending on the stage of design completion, the design-builder was engaged at the predesign phase in eight projects, at the conceptual phase (0–15% completion) in seven projects, and at the schematic design phase (15–30% completion) in four projects (Alameri and Esmaeili 2021).

Exploring the Advantages and Challenges of Progressive Design-Build

To delve into the inner workings, potential advantages, and possible challenges associated with the PDB method, a study was conducted within the context of a significant infrastructure project, specifically Maryland's ambitious $100 million I-270 road resurfacing and expansion project (Alleman and Tran 2021). The authors were able to confirm that the PDB model could indeed provide multiple benefits. These included the ability to offer a tailored innovative solution that was specific to the project's unique needs, ensuring better value for money, a critical factor in any public infrastructure project. Additionally, it allowed for increased control and flexibility for the project owner, a feature that is often sought after in such large-scale projects (Alleman and Tran 2021). However, the journey was not without its challenges. The project faced several hurdles that needed to be overcome. These included the need for comprehensive education about the PDB process for the owner, a factor that cannot be underestimated. The procurement process was also resource-intensive, requiring a significant commitment of both time and resources. Furthermore, the project required preconstruction oversight that was akin to a Design-Bid-Build (DBB) project, adding another layer of complexity. In an interesting turn of events, the Maryland Department of Transportation (MDOT) found itself needing to adjust their existing DB legislation to accommodate the use of the PDB model. This was a necessary step that showcased the flexibility and adaptability of the department (Alleman and Tran 2021). Despite these challenges, MDOT demonstrated a strategic approach by managing to avoid some common issues that often plague such projects. These included negotiation difficulties, problems with team integration, and the complexities of dealing with third-party requirements. They achieved this by carefully selecting team members who had a proven track record of working together effectively and who had prior experience working with MDOT (Alleman and Tran 2021).

The successful implementation of the PDB model is of paramount importance, especially considering that it's still a relatively new approach in the transportation sector (Alleman and Tran 2021). Any shortcomings in its execution could have far-reaching consequences, potentially discouraging other agencies from adopting it. This could have nationwide implications, affecting the future of infrastructure development across the country (Alleman and Tran 2021). Therefore, the findings of this study are not only significant for the I-270 project but also for the broader transportation sector.

Progressive Public Private Partnerships

Introduction to Progressive Public-Private Partnerships

Progressive Public-Private Partnerships (P3s) represent an alternative approach to project procurement that combines efficiency, cost-effectiveness, and a collaborative project development process. This model enables the procuring authority to select a partner more swiftly, reduces the resources and capital required for procurement, and provides greater influence over the early conceptual design and shaping of a project compared to traditional fixed-price, committed-financing P3 procurements (Dugan 2020). This trend underscores the importance of incorporating more cooperative elements in traditional two-stage procurements. This approach is not only innovative but also efficient. It includes the use of Pre-Development Agreements (PDAs), which are also referred to as "Progressive P3s" (Casady and Garvin 2022).

In such Progressive P3s, the authority permits the private sector to contribute to the project's scope and structure (Casady and Garvin 2022). This contribution occurs following a brief Request for Qualifications (RFQ) stage, a stage that is critical in ensuring the right fit for the project (P3 Bulletin 2021). Once the public agency, with its commitment to ensuring the project's success, selects a partner based on qualifications (or potentially their fee structure) for the project's "collaborative" phase, the developer typically receives "first rights" to develop or potentially proceed with the project, entering into a “fit for

purpose" agreement finalizing project design, allocation of risks and associated costs (Casady and Garvin 2022).

Following this, the project design, risk allocation, and pricing are collaboratively developed by the public and private sectors (Casady and Garvin 2022). This collaboration is a testament to the shared commitment of both sectors to the project's success. The aim here is to create an asset that is, ideally, more suitable for its intended purpose, thereby maximizing its potential benefits (Casady and Garvin 2022). Subsequently, the parties enter into a comprehensive agreement. This agreement serves as a formal confirmation of the shared responsibilities and expected outcomes of the project, solidifying the collaboration between the public and private sectors.

Growing Popularity of Progressive P3s

Such an approach is already gaining ground in North America with projects being undertaken in both the United States and Canada. OP Lanes Maryland and the Sepulveda Transit Corridor Project in California have used Pre-Development Agreements with the private sector. A recent development in the field of Progressive Public Private Partnerships is the initiative taken by Transport Canada. They have issued a Request for Expressions of Interest (REOI) for their ambitious high-frequency rail P3 project. This project is a massive undertaking, aiming to connect Quebec City and Windsor, Ontario with a 1,000 km long track along new passenger rail corridors. The project serves as a demonstration of the impact that Progressive P3s can have on public infrastructure development. Many experts consider it to be an intricate undertaking that represents a ""a new pathway forward for hard to procure projects" (Casady and Garvin 2022).

Pre-development agreements are a practical choice for public entities seeking to establish enduring collaborations that will support their initiatives in recognizing and progressing P3s. In this context, the progressive method reinstates control of P3s to the project proprietors, designers, builders, and operators. Pre-development Agreements indeed serve as a strategic tool for public agencies. These agreements are not just about forming long term partnerships (Casady and Garvin 2022), but they also are about creating a roadmap for the successful execution of P3s. They provide a framework that guides the entire process, from the identification of potential projects to their eventual advancement. It does more than just facilitate collaboration, it empowers the key stakeholders, the project owners, designers, builders, and operators. It gives them the reins, allowing them to steer the project in the direction that best serves their vision and objectives (Partnership Bulletin 2023a).

Moreover, Progressive P3s are gaining popularity and are likely to continue growing in the coming years. Progressive P3s are being used to address not only technical risks but also commercial problems, making them a flexible and adaptable option. These deals act as a bridge to overcome challenges such as higher inflation and difficult technical approaches, keeping stakeholders involved. The model has been successful in dealing with market volatility in bids. Overall, Progressive P3s are seen as a positive and sustainable approach to addressing commercial risks in the industry (Partnership Bulletin 2023b).

Challenges associated with Progressive P3s

While Progressive P3s offer a range of benefits, they also present a set of significant challenges. As P3s continue to gain traction as a collaborative approach to tackling complex projects, it becomes increasingly crucial to navigate these challenges thoughtfully and proactively. (Nelischer (2023) argues that the early engagement of private sector partners in project visioning stages can lead to conflicts of interest and confusion regarding roles and responsibilities. Moreover, a reliance on trust and shared decision-making may not provide sufficient oversight, potentially allowing private interests to dominate the planning process. He also argues that this collaborative approach may not be viable in cases where extreme disparities in resources and power between public and private partners exist. These disparities can hinder effective

management of the partnership and even result in the privatization of the planning process (Nelischer 2023). Benefits of integrating different project phases seen in traditional P3s, where the private partner combines design, construction, financing, operations, and maintenance for life cycle optimization, may not be fully realized in Progressive P3s due to delayed engagement of facilities management expertise (Casady and Garvin 2022). Davies (2023) highlights concern regarding protecting intellectual property and reducing competitive procurement where private sector involvement occurs at an early project stage. Casady and Garvin (2022) also further this point by highlighting that competition, a foundation of traditional procurement, diminishes in Progressive P3s as private partners are selected through qualifications-based processes where higher pricing might result without competitive or market pressures. While Progressive P3s offer promising advantages, they come with substantial challenges that demand careful consideration. These challenges range from conflicts of interest and a potential lack of oversight to issues of intellectual property and lack of competitive procurement. To fully harness the benefits of Progressive P3s, addressing these challenges thoughtfully and proactively is essential.

FRAMEWORK DEVELOPMENT

Having extensively discussed the individual characteristics and applications of Project Alliancing, Integrated Project Delivery, Progressive Design Build, and Progressive P3, the paper now transitions towards a comparison of these methods against traditional project delivery approaches. This comparison is crucial as it highlights the distinctive features of collaborative methods in contrast to conventional practices. Table 3 highlights common features of Collaborative Delivery Methods and differences with Traditional Delivery Methods.

Table 3: Common Features of Collaborative Delivery Methods
(Ballard and Howell 2003; Fischer et al. 2018; Moradi 2021)

Common Features of Collaborative Delivery Models	Differences with Traditional Delivery Models
Early involvement of key participants	Focus is on the production system, not the contract
Joint planning, design, and control	Design and planning prioritizes joint design of the product and process and pays attention to the completion of the tasks when they are ready, not as soon as possible; contingency reserves are used for reducing system variability, not for self-interest
Joint decision making	
Open book approach for cost management	
Fair share of risk and reward	
Trust-based relationship	Decision making is unanimous, not divided
Open communication	Learning constantly happens throughout the project life cycle, not occasionally
Multi-party agreements	Stakeholder interests are aligned, not divided

Additionally, a novel framework developed as part of this study is presented as Table 4, designed to evaluate, and contrast the four collaborative delivery methods discussed previously. This newly developed framework aims to provide a granular understanding of each method's effectiveness in various project contexts, considering factors such as project complexity, stakeholder alignment, risk sharing, and dispute resolution among others.

Table 4: Characteristics of Collaborative Project Delivery Methods

Delivery Method Feature/Characteristic	Project Alliancing	Integrated Project Delivery	Progressive Design-Build	Progressive P3s
Contracting Structure	Single alliance agreement binding all key participants. "No-sue" clause.	Single contract for owner, architect, constructor	Two contracts or single contract for both phases	Pre-development agreement then comprehensive project agreement
Risk Allocation/Management	Collective risk/reward sharing	Aligned interests in contract. Shared contingency	Evolving shared risk	Collaborative risk allocation
Stakeholder Involvement/Timing	Early involvement of key participants. Collective decisions.	Early involvement of key trio. Collective control.	Phased collaborative involvement	Early private sector involvement after qualifications review. Collaborative development.
Collaboration Approach	Highly collaborative. Shared goals and interests.	Collaborative with aligned incentives	Collaborative input during design	Collaborative development of deal structure
Decision Making Model	Unanimous	Consensus-based	Varies	Shared
Dispute Resolution	Internal resolution without courts	Define in contract	Define in contract	Define in contract
Collaboration Culture	"No-blame" culture focused on project success	Alignment of goals, open communication	Collaborative input during design	Collaborative project shaping
Flexibility	Flexible to accommodate changes	Adaptable through collaboration	Flexibility for owner to influence design	Adaptable scope
Cost Control	Open book accounting	Enhanced through early collaboration	Improved cost modeling through negotiated GMP	Negotiated between private and public entity with some

Delivery Method Feature/Characteristic	Project Alliancing	Integrated Project Delivery	Progressive Design-Build	Progressive P3s
				aspects of open book accounting

CHAPTER 4

Major Bridge P3 Program (MBP3) Case Study

OVERVIEW OF MAJOR BRIDGE P3 PROGRAM

Description

The Major Bridge Public-Private Partnership (P3) Program in Pennsylvania was initiated to address the state's growing highway and bridge funding gap by replacing or rehabilitating major interstate bridges. A progressive approach using a predevelopment agreement (PDA) was employed to advance this program. Initially, the program targeted nine bridges, but ultimately only six bridge projects were advanced for rehabilitation. The program, which is a part of PennDOT's Pathways initiative, involves Bridging Pennsylvania Partners LLC (BPP), a consortium including Macquarie Capital and S&B USA Concessions, that was selected as the PDA Entity to design, build, finance, and maintain the selected bridges. The total cost of the program is estimated at $2.3 billion, with construction scheduled to start in September 2023 and completion expected between September 2027 and June 2028. The funding model uses an availability payment mechanism over a 30-year period after the last bridge is delivered (PennDOT 2024a, FHWA 2024b).

Figure 1 below shows the bridges identified in Package 1. They are located along I-78, I-80, and I-81 in Pennsylvania.

Figure 3. Six Interstate bridges selected for MBP3

The Progressive Public-Private Partnership (P3) approach for the Major Bridge P3 (MBP3) project was selected to prioritize efficient resource allocation, enhance project selection through a comprehensive evaluation beyond just cost, and ensure financial and project viability from an early stage. This method

fosters advanced design and risk assessment, accelerates the project schedule by packaging bridge projects, and was ultimately aimed at delivering higher-quality infrastructure improvements more efficiently across the Commonwealth (PennDOT 2023).

Timeline

Key events from program launch to financial close are listed in Table 1.

Table 5. Key Events in MBP3 Program

Program Launch	November 12, 2020
PennDOT releases Major Bridge P3 candidate locations	February 19, 2021
Request For Information (RFI) release	February 22, 2021
Industry outreach meeting	March 21, 2021
Request for Qualifications (RFQ) release	June-July, 2021
Short listed teams announced	September 20, 2021
Lawsuit against PennDOT bridge tolling plan is filed	November 2021
PennDOT selects team for Major Bridge P3	March 9, 2022
Predevelopment Agreement Execution	May 06, 2022
Predevelopment work was halted on the project amid the tolling lawsuit	May 18, 2022
Commonwealth Court panel ruled that PennDOT cannot move forward with plans to impose tolls on nine interstate bridges	June 30, 2022
Act 84 passed by General Assembly amending State P3 Law (PennDOT was permitted to continue work on the PDA)	July 11, 2022
Project was restarted after a two-month delay moving forward with Package 1 only	July 22, 2022
Planning and Environmental work resumes on the Six Bridges	September, 2022
Environmental Clearances issued for the bridges by FHWA	October, 2022
Project Package 1 Commercial Close	November 29, 2022
Project Package 1 Financial Close	December 22, 2022

GENESIS OF MAJOR BRIDGE P3 PROGRAM

Need for the Project

The Major Bridge Replacement and Rehabilitation Initiative, as part of PennDOT's broader Pathways initiative, was necessitated by the critical state of Pennsylvania's aging bridge infrastructure (PennDOT 2021a). With over 25,000 bridges, the Commonwealth ranks third in the U.S. for the number of bridges and

fifth for the number of bridges in poor condition. As of 2019, 10% of these bridges were rated as being in poor condition, with the average bridge age exceeding 50 years. Despite aggressive efforts by PennDOT through various programs to improve bridge conditions—successfully reducing the percentage of bridges in poor condition from 24% in 2008 to 10%, the growing highway and bridge funding gap, exacerbated by gas tax revenue losses and the impact of the coronavirus pandemic, highlighted the need for sustainable transportation funding options (PennDOT 2021a). The initiative aimed to accelerate the renewal of major bridges to ensure public safety, mitigate the financial and time impacts of bridge restrictions and closures, fairly distribute the cost of bridge maintenance and rehabilitation among users (including out-of-state traffic), and establish a sustainable funding model for the state's major bridges, addressing both immediate and long-term infrastructure needs (PennDOT 2021a).

Completed in 2021, the PennDOT Pathways Planning and Environmental Linkages (PEL) study indicated that financial constraints could lead to delays in maintaining essential infrastructure like bridges, causing increased future expenses and additional financial strain on Pennsylvania residents. Postponing maintenance also heightens the risk of bridge collapse. To mitigate these risks, State DOTs might resort to measures like bridge closures, resulting in major travel disruptions. Each day of closure imposes significant extra costs on drivers, estimated at $9.21 per detour trip in Pennsylvania, leading to daily expenses surpassing $67,000. Emergency repair situations exacerbate delays and expenses, as illustrated by a 2017 incident where road users incurred an additional expense of approximately $23.2 million (PennDOT 2021b).

Given the significant financial and public impact of bridge infrastructure deterioration and closures, as highlighted in the PennDOT Pathways study, the state acted through its Major Bridge P3 Initiative to start to address these critical issues. PennDOT assessed and selected nine bridges through the Major Bridge P3 Initiative, using the criteria below (PennDOT 2021b):

- These bridges need to be located on either an interstate or an expressway.
- Their significance is determined by factors like size, location, and the costs associated with rehabilitation or replacement.
- The state of the bridges requires immediate action to enhance safety and minimize community disruptions and effects should there be closures or weight limit impositions.
- The sites of the bridges ought to possess revenue-generating potential, given the overall traffic flow.
- A balanced geographic distribution of the bridges throughout the state is essential.
- It should be possible to initiate construction on these bridges within a span of two to four years, providing benefits soon.

Factors Leading to Delivery Approach

The key reasons why the progressive/PDA (Pre-Development Agreement) model was selected as the delivery method for the MBP3 project are (PennDOT 2023):

Enhanced Selection Process: The model allows for proposer selection based on a broad set of criteria including qualifications, pricing strategy, project approach, and other proposal-based factors, rather than focusing solely on the lowest price.

Resource Conservation: By shifting the burden of pre-development work to the PDA Entity, PennDOT can better allocate its resources towards advancing other necessary projects, optimizing the use of available funding and administrative capacity.

Efficient Project Delivery: The involvement of the PDA Entity from the pre-development phase enables the early integration of their expertise, delivery methods, and project management strategies. This results in projects with a clearer scope and work, established well in advance of traditional methods.

Financial and Risk Management: The model introduces a financial structure where the PDA Entity is responsible for financing the project. This not only confirms the project's financial viability from an early stage but also distributes the risk, allowing for lender scrutiny and underwriting.

Competitive Pricing and Risk Assessment: The open-book pricing strategy, based on early risk assessment, fosters transparency and competitiveness. This ensures that the project benefits from financial diligence and competitive constraints, leading to cost-effective execution.

Schedule Acceleration: By grouping bridges into discrete packages for development, the approach allows for the rapid progression from predesign to design phases, significantly speeding up the overall project timeline.

The approach also allows PennDOT to structure project implementation and delivery in a way that captures and maximizes efficiencies from the progressive approach by bundling bridges into packages (PennDOT 2021a). Moreover, packaging the bridges into a single procurement rather than multiple separate ones conserves resources and accelerates the procurement and delivery process. This method negates the need for numerous procurements, each with its own set of proposals and evaluations, thus streamlining the process, saving costs, and expediting timelines. Further, pre-development work identifies risks and opportunities early, aligning PennDOT and the PDA Entity's interests, and enabling the negotiation of more accurate and potentially lower project costs upfront (PennDOT 2023). This strategy, including its financing approach, aligns with PennDOT's objectives to efficiently address infrastructure needs while managing financial and operational risks (PennDOT 2023).

The foundational reasons for selecting the Progressive/PDA model are further validated by insights from project personnel. These interviews not only corroborate the initial motivations but also highlight the model's practical impact on collaboration and project execution.

In the course of interviews with project personnel involved in the Major Bridges P3 (MBP3) project in Pennsylvania, it was confirmed that several key factors influenced the decision to implement the project as a PDA. These factors included:

- Early Collaboration and Engagement

  Project representatives emphasized that the PDA approach is particularly suited for early collaboration. They highlighted the benefits of such an arrangement, explaining that it facilitates setting clear, well-understood expectations from the beginning, thereby minimizing the likelihood of future disputes and errors.

- Partnership Selection

  The selection process was designed to identify partners who not only provided the best technical and financial offers but also demonstrated a strong commitment to transparent and honest communication. According to project representatives, the project favored partners who engaged in transparent discussions and understood the client's perspective, which was integral to navigating the complexities of the project and ensuring its smooth execution.

- Risk Allocation

  A representative from the private sector noted that the PDA framework was particularly suited for efficient risk allocation, allowing for the identification and management of potential issues early in the project lifecycle. This approach allows for a clearer understanding of expectations and

responsibilities, which is crucial for managing uncertainties associated with large-scale infrastructure projects.

- Scope Refinement

  The refinement of scope was a critical factor in deciding to proceed with a PDA. The approach allowed for a more concentrated and manageable set of objectives in the early stages, ensuring that the project could move forward without overextending resources or setting unrealistic deadlines, which a public sector representative emphasized was crucial for maintaining a focused and effective project development phase.

- Contractor Involvement

  This approach allowed for early contractor involvement that facilitated a comprehensive approach to the project delivery, ensuring that the various aspects of the project, from design to construction, were aligned from the outset. Project participants noted that involving contractors early in risk discussions helped in ensuring a smoother execution and alignment project goals.

- Policy Alignment

  Additionally, while not explicitly stated by the interviewees, the discussion suggested that the PDA process was instrumental in effectively addressing political and public opposition. An interviewee noted:

  > If you read a bit about the project, and some of the challenges we had to face and navigate. What we were negotiating was overcoming the political and public opposition to tolling these bridges. And, of course, the PDA or the progressive delivery model helped, I think, navigate those waters, and ultimately led to a successful outcome.

During the interviews, both public and private sector representative also touched upon these factors that played a major role in selecting the progressive model as the delivery approach. From the public sector perspective, a representative of PennDOT drawing on lessons learned from the Rapid Bridge Replacement program, recognized the importance of upfront industry engagement and open communication stating that: "The PDA approach was valuable for open collaboration with the private partner during development, allowing us to apply lessons around proper risk allocation and establishing clear roles/responsibilities early on." The PDA approach allowed for a more transparent procurement process and a better public outreach campaign, with one-on-one meetings that were considered as "very critical." The PennDOT representative also mentioned that the PDA process gave them "the ability to discuss things with the private partner and make sure that there's as much clarification that you can have on scope of the project, and you could start bouncing ideas off of each other."

This was reinforced by the private sector representative from Shikun & Binui who believed that the progressive model facilitated early collaboration stating that "its ripe for early collaboration, leaving risks behind and de-risking projects before the final determination as to the delivery is made, and making sure that expectations are well understood early on."

PRE-PROCUREMENT ACTIVITIES

Prior to initiating the procurement process for the Major Bridge P3 (MBP3) project, PennDOT conducted a range of strategic pre-procurement activities with a strong emphasis on industry engagement. PennDOT specifically targeted industry professionals by hosting dedicated industry forums aimed at educating potential private-sector partners about the project scope and requirements. These forums were integral to a broader strategy that included engaging local contracting organizations through meetings and discussions, crucial in refining the proposed PDA/progressive P3 delivery model and confirming market interest. This approach successfully attracted a competitive and qualified pool of proposers with an overwhelmingly

positive response, highlighted by significant industry participation and interest (PennDOT 2023). Key events promoting industry engagement included an Informational Forum on January 7, 2021, which drew over 300 participants, and a Request for Information on February 22, 2021, that received responses from 23 firms. Subsequent Industry Outreach meetings held on March 29 and May 6, 2021; each attracted over 200 industry attendees (PennDOT 2023).

In parallel, PennDOT implemented public engagement efforts to involve the general public. This included hosting online and in-person meetings for seven of the nine bridges under consideration, which drew substantial community interest, with over 180,000 unique visitors to the project website and hundreds of public comments. To ensure ongoing transparency and to keep the public informed, PennDOT also established a monthly newsletter (Walzak 2022).

Ongoing engagement with legislative bodies and other stakeholders was also a priority, aligning with Pennsylvania's transportation Public-Private Partnership (P3) framework and involving coordination with the Public Private Transportation Partnership Board to ensure the project's approval (Walzak 2022).

Both the public and private sector representatives discussed the importance of pre-procurement activities and early engagement with stakeholders for the MBP3 project.

A PennDOT representative acknowledged that they could have done a better job with upfront outreach and communication:

> The project was stopped because of tolling…if we had done our proper outreach or proper community outreach in regard to our legislators and others, I don't think that would've happened.

The representative suggested that any type of outreach whether with the general stakeholders or one on one with prospective developers is "extremely valuable and very critical for any type of project."

A Shikun & Binui representative emphasized that the pre-procurement engagement was crucial in shaping the project's approach and scope, noting that the early communication process with the marketplace allowed PennDOT to understand that an availability payment (AP) structure would be preferred over a revenue risk model, and it signaled that PennDOT would take a more incremental approach with this project:

> I think the client did two things well; engaging in the early communication process with the marketplace, and that's how they came to an understanding that these bridges were going to be tolled, but even if they were to be tolled, the preference was for an availability payment P3 as opposed to a revenue risk model. And looking at some of the lessons learned from the rapid bridges, that came before, they were breaking the potential delivery of these targeted bridges into two or more contracts. So, it was more a paced approach.

The representative also highlighted how the pre-procurement activities influenced their interest in the project, as the local nature of the bridges made it particularly appealing for their Pittsburgh-based company:

> The project was very interesting to us by the mere fact that it was located in our backyard, and it would allow us to sort of, integrate the full spectrum of delivery of the company. Not only the concessions investment arm, but also our lead construction arm, and some of our affiliates that perform construction activities in the mid-Atlantic region as well.

PROCUREMENT PROCESS

General Description

PennDOT employed a two-step selection process to identify the most suitable proposer for the MBP3 project. Initially, they conducted a Request for Qualifications (RFQ), followed by a Request for Proposals (RFP) in the second phase.

Phase 1 – RFQ

In June 2021, PennDOT started the Request for Qualifications (RFQ) process to collect Statements of Qualifications (SOQs). An amendment in July 2021 allowed respondents to seek clarifications, and responses were due by August 12, 2021. PennDOT established an evaluation team, involving members from the Office of Chief Counsel and the Comptroller's Office. The RFQ had grading criteria set by the P3 Office:

- 600 points for competency and expertise in technical areas, along with practical experience
- 300 points for experience in investment and financial management

100 points for comprehension of project development and strategic approach

Four SOQs were submitted and assessed based on these criteria. In September 2021, PennDOT released the shortlisting of three teams for the subsequent Request for Proposals (RFP) stage (PennDOT 2023):

- Bridging Pennsylvania Partners (BPP) - Macquarie Infrastructure Developments LLC, Shikun & Binui Concessions USA Inc., STV Incorporated, FCC Construccion, S.A., Shikun & Binui – America Inc, and SAI Consulting Engineers Inc (PennDOT 2024a).
- Keystone Pathways Mobility Partners (KPMP) - Cintra Infrastructures SE, Itinera Infrastructure and Concessions Inc., Halmar International LLC, and North Tarrant Infrastructure LLC (unincorporated joint venture), Jacobs Engineering Group Inc., and KS Engineers, P.C (Roads&Bridges 2024).
- Keystone Pathway Developers (KPD) - Kiewit (Development Company, Engineering Group Inc., and Infrastructure Co., dba Keystone Pathway Constructors), Star America PA Bridges LLC, and Urban Engineers Inc (Roads&Bridges 2024).

Phase 2 – RFP

The RFP was released to the participants on December 15, 2021, with two additional updates approved by FHWA on January 6 and January 10, 2022. During this time, one of the initial three participants, KPD, pulled out due to reasons not connected to the project's delivery approach. Despite this, PennDOT proceeded with the process, relying on the competitiveness of the remaining two groups and their selection procedure. PennDOT obtained submissions from the engaged participants, BPP and KPMP, on January 19, 2022 (PennDOT 2023).

Both the public and private sector representatives discussed the unique aspects of the procurement process used for the MBP3 project, highlighting how it differed from a more conventional P3 procurement. From the public sector perspective, it was noted that the multi-step process, involving an RFQ followed by an RFP, was typical for P3s. However, the PennDOT representative felt this procurement to select the Development Entity/PDA Partner enhanced collaboration compared to a conventional approach. This approach allowed PennDOT to screen for the most qualified candidates early on, ensuring that only those with the requisite experience and capacity were considered for the project.

Scoring and Evaluation Criteria

The maximum score was 1000, with 700 points for the Technical Proposal and 300 points for the Financial Proposal (PennDOT 2022).

The Technical Proposal was evaluated based on: (1) the PDA work which is worth 400 points, including strategy, plans, and approaches for pre-development, packaging, subcontracting, and quality management, among others; and (2) the First Package Work was worth 300 points combining for a total of 700 points (PennDOT 2022).

The Financial Proposal was evaluated based on factors like Proposal Equity IRR, Development Entity Closing Fee, Pre-Development Cost Cap, D&C General Conditions Cost Percentage, D&C Markup Percentage, Maintenance Work General Conditions Cost Percentage, and Financing Plan (PennDOT 2022).

The selection of the Development Entity/PDA Partner was based on a combination of technical and financial evaluations. A representative from PennDOT highlighted that the technical panel for selection placed significant emphasis on the candidates' ability to clearly articulate their approach and demonstrate a sound understanding of the project's requirements.

Selection of Bridging Pennsylvania Partners (BPP)

Following the comprehensive and competitive procurement process, BPP emerged as the selected Developing Entity for the MBP3 project. BPP's proposal notably excelled in the technical segment, demonstrating robust strategies, plans, and approaches for pre-development, packaging, subcontracting, and quality management, which collectively accounted for a significant portion of the technical score. Their financial proposal also aligned well with PennDOT's objectives, featuring a compelling financing plan and cost structures that met the project's stringent economic criteria (Walzak 2022).

A representative from BPP elaborated on their proposal strategy, noting, "In the RFP response we had to put forth a proposal more balanced from a scoring perspective in terms of the weightage given to the financial versus the weightage given to the technical." The representative also highlighted how the RFP facilitated broader policy goals, noting, "PennDOT gave themselves the opportunity to advance some other policy decision, policy goals like, for example, in augmenting the level of local contractors, or that would perform the work," which added to the transparency of the procurement process. This transparency was further supported by mechanisms in the RFP designed to penalize unachievable financial proposals, thus preventing potential "bait and switch" tactics. The representative also noted that the **"**RFP in its totality, really spoke about finding a true partner that was transparent and acted with integrity" which BPP was able to demonstrate.

S&B's strategic decision-making and transparent communication played a crucial role in their selection during discussions about the scope of Package 1. This forthrightness about their capabilities and limitations, emphasizing a realistic deliverable, showcased their commitment to transparency. The representative clarified their reasoning, stating:

> We offered six. I understand the other competitor offer eight, we offered six and we explained clearly why these six and not the other three. And I think the rest is history. By the way, we did six in the first package. We did exactly what we said we would.

They maintained this consistent narrative throughout the process, ensuring that their commitments were both clear and achievable, which was instrumental in building trust with PennDOT and securing their role in the project.

A PennDOT representative emphasized the importance of the technical evaluation during the procurement process, where BPP excelled in demonstrating a clear understanding of the project's requirements and presenting a sound, achievable approach. The representative also commended the clarity and depth of their technical proposal, saying, "On the technical side, I could say that I think we felt that they did a much better job explaining things, explaining their approach on how they were going to go about things, giving us a comfort level that they understood things and that their approach was sound. It was achievable." Despite the close competition with another reputable team, it was BPP's well-articulated strategy and comprehensive understanding of the project that ultimately distinguished them.

Initiation

The Pre-Development Agreement became effective on May 6, 2022, which commenced the design work and negotiations associated with PDA Package One. This first package involves six of the nine major bridges (and associated roadways) covered under the overall PDA. The six bridges included in the DBFM (design-build-finance-maintain) Project Agreement for PDA Package One are:

- I-81 Susquehanna
- I-80 Nescopeck Creek Bridges
- I-78 Lenhartsville Bridge
- I-80 Over Lehigh River Bridge
- I-80 Canoe Creek Bridges
- I-80 North Fork Bridges

Following the effective date of the PDA, a project kick-off and partnering session was held on May 16, 2022, with key representatives from both PennDOT and the BPP team participating.

Legal Delays

However, the progression of these activities faced a significant hurdle when, on May 18, 2022, the Commonwealth Court issued an order that halted work related to the project due to concerns surrounding the proposed tolling component.

Court Order

Commonwealth Court Judge Ellen Ceisler temporarily stopped PennDOT's bridge tolling strategy, affecting all nine bridges under the Major Bridges P3 initiative. The decision sided with Cumberland County and several municipalities that deemed the tolling plans illegal and unconstitutional. Consequently, PennDOT was directed to halt all related activities, including studies, construction, and meetings. Later that summer, the Court permanently terminated tolling plans for specific bridges, including those in the Major Bridges P3 initiative, citing that the state had not followed proper procedures for approval. The judges supported three Pittsburgh-area municipalities' argument that PennDOT had not provided a clear list of bridges to be tolled for the state's P3 Board's approval. Because of this oversight, localities could not engage effectively in the approval process (Murphy 2023). This legal challenge put the project on hold for approximately two months, during which time legislative changes were made.

Pennsylvania Act 84

On July 11, 2022, Pennsylvania Act 84 of 2022 was enacted, amending the state’s P3 law to remove tolling of existing free lanes as an eligible component under the P3 provisions. Key changes enacted by Act 84 include:

1. The act modifies the definition of "public-private transportation partnership agreement," focusing on contracts that transfer control of transportation facilities from public entities to development entities. These agreements now clearly specify the types of services such as operations, maintenance, and financing, that can be included.

2. Amendments enhance the duties of the Public-Private Transportation Partnership Board, outlining the procedures for public and private entities to submit transportation project proposals. The board is tasked with evaluating these proposals, ensuring they align with Commonwealth interests. Notably, any project involving optional user fees must receive unanimous board approval.
3. The act mandates a comprehensive analysis of each proposed project, including its social, economic, and environmental impacts, and a detailed public input process. This analysis must be publicly accessible and subject to a comment period before board action.
4. The legislation specifies the conditions under which optional user fees can be implemented in projects, including the technology used for collection and enforcement standards. It ensures transparency and fairness in how these fees are imposed and collected.
5. **The act prohibits the imposition of new taxes on revenues or user fees generated from public-private transportation projects post-enactment. It also clarifies the taxation rules applicable to existing agreements.**
6. **A significant provision is the prohibition on mandatory user fees unless they apply solely to optional services, like limited access lanes.**
7. The act rescinds, in part, previous resolutions of the Public-Private Transportation Partnership Board, particularly those involving user fees for certain interstate and expressway bridges.

Re-initation of PDA Phase

The passage of Pennsylvania Act 84 of 2022 allowed the project to resume on July 22, 2022, without the tolling component.

Once the project resumed, PennDOT and the BPP teams conducted joint field reviews of the bridges in August 2022, followed by necessary design and management submittals in September and October of the same year. A critical part of this phase was the D&C cost reasonableness analysis conducted in October 2022. The BPP Team submitted an initial D&C Cost Model on October 7, 2022, which was thoroughly reviewed in detailed meetings between October 18-20, 2022, focusing on identifying cost discrepancies and opportunities for savings. This open book review process led to the submission of an updated D&C Cost Model on October 28, 2022. PennDOT confirmed that the process and cost estimates followed industry-standard practices and were reasonable given the market conditions and contract terms (PennDOT 2023).

Additionally, during this time, the project's NEPA compliance was managed by converting previously approved Categorical Exclusions (CEs) to Environmental Assessments (EAs) and then reverting to CEs after the tolling was removed, with all NEPA approvals secured by October 2022 (PennDOT 2023).

The negotiation phase was finalized with the restatement and amendment of the PDA on November 29, 2022, leading to the commercial close and financial close of the PDA Package One by December 22, 2022 (PennDOT 2023).

SOURCES OF FUNDING AND FINANCIAL STRUCTURE

Overview of funding

From the public sector perspective, a representative of PennDOT explained that the initial plan was to fund major parts of the nin-bridge scope through tolling revenues. However, a few months into the PDA phase, legislation was passed that prohibited PennDOT from tolling existing non-tolled lanes unless pre-approved.

As the representative stated, "we had to go back, and we really did have to reduce the scope because when things were tolled there was a lot more work, let's just say a lot of things that you want to do that you don't have to do."

Faced with restrictions on tolling, PennDOT re-evaluated its funding approach and decided to concentrate exclusively on the six bridges designated in the initial package. This strategic focus necessitated the exclusion of ancillary projects, including the development of smaller structures, approach roads, ramps, and intersections associated with these bridges.

The overall projected costs for design and construction of Package 1 are estimated at $1.5 billion, excluding financing costs. On January 12, 2023, the Department issued a $90,000,000 Mobilization Payment to BPP. This payment covers initial mobilization, associated costs, and material purchases.

Future payments to the development entity are structured as follows (PennDOT 2024a):

- A Milestone Payment - The Department will make a payment of $50,000,000 to the development entity upon the completion of 65% of the Design & Construction Work, with the earliest possible payment date being September 1, 2027.
- Availability Payments - The Department has committed to annual availability payments over a 35-year term to the development entity. These commence with a partial payment (not full year) in FY 2028, amounting to $48.0 million, marking the completion of construction for all six bridges. The following year, FY 2029, will see a payment of $143.8 million, reflecting the first full year's payment. Subsequent payments will adjust annually in accordance with the Consumer Price Index (CPI), culminating in an estimated $177.7 million in FY 2063. The projected final payment in FY 2064 is anticipated to be $26.6 million.

A representative of Shikun & Binui indicated that the legislative action prohibiting tolls did not fundamentally impact their perspective or confidence in the project. He explained that their financing approach was structured as an availability payment (AP) deal backstopped by the state, not a revenue-risk model dependent on toll proceeds:

> If it is a P3 deal with an AP base component, then you know the AP Payment is backstopped by the state. The other revenue generated for the project is one source of funds for them to make the payment but it's their shortfall, we're not going to be waiting to collect the payment, the payment is an obligation of the State.

While the tolling legislation was an unexpected development, Shikun & Binui had already designed their proposal and financing approach around the AP structure. Their primary concern was how PennDOT would fund the availability payments, but they maintained confidence in the state's commitment to the project moving forward.

As per the RFQ, PennDOT's primary funding for availability payments was intended to come from bridge tolls. Should the toll revenues fall short in any period, PennDOT would draw from federal and Commonwealth resources to ensure payment obligations would be met.

Once tolling was prohibited, PennDOT shifted its strategy, so that the funds for the availability payment would come from a combination of state and federal sources.

Overview of financial structure

In December 2022, the alliance led by Macquarie Capital and S&B USA Concession successfully completed the financial arrangements for the first phase of PennDOT's MBP3 Initiative. They secured $1.8 billion in Private Activity Bonds (PABs), which were backed by Wells Fargo Securities and JP Morgan, with maturity terms extending from 2029 to 2062. These bonds, issued by the Pennsylvania Economic

Development Financing Authority and with Bridging Pennsylvania Developer I (BPD1) as the borrower, have an interest rate ranging from 5% to 6% and yields between 3.81% and 5.33%. In addition to the bond proceeds, the project financing includes $150 million in expected interest income from the bonds and a substantial $140 million contribution from PennDOT. Furthermore, BPD1 will contribute equity of $202 million, divided as $122 million from Macquarie and $80 million from S&B USA. The role of collateral agent and trustee is managed by US Bank Trust Company.

implementation

The project entered the Final Design phase with the issuance of Notice to Proceed 2 on March 14, 2023. All design work for the six bridges is anticipated to be completed, and full construction is expected to start by June 2024. Limited Notices to Proceed (LNTPs) have been issued for initiating construction activities on specific bridges, such as the I-81 Susquehanna Bridge, with more LNTPs expected throughout the remainder of the calendar year. Substantial Completion of all six bridges is scheduled for June 2028, after which the Development Entity will maintain the bridges for a 30-year period (Bonini 2023).

CURRENT STATUS

Work is underway on the six bridges in Package One; details of each respective project are provided below (PennDOT 2024a):

- I-81 Susquehanna

  The I-81 Susquehanna Bridges Project involves reconstructing and repairing a nine-mile stretch of Interstate 81 from New Milford Borough to the New York border, including the replacement of dual bridges over the Susquehanna River built in 1961. This $529.9 million project addresses aging infrastructure, outdated interchange designs, and drainage concerns, with construction set to start in Summer 2023 and anticipated completion by Summer 2028. The project, designed by Michael Baker International, aims to double the current daily traffic capacity from 27,000 to 55,000 vehicles by 2045, improve safety, and update the corridor's pavement, bridges, drainage systems, and associated signage and barriers (PennDOT 2024b).

- I-80 Nescopeck Creek Bridges

  The I-80 Nescopeck Creek Bridges Project involves replacing and widening dual bridge structures (eastbound and westbound) on Interstate 80 over Nescopeck Creek in Black Creek Township, Luzerne County. Built in 1965 and last repaired in 2005, these bridges currently support an average of 33,000 vehicles daily, including significant truck traffic. The $98 million project, designed by Michael Baker International, aims to enhance safety, improve traffic flow, and extend infrastructure longevity by meeting current standards with wider shoulders. Construction is set to begin in Spring 2024 and is expected to be completed by Fall 2027 (PennDOT 2024c).

- I-78 Lenhartsville Bridge

  The I-78 Lenhartsville Bridge Replacement Project involves replacing and widening the existing bridge that spans Maiden Creek and PA-143 in Greenwich Township, Berks County. Constructed in 1955 and last rehabilitated in 1985, the bridge currently supports about 50,000 vehicles daily, with 30% being truck traffic. The $131.7 million project, designed by Michael Baker International, aims to enhance traffic flow and safety by adding auxiliary lanes and full shoulders in both directions on I-78, addressing the inadequate lane lengths at the PA-143 interchange. Construction is scheduled to start in Spring 2024 and complete by Summer 2028 (PennDOT 2024d).

- I-80 Over Lehigh River Bridge

  The I-80 Over Lehigh River Bridge Project involves the replacement of eastbound and westbound bridge structures on Interstate 80, originally built in 1965 and now nearing the end of their

serviceable lifespans. Located in Carbon and Luzerne Counties, these bridges currently handle an average of 27,400 vehicles daily, with significant truck traffic. The $148.9 million project, designed by Michael Baker International, aims to enhance safety and reliability by widening the bridges, extending the eastbound on-ramp auxiliary lane, and increasing barrier heights and shoulder widths to meet current standards. Construction is scheduled to start in Spring 2024 and is expected to complete by Spring 2028 (PennDOT 2024e).

- I-80 Canoe Creek Bridges

  The I-80 Canoe Creek Bridges project involves replacing the eastbound and westbound multi-span structures built in 1966 over Canoe Creek and Tippecanoe Road in Clarion County. The $252.2 million project, designed by Michael Baker International, aims to enhance safety and meet current design standards due to the poor and fair conditions of the westbound and eastbound bridges, respectively. The project, set to start in Fall 2023 and complete by Fall 2027, includes not only the bridge replacements but also roadway alignment improvements and rehabilitation of the Thompson Hill Arch Culvert to address deteriorated wingwalls and streambed scour (PennDOT 2024f).

- I-80 North Fork Bridges

  The I-80 North Fork Bridges Project encompasses the replacement of dual structures (eastbound and westbound) built in 1962 over North Fork Redbank Creek and Water Plant Road in Jefferson County. These bridges, which handle around 30,900 vehicles daily, 44% of which are trucks, are nearing the end of their serviceable lifespan with the eastbound bridge in poor condition and the westbound in fair condition. The $328 million project, designed by Michael Baker International, aims to improve safety and traffic flow by addressing the bridges' structural deficiencies and the substandard curve on the western approach that has led to a high crash rate. Additional replacements include the I-80 bridges over State Route 4003 (Jenks Street) and the State Route 4005 (Richardsville Road) bridges over I-80. Construction is scheduled to start in Spring 2024 and is expected to be completed by Summer 2028 (PennDOT 2024g).

In parallel, PennDOT is conducting a thorough review of project scopes and available funding for two of the nine bridge projects excluded from Package 1 as part of the 2025 12-Year Program Update. These projects include the I-95 Girard Point Bridge Improvement Project and the I-79 Bridgeville Widening, Bridges, and Interchange Reconfiguration Project (PennDOT 2024a).

On June 6, 2023, the PennDOT (PennDOT) terminated the Pre-Development Agreement (PDA) for Package 2 of the Major Bridge P3 (MBP3) initiative. This decision has redirected efforts towards advancing the I-83 South Bridge project through its environmental, design, and construction phases. To accelerate this vital project, PennDOT actively sought and acquired federal funding of $500 million for this project in July 2024 through funds from FHWA's competitive Bridge Investment Program (FHWA 2024).

LESSONS LEARNED

PennDOT Report

Recently, PennDOT's published an evaluation of their experiences with the MBP3 project to date (PennDOT 2023). These lessons learned reflect a comprehensive analysis of the project's lifecycle phases, from initial planning through to financial close. PennDOT has systematically documented these findings to guide future public-private partnership initiatives, ensuring that subsequent projects benefit from past experiences and adopt best practices for enhanced efficiency and effectiveness.

Pre-procurement:

- Early and extensive outreach to industry organizations is vital for understanding concerns and refining the project approach effectively.
- Public transparency early in the process is crucial, especially regarding elements like tolling, to manage stakeholder expectations and refine commercial terms.
- A streamlined and coordinated approach to integrating project expectations, roles, and responsibilities significantly benefits project execution.

Proposals Period:

- Establishing clear and efficient communication processes with shortlisted teams is essential, including a well-structured document management system.
- Legal documents should support the multi-phase delivery method comprehensively, with critical terms well-defined from the outset to guide subsequent agreements.

Evaluation and Selection:

- A structured evaluation process with support from subject matter experts ensures effective proposal assessment and enhances the selection process's transparency and fairness.
- Incorporating some pricing elements into financial proposals from the start can facilitate a more streamlined and effective negotiation phase.

Development and Agreement:

- An open book approach during negotiations can enhance cost transparency and validation, proving particularly valuable in volatile market conditions.
- Scheduling flexibility and clear milestone planning are crucial, especially to accommodate potential legal and procedural delays.

Commercial and Financial Close:

- Effective document management from the pre-procurement phase onward is crucial, with clear communication channels established for escalating important questions.
- Strong coordination with all relevant stakeholders from project inception ensures continuity and alignment throughout the project lifecycle.

Interviews

A representative from PennDOT while talking about their experience with the PDA and lessons learned, highlighted several advantages and disadvantages of the progressive model.

- **Advantages:**

The representative highlighted how the progressive approach fosters a collaborative atmosphere where all parties are encouraged to openly discuss options, advancements, and the merits and demerits of different design choices. This open dialogue is essential for innovative and adaptive problem-solving throughout the project lifecycle.

> We had an open design environment where we talk openly about the options. You talk openly about the goods and bads about things and as things are advanced, you work together to get them underway.

Further, the representative mentioned the progressive approach allowed for transparency in cost estimation, where the development entity reveals their numbers, facilitating a "gut check" against independent

estimates. This open book process aimed to build trust and ensure that all parties were aligned on the financial aspects of the project.

> So, I really liked that. I was really looking forward to the open book pricing…which really intrigued me.

- **Disadvantages:**

A significant challenge for the MBP3 project was its accelerated timeline. The constrained schedule did not permit the full exploration of collaborative benefits, particularly in terms of open book pricing and thorough engagement on cost adjustments.

> We only had maybe about a month or maybe six weeks to really start going through that, which does not give that process enough time.

A representative from Shikun & Binui also highlighted several advantages of the progressive model employing PDAs.

- **Advantages:**

The representative advocates for maintaining the integrity of PDAs as a tool for early project engagement and decision-making, stressing that PDAs should truly serve their intended purpose rather than being diluted through competing PDAs across multiple projects.

> A PDA needs to be what it is, which is a PDA. I would not encourage people to do competing PDAs. If you are applying that recipe for other projects in other markets what you're really doing is diluting the benefit of the PDA.

The representative also underscored that the greatest value of PDAs lies in allowing project stakeholders to make early, informed decisions about who to engage with, aiming to give projects a strong and efficient start.

> To me the biggest benefit the PDA brings... is that it allows people to make early decisions as to who to interact with in the hopes of getting a project finalized or to get a good start.

Finally, the representative highlighted the importance of PDAs in bringing new players into the P3 market, which is crucial for diversifying the pool of contractors and ensuring competitive pricing.

> The benefits of these approaches... you can give voice to the local contractors and make them part of it. Bring new voices into the mix that will help contain prices.

SUMMARY AND CONCLUSION

The MBP3 project under PennDOT's Pathways initiative exemplifies a progressive approach to public-private partnerships (P3), particularly through its utilization of the PDA model. This model was strategically chosen to enhance the project delivery process by fostering an environment conducive to collaborative problem-solving and innovation. The progressive/PDA approach is designed to integrate all parties early in the project lifecycle, allowing for a comprehensive discussion on design options and construction methodologies. This collaboration is essential for adapting project details in real-time and aligning them with evolving technical and financial realities, ensuring that the project's goals are met efficiently and effectively.

However, the project also faced significant challenges, particularly in terms of timeline constraints which limited the exploration of the collaborative benefits the progressive model aimed to provide. These constraints highlighted a critical aspect of the PDA approach: the need for sufficient time to leverage its full potential. The time-limited nature of certain project phases, such as cost negotiations and design

finalizations, underscored the necessity for a more elongated timeline to fully engage the benefits of open-book pricing and thorough stakeholder engagement, thus ensuring a deeper and more transparent alignment of Project costs and expectations.

Despite these challenges, the PDA model facilitated a level of transparency and flexibility not typically seen in traditional procurement methods. For instance, the open-book process allowed PennDOT and its partners to continuously align on cost estimations and project scope, building trust and ensuring financial prudence. The phased approach enabled by the PDA also allowed adjustments to be made in response to legislative changes, such as the amendments that led to the removal of tolls as a funding mechanism. This adaptability is crucial in public infrastructure projects where external factors such as legislative changes can significantly impact project delivery. The MBP3 project, through its progressive/PDA model, thus offers valuable lessons in balancing ambition with adaptability, aiming for innovation in public infrastructure while remaining responsive to the practicalities of regulatory and financial environments.

CHAPTER 5

Op Lanes Case Study

OVERVIEW OF OP LANES MARYLAND PROJECT

Description

The Op Lanes Maryland project has been a significant transportation initiative aimed at improving traffic congestion and enhancing transit options within the National Capital Region, specifically focusing on the Interstate 270 (I-270) and the Capital Beltway (I-495) corridors. This project has been part of Maryland's Traffic Relief Plan and included the construction and operation of managed lanes, which were designed to offer more reliable travel options(Op Lanes Maryland 2024a).

The Op Lanes Maryland project encompasses more than 70 miles of interstate, including all of I-495 in Maryland to the Woodrow Wilson Bridge, and all of I-270 from I-495 to I-70, including the east and west I-270 spurs (see Figure 4). It aims to provide congestion relief at no net cost to the State's transportation budget, leveraging private sector financing and delivery in exchange for the revenue generated through tolls (Op Lanes Maryland 2024a).

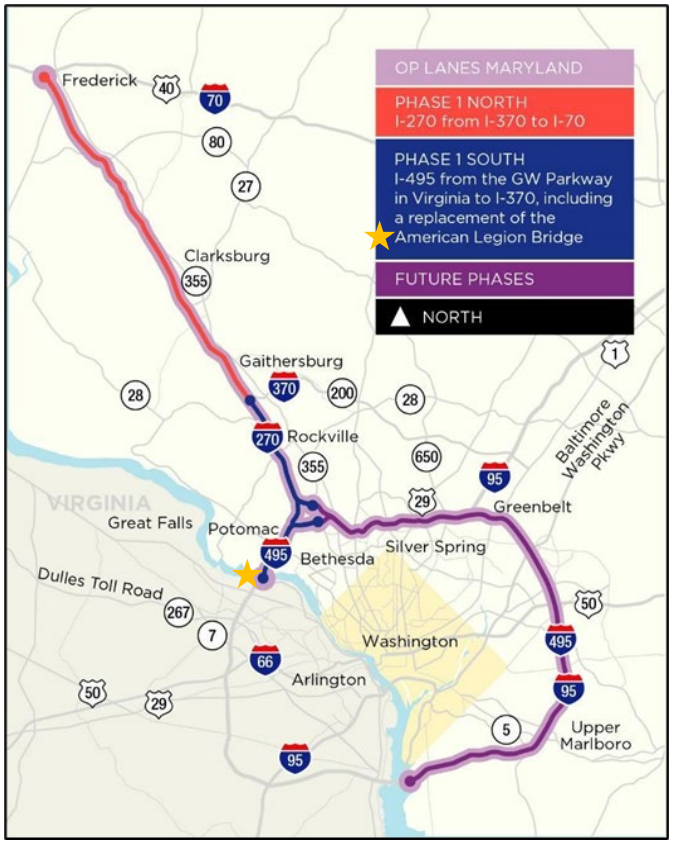

Figure 4. OP Lanes Corridor Map

The scope of the Initial Phase 1 P3 Agreement included Phase Developer (AM Partners LLC) to perform preliminary design and predevelopment work, and to reach out to all the stakeholders along with reporting agencies. On August 25, 2022, the Maryland Department of Transportation State Highway Administration (MDOT SHA), U.S. Department of Transportation (USDOT), and Federal Highway Administration (FHWA) announced the Record of Decision for the I-495 and I-270 Managed Lanes Study.

The ROD documented Alternative 9 as the Selected Alternative, and its scope included the replacement of the 60-year-old American Legion Bridge, two new High Occupancy Toll (HOT) managed lanes in each direction from south of the George Washington Memorial Parkway in Fairfax County, Virginia, to west of MD 187 (Old Georgetown Road) in Montgomery County, Maryland, along I-495. It also included the conversion of the existing high occupancy vehicle (HOV) lane in each direction to a HOT managed lane on I-270 from I-495 to north of I-370, and on the I-270 east and west spurs on I-270, as well as the addition of one new HOT managed lane in each direction on the same segments . The scope was also divided into Phase 1 South and Phase 1 North, with Phase 1 South including I-495 from the GW Parkway in Virginia to I-370, and Phase 1 North including I-270 from I-370 to I-70.

The project has included a joint agreement between the MDOT, SHA, and the Maryland Transportation Authority (MDTA). The state was supposed to retain ownership of the new facility and its highway improvements and be responsible for ensuring the facilities met their public function throughout the life of the agreement. The development entity selected was Accelerate Maryland Partners LLC (AM Partners), led by Transurban and Macquarie Capital, to perform Predevelopment Work and deliver the American Legion Bridge I-270 to I-70 Relief Plan (Davies 2024).

Maryland decided to use the progressive P3 approach to minimize risks to the state and provide more efficient pricing and better schedule certainty. Through the progressive P3 approach, it was expected to leverage private sector innovation and attract significant investment, optimizing the transfer of key risks while delivering numerous benefits to the state (MDOT 2021a).

However, the contract with AMP was terminated in March 2023, when AMP decided to withdraw due to frustrations over delays in environmental approvals, lawsuits, rising costs, and changing political leadership in the state (Sears 2024, Parsons 2024b). Although significant costs had been incurred up to that point, choosing not to continue with the project allowed AMP's owners to use their operating cash and corporate liquidity for other purposes (Transurban 2023).

This case study aims to analyze the progress of the Op Lanes project to examine the characteristics, strengths, and weaknesses of the Progressive P3 method and to derive the implications that the project's fate presents for future Progressive P3 projects.

Timeline

Key events are listed Table 6 and below.

Table 6. Timeline of Key Events

Request For Qualifications (RFQ) issued	February 7, 2020
Shortlisted proposers announced	July 17, 2020
Draft Request for Proposals (RFP) issued	July 24, 2020
Final Request for Proposals (RFP) issued	December 18, 2020
Three pre-development work proposals were submitted	December 23, 2020
Three financial proposals submitted	January 8, 2021
Announcement of Selected Proposer	February 18, 2021
CEMP filed a protest objecting to the award decision	March 1, 2021
MDOT issued a final decision that rejected each protest basis as meritless and untimely.	April 15, 2021
CEMP filed an appeal of the Final Decision to MDOT and requested a hearing on its appeal	April 21, 2021
The Board of Public Works (BPW) approved the recommended award of the Phase P3 Agreement for predevelopment work to AMP.	August 11, 2021

Phase P3 agreement signed	August 18, 2021
Predevelopment Work	Spring 2021 – Fall 2022
AMP submitted a complete and compliant section proposal for Phase 1 South after the deadline was moved from an earlier date	November 17, 2022
Lawsuit by CEMP formally dismissed by Court	November 22, 2022
AMP terminated the PPP Agreement with MDOT and the MDTA	March 9, 2023
Joint stipulation of dismissal with prejudice, dismissal of case confirmed	May 25, 2023

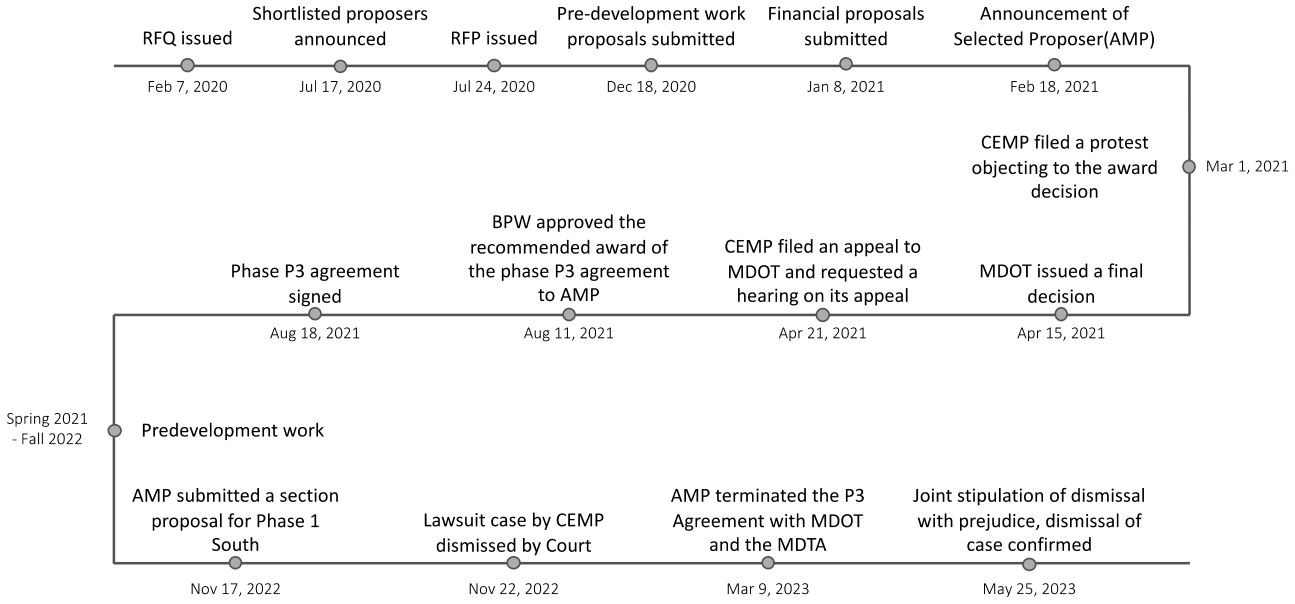

Figure 5. Schematic Timeline of Key Events

GENESIS OF THE OP LANES MARYLAND PROJECT

Interest in the Op Lanes project emerged from several critical factors affecting the National Capital Region, particularly high traffic volumes and unpredictable travel times, given the area's economic importance. The Program Corridor saw over 260,000 vehicles daily, and population and employment growth, as outlined in the Maryland State Highway Mobility Report, had led to increasing congestion and delays on key highways. Managed lanes were selected to address these issues and improve transportation services. I-495 and I-270 experienced significant congestion, reducing reliability and increasing crash risks. Long-term traffic management was deemed necessary to alleviate both current and future congestion. Managed lanes were proposed as a dependable solution, functioning effectively even when regular lanes were overburdened. Without intervention, congestion was projected to worsen, leading to more delays and costs for commuters (Op Lanes Maryland 2024c).

The managed lanes also offered options like tolls for faster travel or carpooling, supporting efficient transit and multimodal solutions. I-495 and I-270 are vital for the economy, facilitating the movement of goods

and services, including commuter traffic and freight. Congestion on these corridors raises travel costs and creates an unreliable transportation network, ultimately affecting the region's economy. Efficient highway movement is crucial for maintaining access to densely populated areas, government, and military facilities in the National Capital Region. Increased capacity could improve emergency response times and allow for easier evacuations during crises (Op Lanes Maryland 2024c).

However, critics argued against the project, citing concerns about high tolls imposed on the public, which many deemed an unfair burden. Allowing a private, foreign corporation to lease public property for a nominal fee while charging citizens for its use was seen as contrary to public interest. This approach could disproportionately affect low-income commuters, exacerbating social inequality rather than resolving congestion issues (Maryland Board of Public Works 2021b).

Environmental concerns were also significant, as the project's environmental impact study remained incomplete. Without thorough financial and environmental analyses, the true costs, including potential environmental harm, could exceed initial estimates, leading to long-term consequences that might outweigh the project's intended benefits (Maryland Board of Public Works 2021b).

Factors Leading to Delivery Approach

Before the project was implemented, MDOT made various efforts to develop a viable solution, involving close collaboration with stakeholders to advance environmental studies, engage with industry, and analyze various delivery methods. According to the project report submitted by MDOT and MDTA to the Maryland General Assembly in 2021, they decided to use the progressive P3 approach to minimize risks to the State and provide more efficient pricing and better schedule certainty. Additionally, the progressive P3 approach was expected to leverage private sector innovation and attract significant investment, optimizing the transfer of key risks while delivering numerous benefits to the state (MDOT 2021a).

Final decision authority in Maryland rests with the Baord of Public Works (BPW), which consists of the governor, the state comptroller, and the state treasurer. The governor and comptroller are both elected positions, while the state treasurer is selected by a joint vote of the state House of Delegates and Senate. Given this structure, the BPW is independent of the governor, who controls only one of the three votes.

In the meeting before the BPW to consider the decision, the Secretary of MDOT explained the necessity of the project itself and the reasons why a P3 approach was needed for this project, BPW ultimately approved the project with a 2-1 vote (Maryland Board of Public Works 2021b).

MDOT's choice of the P3 approach arose from several considerations. First, risk and revenue sharing with the private sector was one of the key factors. MDOT cited the successful example of Virginia's priced managed lanes in the national capital region as a model. Virginia's implementation of priced managed lanes had proven effective in providing congestion relief, resulting in more reliable travel times for all users, including transit riders, carpoolers, toll payers, and general-purpose lane users, despite increasing demand. These lanes also generated the necessary revenue to cover project costs and long-term maintenance. Achieving public benefits and generating revenue was impractical without completing substantial road sections. A piecemeal approach would have been less effective since significant benefits would only materialize once a corridor of lanes is completed. Therefore, significant financing was essential to advance proposed improvements meaningfully. The P3 model was expected to enable MDOT to deliver a priced managed lanes solution across Phase 1 South promptly, transferring toll revenue performance risk to a Section Developer while leveraging private capital through equity and debt (MDOT 2021a).

Another key factor was that a would allow the state to save public funds by drawing in private capital. Using a public delivery model for MDOT SHA would have required significant funds from Maryland's Transportation Trust Fund, equaling an entire year's capital program just to reconstruct the American Legion Bridge. Completing Phase 1 South would have used about three years' worth of funds, forcing delays

or cancellations of other projects. Raising funds through MDTA bonds or consolidated transportation bonds (CTBs) wasn't viable due to debt limits, making P3 the only financially feasible option at the time (MDOT 2021a).

According to interviews with industry and government experts, the complexity and uncertainty of the Maryland Op Lanes project increased the need for a progressive model among the various P3 options. The interviewees highlighted that a progressive P3 is recommended "when there is uncertainty about project details or critical risks such as environmental permitting or right-of-way acquisition" and in situations where the project is "vague or broad." For the Op Lanes project, interviewees held that improving congestion through traditional capital improvement delivery methods would have been challenging and costly due to the large scale and complex nature of the project, the existing highway system, land uses, and travel patterns in the region. Moreover, the Op Lanes faced various uncertainties such as difficulties in the NEPA approval process due to opposition from environmental groups, conflicts with local resident groups over the preservation of historic sites, and the 8-year term limit of a governor who was favorable to the project at the time.

Interviewees stated that the progressive model helped resolve complexities and define the project by selecting and involving private partners from the beginning, incorporating their input into the project planning and design processes to effectively prevent potential problems. Additionally, they noted that the progressive model helped reduce uncertainties in the project and minimid issues such as budget overruns or schedule delays through resource optimization and effective task/activity coordination from the project's early stages.

PRE-PROCUREMENT ACTIVITIES

Before initiating the Op Lanes project, MDOT conducted various pre-procurement activities such as industry forums, workshops, and webinars – focusing on industry stakeholders. Through these activities, MDOT aimed to provide information and requirements about upcoming projects to industry participants, identify potential business partners, and improve the P3 model.

In December 2018, an international Industry Forum was held, attended by over 300 key industry stakeholders. Information was shared on the overview of Op Lanes Maryland, updates on the environmental process, and the recruitment process for the first phase of Op Lanes Maryland (MDOT 2018a). In August 2019, the Opportunity MDOT Kick-Off Workshop provided information to companies interested in participating in the project on what steps they should take to be prepared for upcoming opportunities. In December 2019, the Teaming & Partnering Workshop was held to offer small, minority-, women-, and veteran-owned businesses, and disadvantaged businesses interested in Op Lanes Maryland the opportunity to engage with prime contractors and receive expert advice on how to prepare their businesses for potential work (MDOT 2024a).

Additionally, just before the RFQ was issued in January 2020, an Industry Update Webinar was held to provide a comprehensive overview of the project, including the RFQ, RFP procedures, evaluation criteria, and the overall P3 model participation process (MDOT 2020a). Multiple public workshops and hearings were also held to gather feedback, improve the project, and build consensus, targeting not only private stakeholders but also interested individuals, organizations, and public agencies (MDOT 2024b).

Apart from these events, MDOT and MDTA developed the Presolicitation Report (PSR) for Op Lanes Maryland, as required by Maryland law before seeking official designation by the Board of Public Works as a public-private partnership. This report outlined the need and rationale for the P3 project and provided a detailed explanation of how MDOT and MDTA intended to pursue the benefits of a P3 (MDOT 2018b). Additionally, MDOT issued biannual newsletters to share updates on the project preparations (MDOT 2024c).

In project interviews, P3 experts confirmed the importance of these pre-procurement activities in the progressive approach. A public sector representative stated, "…it allows engagement with the public and stakeholders as the design evolves, incorporating their feedback," noting that this is hardly possible in the traditional competitive process due to "commercial confidentiality." Additionally, they mentioned the PDA approach enabled "holding public meetings and discussions with elected officials to build consensus and gather input throughout the design process."

A private sector interviewee also commented on this, emphasizing that industry soundings and general market outreach are used to "gauge interest from the contracting and developer industry" to see if they are willing to participate. However, during MDOT's public outreach process, it was noted that small groups could delay projects over environmental or other concerns, which underscored the need for thorough stakeholder engagement to address valid points and avoid blocking progress. Interviewees also highlighted that, "Continuous engagement with stakeholders is crucial and requires significant investment in time and money throughout the project's duration."

PROCUREMENT PROCESS

General Description

MDOT used a two-step process to identify and select the most suitable developers starting with an RFQ in the first phase, followed by an RFP in the second phase (MDOT 2021a).

Phase 1 – RFQ

MDOT issued an RFQ in February 2020, seeking Statements of Qualification (SOQs) to identify potential developers. The RFQ set overarching goals including congestion relief, minimizing impacts, no net cost to the State, accelerated delivery, and innovation. It was expected that Phase 1 would be developed and delivered by the Phase Developer selected through the RFP initiated by the RFQ (MDOT 2022).

The RFQ outlined the overall solicitation process, allowed potential proposers to ask questions, and required SOQ submissions from teams desiring to be shortlisted and proceed to the RFP process. The evaluation process and criteria for SOQ submissions were described, including three main criteria: Phase Developer Team (Critical), Key Personnel (Significant), and Understanding of Development Approach (Important), each with different weights. The RFQ explained that SOQs would be evaluated as Exceptional, Good, Acceptable, or Unacceptable, with further differentiation possible within those ratings (MDOT 2022).

Interested proposer teams submitted SOQs, and on July 17, 2020, MDOT announced four teams as Shortlisted Proposers:

1. Accelerate Maryland Express Partners (AMEP), led by Itinera Infrastructure & Concessions;
2. Accelerate Maryland Partners LLC (AMP), led by Macquarie and Transurban;
3. Capital Express Mobility Partners (CEMP), led by Cintra, Meridiam, and John Lang; and
4. Potomac Mobility Group (PMG), led by Vinci Highways.

These teams would move forward in the P3 Program solicitation process and have the opportunity to submit technical and financial proposals in response to the final RFP (MDOT 2022).

Phase 2 - RFP

In July 2020, an RFP was issued, which included the terms and conditions governing how the Project would be delivered by Phase Developer and Section Developers (MDOT 202b). Over the next six months, the Reporting Agencies, MDOT and MDTA, received over 1500 written questions and met with Proposers to provide clarifications, receive feedback, and optimize the P3 agreements. Three pre-development work proposals were submitted on December 23, 2020, followed by three financial proposals submitted on January 8, 2021 (MDOT 2021a).

Compared to the Phase 1, there were changes in the team compositions for their RFP proposals. In the case of CEMP, Meridiam Capital Express dropped out from the Lead Project Developer, and HNTB Corporation was newly added as the Designer. On the AMP side, the Lead Contractor was replaced by Transurban and Macquarie, who are also the Lead Project Developers. Specifically, the changes on the AMP side meant that Transurban and Macquarie would together serve dually as Lead Project Developer and Lead Contractor. This raised concerns by CEMP later because the timing of this announcement—after proposal submission—gave none of the other proposers an opportunity to shape their proposals in light of that development (Gansler 2022).

The three teams that submitted proposals were:

1. Accelerate Maryland Partners (AMP)
    a. Lead Project Developer/Equity: Transurban (USA) Operations Inc. and Macquarie Infrastructure Developments LLC
    b. Lead Contractor: Transurban and Macquarie (At the time of the announcement, Archer Western Construction, LLC)
    c. Designers: Dewberry Engineers Inc. and Stantec Consulting Services Inc.
2. Capital Express Mobility Partners (CEMP)
    a. Lead Project Developer/Equity: Cintra Global SE and John Laing Investments Limited (At the time of the announcement Cintra Global SE, Meridiam Capital Express, LLC, and John Laing Investments Limited)
    b. Lead Contractor: Ferrovial Agroman US Corp.
    c. Designers: AECOM Technical Services Inc. and HNTB Corporation (At the time of the announcement AECOM Technical Services, Inc.)
3. Accelerate Maryland Express Partners (AMEP)
    a. Lead Project Developer/Equity: Itinera Infrastructure & Concessions, Inc.
    b. Lead Contractors: Halmar International, LLC and Itinera S.p.A
    c. Designer: Atkins North America, Inc. and Gannett Fleming, Inc.

Scope of Work

The Selected Proposer was expected to manage the successful preliminary development of Phase 1 consistent with the requirements of the RFP. Upon BPW approval of the Phase P3 Agreement, the Selected Proposer for Phase 1 would enter into the Phase P3 Agreement as the “Phase Developer/.” The Phase Developer was responsible for the predevelopment work, as set out under the Phase P3 Agreement (the "Predevelopment Work"), and for the process leading to execution of each Section P3 Agreement.

After MDOT approval of a Committed Section Proposal for each section of Phase 1, and with BPW approval, MDOT and MDTA would enter into a Section P3 Agreement for such section (the "Section P3 Agreement") with the "Section Developer,” an entity controlled and established by the Phase Developer. For each section of Phase 1, the relevant Section Developer would be responsible for the final design, construction, financing, tolling, operation, maintenance, and handback of that section, as such work is defined under the Section P3 Agreement (the "Section Work").

Selection Process

The Selected Proposer was expected to manage the successful preliminary development of Phase 1 consistent with the requirements of the RFP. Upon BPW approval of the Phase P3 Agreement, the Selected Proposer for Phase 1 entered into the Phase P3 Agreement as the "Phase Developer." The Phase Developer was responsible for the predevelopment work, as set out under the Phase P3 Agreement (the "Predevelopment Work"), and for the process leading to execution of each Section P3 Agreement.

MDOT formed technical evaluation teams and an Evaluation Committee, including members from MDOT, MDOT SHA, MDTA, industry experts, advisors from Montgomery and Frederick counties, and an observer from FHWA. The evaluation process involved three stages. Initially, the Technical and Financial Review Teams, comprising 40 experts with over 500 years of combined experience, assessed the proposals through 15 meetings, spending 120 hours on detailed reviews and group deliberations. Following this, the Evaluation Committee, including senior leadership from MDOT, MDOT SHA, MDTA, community representatives, and an FHWA observer, reviewed the work of the review teams. They held six full-day meetings and spent over 50 hours deliberating. Finally, the Selection Committee, consisting of the MDOT Secretary, MDTA Executive Director, and MDOT SHA Administrator, approved the Evaluation Committee's recommendation (MDOT 2021a, Maryland Board of Public Works 2021a).

The teams evaluated proposals based on specific criteria: Delivery Certainty, Minimize Impacts, Maximizing Value to the State, Opportunity MDOT/Community Benefits, and Congestion Relief. Each team focused on their assigned criterion and sub-criteria, developing consensus adjectival rating recommendations. After completing the technical evaluations, the Evaluation Committee assessed the financial proposals and conducted a trade-off analysis as outlined in the RFP, to determine the proposal that would provide the greatest benefit to the State. (MDOT 2021a, Maryland Board of Public Works 2021a).

Table 7. Selection Categories and Criteria

Category	Criteria	Considerations
Technical aspect	Delivery Certainty (Priority: Critical)	- Emphasis on the proposer's strategy to conduct Predevelopment Work and reach Financial Close for Phase 1's first section, with goals to maximize value, minimize state risk, and assess the impact on all project objectives. - Highlighting the proposer's collaboration with stakeholders, leveraging their expertise for risk management, and incorporating lessons learned from critical past experiences into Phase 1's approach. - Detailed approach for sequencing Phase South, including timelines for reaching Financial Close, a summary schedule for Predevelopment Work, construction, and operation commencement
	Quality Control (Priority: Significant)	- Methodologies to ensure quality and risk minimization in Predevelopment Work, ensuring comprehensive inclusion and communication in the technical proposal for P3 agreements. - Strategies to maintain consistency across Phase 1 and with future operations and maintenance responsibilities to achieve long-term performance requirements. - Strategies for selecting and contracting with external subcontractors to ensure competitive pricing, quality, and cost efficiency. - Developing a tolling strategy to enhance travel time reliability, condition of the facility, and ensure long-term operation and maintenance.
	Opportunity MDOT/Community Benefits (Priority: Important)	- Maximizing local workforce involvement in Predevelopment and Section Work, creating opportunities for area residents. - Methods for involving local small, minority, disadvantaged, and veteran-owned businesses during Predevelopment and Section Work. - Collaborating with local labor unions and contractors for community benefits and local participation. - Ensuring goals for minority and disadvantaged business participation are met, including on-the-job training and reporting

Category	Criteria	Considerations
	Congestion Relief (Priority: Important)	- Approaches to develop and maximize regional transit services complementing the Priced Managed Lanes, providing alternative travel options. - Strategy to ensure GP Lanes offer maximum congestion relief and dependable journeys for users of the Priced Managed Lanes. - Creating and implementing a TMP to manage traffic impacts, coordinating schedules, and maintenance with other projects for efficient traffic flow.
Financial aspect		The Financial Proposal score is the sum of points from these seven criteria, combining various aspects of cost, fees, and percentages to gauge the financial viability and efficiency of each proposal: 1. Points are awarded based on the Proposal Equity Internal Rate of Return (IRR), with a cap that cannot exceed 17%. 2. Calculated using a formula that awards points based on the percentage of the developer closing fee. 3. Points are given based on the aggregate Development Rights Fees (DRF), with a cap at $145 million. 4. Determined by a formula based on the predevelopment cost cap (PCC). 5. Points are awarded based on the percentage of Direct and Condition (D&C) General Conditions Costs relative to the D&C Costs. 6. Based on the allowed percentage markup on D&C Costs. 7. Points are based on the percentage of Renewal Work General Conditions Costs.

Although CEMP's technical proposal was slightly better than AMP's, AMP's financial proposal scored significantly higher. The Evaluation Committee concluded that the higher financial proposal score of AMP outweighed the marginally higher technical rating of CEMP, making AMP's proposal the most advantageous offer to the State and the overall best value. The Evaluation Committee presented its recommendation to the Selection Committee, which agreed with the Evaluation Committee's assessment when both technical and financial proposals were considered (MDOT 2021a, Maryland Board of Public Works 2021a).

AMP's financial proposal consisted of a $145 million Development Right Fee (DRF) and a $54.3 million Predevelopment Cost Cap (PCC), which were considered more competitive than other proposers. AMP's margins for Design and Construction (D&C) General Conditions Costs and Contractor Markup Costs were also competitive, although the figures were not disclosed to the public. However, CEMP later claimed that they were commercially unfeasible, which should have disqualified their proposal (Gansler 2022).

AMP's pre-development work proposal also included potential solutions for funding public transit services, community grants, Vision Zero initiatives, and an innovation alliance for Phase 1 South. They estimated $5 million support for Vision Zero to enhance pedestrian and cyclist safety during construction and planned to invest $300 million in public transit services over the 50-year term of the Phase 1 South Section P3 Agreement. Additionally, AMP intended to allocate $25 million for community grants and another $25 million to support emerging technologies through the innovation alliance (MDOT 2021b).

Table 8. Summary of Proposal Evaluation

Proposer	Technical Rating	Financial Score
Capital Express Mobility Partners (CMP)	Good+	665
Accelerate Maryland Partners, LLC (AMP)	Good	1,356
Accelerate MarylandExpress Partners	Acceptable	800

The AMP team as ultimately awarded consisted of the following team:

- Lead Project Developer/Equity: Transurban (USA) Operations Inc. and Macquarie Infrastructure Developments LLC
- Lead Contractor: Transurban and Macquarie
- Designers: Dewberry Engineers Inc. and Stantec Consulting Services Inc
- Supporting Construction Manager: Bechtel Infrastructure Corporation

SOURCES OF FUNDING AND FINANCIAL STRUCTURE

The financial plan for Phase 1 involvedw the preparation of a detailed and committed section proposal for each section by the Phase Developer. The financial plan was developed in collaboration with MDOT on an open-book basis, detailing the design, construction, operation, and maintenance costs (MDOT 2021b).

The state's contributions to the project were minimal, with no payments anticipated for predevelopment work once financial close was achieved. Federal loans or credit assistance were also not provided directly to the Reporting Agencies under the Phase P3 Agreement. However, the primary federal assistance tool expected to be used was USDOT's TIFIA credit assistance program. The Phase Developer was responsible for outlining and securing a TIFIA loan through a comprehensive financing work plan, including necessary submissions and reviews (MDOT 2021b).

Private investment was a significant component of the financial plan, with the Phase Developer bearing the risk for predevelopment work without state funding. The developer was expected to secure financing commitments from various sources, including tax-exempt Private Activity Bonds (PABs), taxable bank debt, and private placements. For sections utilizing PABs, the Maryland Economic Development Corporation (MEDCO) was designated as the issuer, and the Phase Developer was solely responsible for obtaining necessary ratings, legal opinions, and credit enhancements (MDOT 2021b).

Local and other funding contributions were not anticipated beyond the sources. The section construction responsibilities were to be financed through private debt and equity, secured solely on toll revenue, without recourse to MDOT, MDTA, and the state. The MDTA planned to issue toll revenue bonds under a new master trust indenture, with the Phase Developer purchasing these notes in a private placement. These financial arrangements were designed to ensure that the project costs borne by the state were managed effectively, without impacting the state's debt capacity or MDTA's ability to advance other capital projects (MDOT 2021b).

CURRENT STATUS

Transurban decision to exit

Transurban decided to exercise its contractual right to terminate involvement in the project due to frustrations over delays in environmental approvals, lawsuits, rising costs, and changing political leadership in the state. The exit was announced March 10, 2023. Specifically, a Transurban representative stated, in an interview with Engineering News-Record, "the project continues to face challenges including significant delays to environmental approvals, a changing political landscape and environmental lawsuits that remain unresolved." The representative also cited uncertainties with "supply chain and other financial pressures in the construction market" (Parsons 2024b).

The Transurban representative cited the lawsuits filed by environmental groups in late 2022 as a major concern, as this created substantial legal uncertainty. With the lawsuits likely to take over a year to resolve, Transurban was worried about being bound to a financial proposal when the full risks and costs were still unclear (Parsons 2024b). Also, interviewees commented that the project's environmental impact mitigations were extremely restrictive and raised costs substantially, and that state commitments to other stakeholders could redound to AMP's expense.

In addition to the environmental concerns, interviewees mentioned that the unforeseen impacts of COVID-19 and wars, including a significant revenue drop, doubled interest rates, and increased supply chain costs, drastically heightened financial risks. Rising interest rates and dramatic increases in construction costs raised the price tag of the project each month. Since Maryland had stipulated that the project would require no public subsidy, AMP was at risk for rising expenses.

The change in state political leadership with the election of Governor Wes Moore in November 2022 also influenced Transurban's decision. Transurban attempted to negotiate an extension of the contract period with the state, but the new administration insisted on adhering to the original contract timeline. As a result, the company felt uncertain about continuing the project and decided to terminate the agreement.

Interviewees also discussed the role of PDAs in the exit. Some interviewees stated that the PDA was appropriate given the complexity and uncertainty of the Op Lanes project and that withdrawal was based on the course of events encountered in the project. Interviewees also highlighted that PDAs facilitated easier exits by incorporating clear off-ramps. The project could end with "a failure to agree," allowing both parties to walk away without significant penalties. The financial impact on both sides was mainly the money spent on developing the project, and "no money changed hands."

Other interviewees observed that while the ability to terminate the contract by mutual agreement without disputes was a positive aspect of the PDA, it should not overshadow the fact that the project ultimately failed, noting that negotiating for years and spending millions of dollars only to see the project end signifies inadequate project preparation raises questions about sponsor's management of the contract.

Losing Consortium - CEMP's Lawsuit

CEMP, one of the competing bidders led by Cintra, lodged a bid protest against MDOT, contesting the awarding of a contract for the development of toll lanes on the Capital Beltway and Interstate 270. The protest, filed on March 1, 2021, contended that Maryland wrongly granted the contract to Australian toll-road operator Transurban and Australian investment bank Macquarie, alleging a lack of construction expertise and an "unrealistic" financial pitch (Shaver 2021).

Main Arguments of CEMP (Gansler 2022)

CEMP argued that MDOT's selection of AMP was arbitrary and capricious, primarily because AMP's financial inputs were unrealistic and did not comply with the RFP's definitions and formulas. CEMP contended that AMP's proposed margins for Design and Construction (D&C) General Conditions Costs and Contractor Markup Costs were commercially unfeasible, which should have disqualified their proposal. For instance, AMP's bid included percentages that were significantly lower than what CEMP and other bidders proposed, which CEMP argues are not sustainable in a real-world scenario. CEMP asserted that MDOT ignored the RFP's clear stipulations requiring realistic and appropriate financial values, effectively bending the rules to favor AMP. They claimed that MDOT failed to consider or identify the risks associated with AMP's proposal, which includes underestimating the actual costs for D&C General Conditions and Contractor Markup. CEMP contended that AMP's proposed financial model was not sustainable and would likely lead to cost overruns and project delays. For instance, CEMP argued that the low margins proposed by AMP would not cover unforeseen expenses or changes in market conditions, leading to financial instability during the project. CEMP maintained that their proposal was technically superior and more aligned with realistic financial projections, ensuring a higher certainty of project delivery.

Additionally, CEMP pointed to several procedural errors committed by MDOT during the selection process. The selection process began in September 2017 under Governor Larry Hogan. During the bidding process, pre-solicitation contacts between MDOT officials and representatives from Transurban, a part of the AMP consortium, allegedly raised concerns about the fairness of the selection process. For instance, Governor Hogan's trip to Australia included meetings with Transurban representatives, which CEMP claimed provided AMP with an unfair advantage. CEMP argued that this selection was biased and influenced by these pre-solicitation contacts. Moreover, during the RFP stage, the sudden change in AMP's consortium composition, where Transurban and Macquarie served dually as Lead Project Developer and Lead Contractor, was also questioned. CEMP argued that the timing of this announcement—after proposal

submission—gave none of the other proposers an opportunity to shape their proposals in light of that development.

CEMP also argued that MDOT failed to provide relevant documents requested by CEMP, which were essential for a comprehensive evaluation of AMP's proposal. Furthermore, CEMP highlighted that MDOT prevented them from fully cross-examining MDOT's witnesses during the hearing in April 2022, particularly concerning contacts between Transurban and Maryland officials outside the solicitation process. For example, CEMP was unable to question key witnesses about potential conflicts of interest or undue influence that may have affected the selection process. These actions, CEMP asserted, compromised the transparency and fairness of the selection process, necessitating judicial review and correction. Based on these assertions, CEMP sought to either disqualify AMP or reopen the solicitation process to ensure a fair competition.

Main Arguments of MDOT (MDOT 2022)

CEMP also argued that MDOT failed to provide relevant documents requested by CEMP, which were essential for a comprehensive evaluation of AMP's proposal. Furthermore, CEMP highlighted that MDOT prevented them from fully cross-examining MDOT's witnesses during the hearing in April 2022, particularly concerning contacts between Transurban and Maryland officials outside the solicitation process. For example, CEMP was unable to question key witnesses about potential conflicts of interest or undue influence that may have affected the selection process. These actions, CEMP asserted, compromised the transparency and fairness of the selection process, necessitating judicial review and correction. Based on these assertions, CEMP sought to either disqualify AMP or reopen the solicitation process to ensure a fair competition. MDOT asserted that its selection of AMP was based on a thorough evaluation of all proposals against the requirements outlined in the Request for Proposal (RFP). MDOT claimed that AMP's financial proposal was superior due to its strong financial inputs, which maximized the score within the RFP's scoring system. For example, AMP's proposal included lower percentages for Design and Construction (D&C) General Conditions Costs and Contractor Markup Costs, which, according to MDOT, made their financial bid more attractive. They argued that while CEMP's proposal was technically strong, it lacked the financial robustness demonstrated by AMP. MDOT maintained that their decision-making process adhered strictly to the guidelines set forth in the RFP, ensuring a fair and competitive selection process. This compliance with the RFP requirements was a cornerstone of MDOT's defense against CEMP's allegations of arbitrariness and capriciousness.

MDOT defended its scoring decisions, particularly the downgrade of CEMP's technical score due to perceived risks in their proposal. CEMP's plan to deliver Phase South in two sections was seen as introducing uncertainties that were not present in AMP's proposal, which proposed a more streamlined delivery. MDOT highlighted that their evaluation process was consistent and objective, focusing on delivery certainty and financial viability as critical criteria. They argued that the decision to favor AMP was based on a holistic assessment of both technical and financial proposals, aligning with the project's goals and requirements. This approach, MDOT argued, was necessary to ensure the project's successful and timely completion. For instance, MDOT believed AMP's approach minimized potential delays and logistical challenges associated with dividing Phase South into multiple sections.

MDOT contended that the selection process was transparent and fair. They argued that all bidders were given equal opportunities to compete, and that the evaluation was conducted based on the established criteria in the RFP. MDOT rebutted CEMP's claims that they failed to produce relevant documents by stating that these documents were not crucial to the evaluation process. Additionally, MDOT argued that the interactions between Transurban and state officials did not influence the outcome of the selection process. For example, MDOT claimed that the meetings between Transurban representatives and Governor Hogan were part of routine business and did not involve any preferential treatment. They asserted that their

decision to choose AMP was made in the best interest of the project and adhered to the principles of fairness and transparency throughout.

Table 9. CEMP Lawsuit Timelline

Action	Date
MDOT announced AMP as the selected proposer, and CEMP requested a debriefing	February 18, 2021
A debriefing was held with the representatives of MDOT and CEMP	February 24, 2021
CEMP filed a protest objecting to the award decision	March 1, 2021
MDOT issued a final decision that rejected CEMP's protest basis	April 15, 2021
CEMP filed an appeal of the Final Decision to MDOT and requested a hearing on its appeal	April 21, 2021
MDOT and AMP filed motion to dismiss CEMP's appeal	June 1, 2021
CEMP filed oppositions to each motion	June 11, 2021
MDOT Secretary's Designee conducted hearing on Motions to Dismiss	June 29, 2021
MDOT Secretary's Designee issued final decision dismissing all of CEMP's protests as untimely	September 9, 2021
CEMP filed Petition for Writ of Administrative Mandamus	September 13, 2021
Circuit Court held hearing on CEMP's Petition	February 16, 2022
Circuit Court reversed Secretary's Designee's decision on protests	February 18, 2022
CEMP filed notice of appeal to Court of Special Appeals	February 25, 2022
State and AMP filed notices of appeal	March 7, 2022
Case taken under advisement; Agency Report submitted; hearing conducted; post-hearing briefs submitted by CEMP and MDOT	March – April, 2022
Court Order to Expedite Decision	July 5, 2022
Case Formally Dismissed by Court	November 22, 2022
Joint stipulation of dismissal with prejudice, dismissal of case confirmed	May 25, 2023

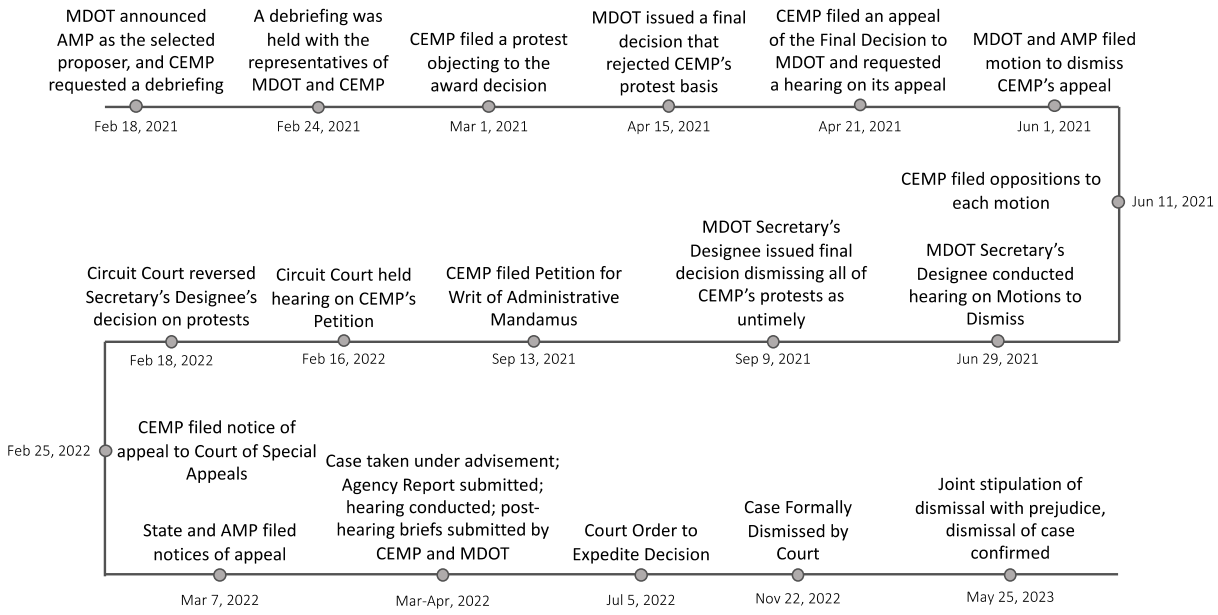

Figure 6. Lawsuit Timeline

Maryland's Options After Transurban's Exit

Baruch Feigenbaum, a senior managing director of transportation policy at the Reason Foundation, considered options that Maryland has following Transurban's exit; it could maintain the status quo, add general-purpose lanes, take over construction and operation, or contract with a private-sector team (Feigenbaum 2024). Fiegenbaum assessed each of the options as follows:

- Status Quo (Grade: F): Continuing with the current situation poses challenges due to the deteriorating American Legion Bridge. Operating transit without new highway capacity is impractical, and elected officials largely agree that doing nothing is not realistic.
- Add General-Purpose Lanes (Grade: C at Best): Adding non-tolled lanes might alleviate traffic congestion but comes with downsides. State taxpayers would bear the entire project cost, and environmental opposition to new 'free' highway lanes is likely. The relief provided would be minor given the corridor's demand.
- State Takeover (Grade: B): Maryland could assume control of construction and operation, leveraging toll facilities for financing. However, this option exposes the state to risks, with taxpayers covering revenue shortfalls during economic downturns or unexpected interest rate increases. Transit options would lack dedicated funding for operations and maintenance.
- Private-Sector Partnership (Grade: A): Contracting with a private-sector team, despite rising project costs, is deemed the best option. Short-listed teams may face challenges in meeting Maryland's requirements, but this approach minimizes state risks and provides potential transit subsidies. Reviving the public-private partnership for managed lanes remains a desirable goal.

Other Lawsuits

Third parties have also had a fair share of interest on this project and have been a target of a lawsuit brought forward. Public interest groups filed a federal lawsuit to stop Maryland's plan to add toll lanes to highways around Washington D.C. On October 11, 2022, the Maryland Chapter of the Sierra Club, the Natural Resources Defense Council (NRDC), Friends of Moses Hall, and the National Trust for Historic Preservation filed a lawsuit against the MDOT and the FHWA. The groups say the project's environmental review was inadequate and failed to properly address impacts to historic sites, air pollution, and traffic congestion. The lawsuit aims to halt the project while errors in the review are fixed including the failure to consider how increased traffic on the Beltway and I-270 would affect air quality and uncertainties about traffic reduction claims. They argue the project threatens the historically significant Morningstar Moses Cemetery and Plummers Island. The groups say Maryland should reconsider the toll lanes and explore cleaner transportation options instead, given climate change (National Trust for Historic Preservation 2024, Sierra Club 2022).

This lawsuit has continued even after the Transurban withdrew from the project. The Moore administration has adjusted the timing of the phases and rebranded the project as a multimodal plan that includes transit elements, but it still considers the same toll lane highway expansion project that was proposed under the Hogan administration. In March 2024, the judge presiding over the Beltway/I-270 toll lanes case issued a 68-page ruling in favor of the agencies. The Sierra Club, National Trust, and NRDC filed an appeal in May 2024 (Sierra Club Maryland Chapter 2024).

LESSONS LEARNED

The Op Lanes project was ultimately put on hold. The key factors influencing the project's suspension include unexpected economic crises (e.g., COVID pandemic, wars), political risks (opposition from local communities, changes in leadership), and environmental concerns (delays in NEPA approval, lawsuits). Iterviewee opinions varied, but the majority agreed that the choice of the PDA method was appropriate. This analysis aims to explore the trade-offs of the PDA by examining its performance in response to these factors.

External events like the pandemic and wars introduced significant financial risks, causing both Transurban and MDOT to incur substantial economic losses before ultimately walking away. Given the project's termination after such heavy losses, it's difficult to argue that the PDA was entirely successful. However, several interviewees noted that labeling it a failure is likely inappropriate as well since a hard bid might have resulted in even worse outcomes. According to some interviewees, Maryland would not have been able to manage the overwhelming cost increases with a fixed-price method. "The PDA allowed for an easier breakup with smaller losses," and "The off-ramps in the PDA worked well," in this context.

Political risks were also a major reason for the project's suspension. These risks can be viewed from two perspectives: opposition from outside (e.g., Montgomery County) and opposition from within (e.g., changes in political leadership). According to interviewees, the PDA is more resilient to external risks but vulnerable to internal ones especially in terms of a project's sustainability.

When the project was designed and initiated, there was strong local opposition from areas like Montgomery County. A public sector interviewee mentioned that the PDA allowed more time for public and stakeholder engagement, including opposition groups, through pre-procurement activities such as public meetings with politicians, elected officials, and local communities—something that is often not possible in traditional competitive approaches due to commercial confidentiality. While it's true that commercial confidentiality is an issue once procurement begins, traditional procurement allows substantial public and stakeholder input for a project like Op Lanes since the corridor and basic scope were well known. hard bid.

However, when a new administration that opposed the P3 approach took office, the state no longer supported the agreement, leading to the denial of extensions. Moreover, the flexibility of the PDA eventually allowed the project's termination, as features like the off-ramp made it more feasible to break up. In terms of advancing the project, a hard bid would have provided no easy exit options, making it harder for the state to terminate the project, and potentially requiring a greater commitment from the agency to do so. But a hard bid would not have occurred until much later, by which time the scope would have been much more well defined. Some interviewees observed that the PDA method is advantageous in environments where political changes create challenging conditions for private-public collaboration, as it allows for a swift termination when necessary.

Regarding environmental issues, it's challenging to determine which method is more advantageous. Interviewees noted that NEPA approval would have delayed the project, and lawsuits from environmental organizations would likely have occurred regardless of the delivery method. However, others observed that the PDA might be considered more advantageous than traditional methods, as it allows for greater communication with the public, including local and environmental communities. Additionally, the economic challenges posed by environmental delays could have been exacerbated under a hard bid approach. Still others observed that substantial progress on NEPA clearance is appropriate before a PDA is begun and it is reasonably clear that the project is likely to receive a favorabale record of decision.

SUMMARY AND CONCLUSION

The Op Lanes Maryland project, a major transportation initiative within Maryland's Traffic Relief Plan, represents a significant effort in employing a progressive approach to P3s, particularly through the use of the PDA model. This model was selected to mitigate risks and optimize the project's delivery by leveraging private sector innovation and investment. The Op Lanes project aimed to alleviate congestion on the I-270 and I-495 corridors by constructing and operating managed lanes, ultimately enhancing transit options in the National Capital Region.

However, the project encountered substantial challenges that underscored the complexities of the PDA model. Environmental delays, legal disputes, rising costs, and shifting political leadership led to frustrations that culminated in the project's eventual termination. These challenges highlighted the vulnerability of the PDA approach to external factors such as environmental approvals and political changes, which suggests that factors under a jurisdiction's control such as environmental clearances need more clarity and progress before engaging a private partner through a PDA. The project's timeline and financial projections were significantly impacted by these issues, leading to the withdrawal of the private partner, Transurban, in March 2023.

Despite these challenges, the PDA model provided a degree of flexibility that traditional procurement methods might not have afforded. The model allowed for a phased approach, which facilitated ongoing adjustments in response to the project's evolving landscape. This adaptability proved essential in managing the complexities of the project, although it was not enough to overcome the significant external pressures that ultimately led to the project's suspension. The Op Lanes Maryland project serves as a case study in balancing innovation with the realities of public infrastructure delivery, illustrating both the potential and the limitations of the progressive P3 approach in a dynamic and challenging environment.

CHAPTER 6

Subject Matter Expert Interviews

INTRODUCTION

Fifteen subject matter experts (SMEs) were interviewed to obtain their perspectives about P3s. These SMEs have held various roles throughout their careers. Several had both public and private sector experience (33%) and experience with P3s ranged from 5 years to over 30 years with an average experience of approximately 15 years. Those with private sector experience currently work or have worked for developers, consultants or contractors. Overall, the SMEs are generally indicative of the participants in the contemporary P3 market. Each was asked a series of questions about progressive P3s/PDAs. Accordingly, this chapter summarizes the results on these interviews.

INTERVIEW RESULTS

Selection/Rationale of Progressive Approach

One of the first questions addressed was why should progressive approach be taken for a project. Many interview cited *uncertainty, complexity and risk in large-scale infrastructure projects where P3s are often employed as one of the decisive factors* for taking a progressive approach or employing the PDA model. Representative comments from interviewees regarding uncertainty and risks follow:

> Comment 1: A conventional hard bid approach, where a fixed budget is set years before construction, is fraught with uncertainty and risk. For example, estimating a project to cost $2 billion and delivering it within that budget is highly challenging due to unforeseen design and development risks. This often necessitates a substantial contingency, potentially inflating the budget to $2.5 or $3 billion. A progressive partnership approach is more advantageous, as it allows for a collaborative P3 where both sectors share risks and benefits. It is important for government partners to understand the true nature of P3s, rather than treating them as mere procurement models. A successful P3 requires the government to be commercially minded and willing to leverage private capital for improved taxpayer outcomes. This approach mitigates risks and ensures high-quality infrastructure projects are delivered efficiently.

> Comment 2: The primary issue with traditional fixed-price procurements for major megaprojects is their extended and expensive nature. This process not only incurs significant costs but also lacks certainty in project feasibility during the early stages, including public information meetings. The complexity of implementation increases the need for a progressive model. Decisions in this context often revolve around risk and price risk allocation. The model aims to address unknowns quickly with a capable partner for implementation.

> Comment 3: It's about the risk. You're not going to eliminate the risk, but you're going to be able to mitigate the risk and you're going to reduce the potential for premium contingencies in a low bid process about those "known unknowns. You're still going to have contingency, but it will not be at a premium level. A developer is still going to put in contingency about unknown unknowns. But if you can get better handle on known unknowns, so you can mitigate those and get everybody better information so that a project can get better pricing.

Others noted the early expertise and compentency that a private partner can bring to shape a project as an important factor. Representative comments follow:

> Comment 1: A PDA or progressive P3 is preferred when a public owner needs a developer, contractor, designer, and financial perspective much earlier than usual to help shape the project. The private sector team can assist with technical and financial reviews and develop the project differently than the government typically can. They can also provide input during the environmental process, such as assessing the economic vitality or feasibility of detailed study alternatives. Their input is especially valuable in total revenue deals. The private sector's insights are crucial as they are responsible for building and designing the projects.

Comment 2: Progressive P3s as a concept make sense since for these large-scale projects that take years to develop, it would be valuable to have that whole development basically from the start of the project in terms of design and everything that goes with it to be done by the party, that prospectively will actually deliver it instead of a hard bid where the client develops the product to a certain point and then bids it out.

Finally, one interviewee shared that with *the nature of the current market that most contractors are not willing to get involved in fixed price procurements*:

Especially in today's environment, it's going to be difficult to get contractors willing to participate in a lump sum bid on P3s. I don't say it's impossible, but I think that [public agencies] are limiting themselves to companies that are vertically integrated… What's happening is contractors are just saying, no, thank you. I'm just not going to risk lump sum on such a big project with such limited information.

Procurement of Progressive/PDA Partner

Interviewees were also asked about how the procurment of a progressive/PDA partner should be handled for P3s. Various perspectives were shared but all emphasized that *a public agency is seeking a partner that has a strong record of working well and collaboratively with public agencies*:

Comment 1: When selecting a private partner using a progressive approach, consider the project's advancement. If NEPA is finished, a contractor developer team might not be needed since a solution is already in place. With 25% design completion, traditional procurement might be suitable. Consider industry reactions and avoid excluding local contractors. Assess the workload inside the DOT or governmental agency and ensure you have the resources to staff a PDA. Engagement with the developer team is crucial. The selection process isn't very different from other procurement approaches. When shortlisting teams, ensure satisfaction with any winning team. PDAs offer more opportunities to select a compatible team, considering not just competence but also how well you work together, mutual respect, and cultural fit. The procurement process helps identify the best team to work with, and vetting their experience, credentials, and past performance is essential.

Comment 2: When selecting a private partner using a progressive approach, it's crucial to consider the partner's qualifications and experience, particularly with P3s and PDAs. The PDA process is more open and collaborative compared to traditional negotiations, and partners accustomed to withholding information will not perform well. The primary focus should be on the construction company and design-builder, not the equity investor. Most of the risk in these projects lies in the design-build phase. Once the project is built, if the operator and maintainer do not meet standards, they can be replaced, and the asset will still function. However, if the design-builder goes bankrupt midway or misprices the project and encounters unforeseen costs due to an aggressive [price], it poses significant issues. Hence, the design-builder's track record is more important than the equity.

Comment 3: Well, it's typically qualifications-based. Typically, RFQ looks back whereas an RFP looks forward. In progressive, it's typically single-step where RFP looks [both back and forward], back at track record – what's history, what types of projects, what client relations have they had, have they been able to move forward on negotiations for GMPs. The forward looking elements – what are primary ideas for project, how will you interact with third-parties, how will you interact with DOT, how will interact for duration of contract and phase one, what are main scope items that you will focus on during pre-construction services or phase one services.

Advantages and Disadvantages of Progressive P3s

Interviewees shared a variety of perspectives about the advantages and disadvantages of progressive P3s.

Advantages

Below are comments about advantages – underlining is added for emphasis. The principal advantages noted are the collaboration to *identify and manage key risks*, *improve a project's feasibility*, and *develop novel solutions to project challenges or issues*.

Comment 1: A progressive partnership approach is more advantageous, as it allows for a collaborative P3 where both sectors share risks and benefits. It is important for government partners to understand the true nature of P3s, rather than treating them as mere procurement models. A successful P3 requires the government to be commercially minded and willing to leverage private capital for improved taxpayer outcomes – a procurement mindset is rigid one where risks are transferred and the developer is expected to bear them despite external or macroeconomic shocks.

Comment 2: The progressive approach benefits both parties by increasing project certainty, controlling costs, and improving feasibility. Fixed-price procurements often involve significant upfront costs with no guarantee of winning the project, unlike progressive models. These models involve making cost estimate assumptions from preliminary design plans and adjusting prices along the way, while also identifying and allocating risks as the project progresses. Public and private sectors face similar challenges in procurement types, leading to a shift towards progressive models with qualification-based selections and commercial off-ramps for unfeasible pricing.

Comment 3: Private partner involvement during predevelopment under a PDA can help owners develop project solutions they hadn't considered and make the project happen. The private sector brings creativity and expertise in financing and project solutions that government entities often overlook. They might assume some revenue risk combined with public subsidies, securing funding from various sources in innovative ways. This input is particularly valuable for unique projects where the solution is not immediately clear.

Comment 4: Having earlier developer and contractor involvement can help an agency shape a project that's feasible both technically and financially.

Comment 5: The main advantage of progressive approaches is that they allow projects to start without a long procurement process, though this doesn't necessarily mean faster completion due to the development steps involved, like traffic and revenue analysis. The speed depends on the project.

Disadvantages

Below are comments about disadvantages – underlining is added for emphasis. Key disadvantages include *selection of a progressive approach by a public agency to demonstrate "progress" without a firm commitment for implementation*, *agreement on the pricing of an evolving scope of work*, *the effort involved in the process*, and *concerns about alignment of this approach with developer/contractor business models*.

Comment 1: Sometimes a public agency might select this approach to show progress on a particular project. If this is their principal motivation, then this is a recipe for disaster. They likely haven't done sufficient due diligence, so once pricing of the scope starts they are surprised when it's two times or three times what they expected. There's a misconception that the process is faster and possibly cheaper, and neither is usually the case.

Comment 2: Private companies have learned that while PDAs are promoted as solutions to many issues, this isn't always the case. Some contractors and developers who were enthusiastic about PDAs two years ago now find them too labor-intensive. If a few projects fail, significant time and energy are wasted that could have been directed towards more viable projects. PDAs can be good for the right project, but they are not the universal solution some believe them to be.

Comment 3: I think [PDAs] can sometimes be used as a way to do pre-feasibility studies without necessarily committing to actually doing a project. And that obviously is an issue for the private sector, as a developer we're not set up to work as advisors. So, working on a project for years without the client actually being committed to, at the end of the day, taking a decision on whether it's going to execute the project or not.

Key Considerations

Interviewees provided a number of perspectives about key considerations when implementing progressive P3s. Several comments are provided below – underlining added for emphasis.

Comment 1: Most of the time having a political champion for the project is the most important. Changes in political scenery are definitely big risks that you take in these multi-year developments. Also, to add to that changes in the staff of the clients, that's also very important. Over a three, four year period, there's a lot of turnover usually at these agencies. So you might be talking to a team that wasn't even there when they decided to do a P3 and they don't understand P3s or why [the agency] would want to do a P3 and give away the control they're used to having. So, I would also add that to potential risks just due to the time that it takes.

Comment 2: A public agency needs to think carefully about how it will augment its staff, particularly if they plan to engage an independent cost estimator (ICE). Right now, the ICE market has a limited number firms that have the requisite expertise to develop realistic estimates of such complex projects.

Comment 3: If you want the progressive approach to succeed, then you have to be a transparent partner.

Comment 4: The value of a private partner in P3s lies in their transparency and track record of managing such arrangements. A trustworthy private partner ensures a balanced sharing of risks and rewards, aligning interests with the government. P3s are seen as optimization models aiming for sustained, reasonable returns over decades rather than short-term profit maximization, which can undermine the partnership's longevity. The selection of a private partner hinges on their alignment with these principles, ensuring a successful, long-term collaboration.

Comment 5: The PDA model facilitates easier exits by incorporating a success gate and clear off-ramps. This approach involves regular check-ins and constant engagement with the public sector partner over the project development period. If risks change materially, the model allows for a pivot or additional support from the government side to mitigate these risks, reinforcing the partnership aspect of P3 projects. Virginia's model, characterized by a commercial, pragmatic mindset and effective risk management, is a successful example. In contrast, other jurisdictions often view taking risks with the private sector as career-limiting, lacking proper incentive structures for managing risks appropriately.

Comment 6: In a true PDA, the lack of competition arises because there's no incentive to drive the revenue line without the competitive tension of the ATC process. Developer teams in revenue risk toll P3s push hard to enhance the revenue solution since higher revenue means better chances of winning and higher concession payments. However, PDAs can still be competitive in construction pricing. For instance, if a prime contractor does 30% of the work and subcontracts 70%, competitive pricing can be achieved on that 70%. The process can be transparent, with open-book practices showing labor rates, equipment rates, overhead, profits, and insurance. The risk evaluation and transfer are challenging but involve negotiation between the private and public sectors, ensuring appropriate pricing for risk. Although not as competitive as traditional procurement, PDAs can still be competitive.

Comment 7: During the selection of a private partner, the owner needs to be clear about their requirements and adhere to the rules they set, as PDAs rely on relationships and transparency. In one instance, part of the issue was that advisors, acting as spokespeople for the DOT, led the conversations. This set the wrong tone, as they seemed to lack a full understanding of the issues. It's crucial for the owner agency to have someone within the agency act as the spokesperson and face of the procurement to avoid such problems. Another key point is the importance of off ramps, which are critical for protecting both the private and public sectors. Off ramps allow decisions to proceed or terminate a project without heavy financial losses if it isn't feasible. Protecting the private sector's investment in such cases is essential. There have been PDAs without off ramps, which is problematic.

Comment 8: In P3s, DBJVs do have a say in how things are priced and certainly they have more leverage when they are a subsidiary of the developer who will have equity at stake. DBJVs aren't forced to accept the terms, but it's a bit difficult for them to walk away once engaged. I think the danger is where you have a developer concessionaire who's not yet selected a design build team or just has a few names in the background and has informal conversations with that design team to try and get a rough number. It goes in with their financial model initially. And then when they get further into the project, the T&R didn't quite work out, the O&M is costing more than they thought. They're basically going to try and squeeze the design builder.

Comment 9: In a concession, although I haven't seen it done in the US, I'd suggest setting very hard deadlines for the submittal of a firm binding proposal. And that deadline is not going to be exceeded unless something really significant happens. So let's say you've got nine months and we'll pay you during that nine months. The owner will pay the developer for its reasonable costs during that nine months to prepare all the things it needs to prepare, whether that be design, work, products, investigations, traffic and revenue studies, getting permits agreed, lining up right-of-way, whatever it may be. [The agency] will pay the developer for these things. Probably not at full rates, probably at less than full market rates. But at the end of that time, there has to be a fixed firm price proposal put on the table, which is fully backed as it would be if it was competitive process.

Comment 10: You could draw a graph to basically show the amount of cost the owner would suffer to extricate themselves from the deal, it just simply keeps going up and up because they become more and more wedded to that developer, whether it be because they have a design builder on board and the designs have been tailored specifically to the means and methods of a particular design builder. So even though they might be able to take the design work product back, would they be able to run with it in the market? Probably not. They'd probably have to go and do a whole lot of additional work to turn that into a bid package that they could put out on the street. All of the things the developer is doing is specifically designed to embed themselves more and more deeply into the project. And it's a natural progression, but it's completely contrary to what you'd really want. You'd really want that cost graph to be going in the other direction so that the more and more the owner invests, the greater the owner's opportunities to do other things if they don't like what they're seeing. So to me, that's just going in the wrong direction. Incentives diverging where they should be converging, which is why I'm not a great fan of completely open-ended negotiations.

Comment 11: I think from a contractor side, it's a different business model and they have to adjust to that business model. Some will interact with the owners well and other contractors just won't interact as well with the owner or the bureaucracy of the owner. So I think that as contractors move over to this delivery method, they've got to adjust their business model a little bit because that timeframe, especially for phase one, when pre-construction services are underway, all of the effortt has nothing to do with construction. It has to do with the development of a project and design.

Comment 12: There need to be clear parameters about the process and milestones. Otherwise, the parties are just wandering around. You absolutely have to put boundaries on the time and also on the scope so that you don't start down paths and you're just wandering around spending on rework or how about this idea? How about that idea? I think it takes a very strong focus upfront on making sure there's alignment on the scope and the timeframe.

CHAPTER 7

Key Findings & Recommendations

OVERVIEW

This research has explored collaborative/progressive project delivery and P3s. It has developed a framework to characterize these delivery methods while the case studies and interviews provide the basis for several key findings. The two case studies demonstrate issues that can arise as well as how the progressive model was implemented. In the MBP3 case, the progressive model weathered issues that arose, and its set of projects are underway. In the Op Lanes case, the progressive model gave the private partner the option to exit the arrangement as the circumstances and conditions of the project changed over time.

Both the cases and the SME interviews provide important insights about the rationale, advantages and disadvantages of progressive P3s.

COLLABORATIVE DELIVERY FRAMEWORK

Based a review of the literature, a framework to characterize project delivery methods was developed. This framework includes the following characteristics:

- Contracting Structure
- Risk Allocation/Management
- Stakeholder Involvement/Timing
- Collaboration Approach
- Decision Making Model
- Dispute Resolution
- Collaboration Culture
- Flexibility
- Cost Control

These characteristics can be utilized to illustrate the collaborative features of a delivery method. Table 4 depicts the framework by contrasting project alliancing, integrated project delivery, progressive design-build and progressive P3s.

MBP3 CASE STUDY

The MBP3 case study is an example of a progressive P3 where PennDOT was able to select a private partner to shape and develop a program to rehabilitate six major interstate highway bridges that were geographically dispersed across Pennsylvania. PennDOT initiated the progressive delivery with the goal of rehabilitating nine bridges. However, through its pre-procurement outreach, its procurement process and the pre-development collaboration between PennDOT and its private partner – Bridging Pennsylvania Partners – the scope was reduced to six bridges. The reduction in scope was a result of the collaboration between the parties to determine a program that was both technically and financially feasible. This case demonstrates the importance of well-defined objectives and timeframes for a progressive delivery. Yet, in some respects, the full potential and benefits of the progressive approach were limited by the schedule for delivering the rehabilitation improvements. Further, insufficient outreach to key stakeholders such as legislators and citizens about the imposition of tolls on the bridges caused legal challenges, but these were ultimately resolved through the passage of legislation and PennDOT's capacity to identify alternative sources of funding.

OP LANES CASE STUDY

The Op Lanes case study is an example of a progressive P3 where MDOT selected Accelerate Maryland Partners (AMP), which was led by Transurban and Macquarie, as its pre-development partner ("Phase Developer") to improve mobility in the I-270 and I-495 corridor in Maryland, northwest of Washington, DC. The scope included the addition of managed express lanes and the replacement the American Legion Bridge. The corridor was subdivided into Phase 1 North, which included I-270 from I-370 to I-70, and Phase 1 South, I-495 from the George Washington Parkway in Virginia to I-370 including the replacement of the American Legion Bridge (see Figure 4 for a map of the project). MDOT selected a progressive approach to mitigate risks throughout the corridor while shaping a plan to develop managed lanes in the corridor and to enhance transit options in the region.

Ultimately, the Op Lanes project was put on hold. AMP's lead partner Transurban decided to exit the project due to environmental issues, legal disputes, macroeconomic changes, rising costs and shifts in the political landscape. In this case, the ability of AMP to exit allowed its firms to avoid mounting risks and costs in the project's evolving and fluctuating environment. Hence, the progressive model facilitated this decision. Yet, the project is still in flux, so the mobility needs within the corridor remain unmet. And both Maryland and AMP expended considerable resources with no clear path to completion as yet in sight. Consequently, this case serves as an example of balancing innovation in project delivery with the realities of public infrastructure development, so it is illustrative of the both the potential and the limitations of progressive P3s.

PROGRESSIVE P3S: SELECTION, TRADE-OFFS & CONSIDERATIONS

The cases and SME interviews illustrate the rationale for selecting a progressive P3 approach as well as the trade-offs and key considerations associated with this strategy.

Rationale

Project owners and private participants have multiple reasons for pursuing progressive P3s:

- By far, the cases and interviews demonstrated that a progressive delivery approach is most suitable for complex projects with significant uncertainties, where known unknowns are hard to quantify and/or unknown unknowns are possible. In such circumstances, a progressive approach allows the public and private partners to collaborate to collect necessary information to shape a project's scope, risk profile and risk allocation in a way that drives down the need for contingencies when pricing the work. Essentially, an owner and their private partner are attempting to "de-risk" a project through proper risk allocation or risk sharing.
- With P3s in particular, the public agency and private partner have various levers to pull to promote alignment of interests. Such alignment is more easily achieved in a collaborative environment.
- The progressive approach allows an owner to select a partner based on their expertise and competency as well as their capacity and willingness to collaborate in a transparent manner to define and then deliver a project.
- Some noted that the attention given to the progressive model is a circumstance of the current market where ample opportunities are available for developers and contractors, so owners have had difficulty attracting sufficient interest in projects through competitive processes.
- A progressive approach provides owners the opportunity to advance a project toward its implementation; note this is a potential drawback as well (see below).

Advantages

The cases and interviews identified a number of key advantages for a progressive approach.

- The approach allows a scope and depth of collaboration between the public agency and the private developer that is not possible in a competitive process. For instance, the parties can jointly develop a stakeholder engagement plan that meets both parties' expectations.
- It allows both parties to increase a project's certainty, control costs and enhance feasibility. Together, a public agency and private developer are developing a project that's feasible both financially and technically.
- Earlier involvement of a private developer/contractor may enhance a project's solutions, potentially resulting in outcomes that a public agency has not considered.
- Both parties are afforded "off-ramps" to exit the arrangement if conditions/issues change and continuing with the development process becomes untenable.
- It provides the opportunity to use a negotiated process to establish a price for an agreed scope, conditions/terms and risk profile.

Disadvantages

The cases and interviews also identified a number of key disadvantages for a progressive approach.

- Public agencies may select a progressive approach to show progress rather than a real commitment to implementing a project.
- Pricing of the scope of work in a progressive approach has proven challenging in some cases. Public agencies are often surprised when the preliminary price is two or three times what they expected.
- Similarly, qualified and experienced ICEs are scarce, which may deter or slow the diffusion of this approach.
- Exercising the option to take an off-ramp comes with risks for both the public and private sector. For a public agency, they likely will need to explain why a project did not succeed. Private developers will have incurred some level of costs that are now sunk. For both, there are reputational and business risks with exercising an off-ramp.
- This approach does not necessarily fit the business model of most developers/contractors since they are not structured for advisory services.
- It is not likely to be a quicker or less costly option to reach commercial and financial close.

Key Considerations

The cases and interviews also produced a number of factors for public agencies and private developers alike to consider about progressive P3s.

- The pre-development phase needs structure and milestones, so the services provided and their longevity are reasonably predictable and reliable.
- Projects following this model need a political champion. Additionally, they need stability of staffing on both sides to sustain progress and relationships.
- The value of a private partner in P3s lies in their transparency and track record of managing and implementing such arrangements. P3s can potentially optimize scope and outcomes while affording

reasonable returns over decades rather than short-term profit maximization. A progressive approach may enable this potential better than a conventional approach.

- Progressive approaches lack competitive tension that can drive innovation and revenue potential through the alternative technical/financial concepts (ATCs/AFCs) process. However, there is still the potential for competitive construction pricing.
- Public agencies need to realize that taking a progressive approach does not mean that they do not need to complete adequate due diligence before selecting a partner. They need a reasonable understanding of their objectives, the quality of the information that they have, the stakeholders involved or impacted, etc.
- Public agencies should determine what is gained through a progressive approach versus a conventional approach where proper due diligence and project preparation are done before launching a competitive procurement.
- "Success gates" and off-ramps are necessary in progressive arrangements. If risks or conditions change materially, then this allows a pivot by either or both parties as well as the opportunity for the public sector to identify additional support for the project or the private sector to propose an alternative solution.
- Public agencies should evaluate whether or not a developer partner needs the expertise of a design-build team during the pre-development phase to provide the technical and pricing input needed as the project takes shape.
- Payments during the pre-development phase should be sufficient to sustain the private partner's effort and engagement. However, it is not entirely clear how much of the pre-development services should be provided "at-risk."
- Pre-development agreements or progressive approaches have the potential for enhancing the essential information to proceed with a project, but acquiring this information comes at a premium.

CONCLUSION

Progressive/collaborative project delivery methods have emerged to address particular issues with more conventional approaches. These arrangements alter key characteristics of a project's planning and delivery, including: (1) risk allocation and management, (2) key stakeholder involvement and timing, (3) collaboration, (4) decision-making, (5) dispute resolution, (6) flexibility, and (7) cost management and control. The various progressive delivery models will adopt particular methods with respect to each of these characteristics that will define how a particular delivery method is employed, and its key stakeholders will interact.

Not surprisingly, P3s have started to utilize the progressive model to address issues that have arisen in the market with the more conventional competitive, fixed-price model for their implementation. In the transportation sector, a number of contractors involved in the design-build phase of a P3 have either exited this market sector or become more selective – primarily due to inappropriate risk transfer. Interviews conducted also indicated that the P3 project opportunities in the market have increased, so the developers and contractors available and capable of meeting this demand are insufficient. Both of these circumstances have led public agencies to consider progressive P3s as a solution to these issues.

The case studies and SME interviews conducted indicate that progressive P3s should certainly be among the options considered in the spectrum of project delivery methods. A progressive P3 is particularly suitable for complex transportation projects with high levels of uncertainty where the early involvement of a developer or contractor can allow collaboration between the public and private entities to shape the scope of a project, collect additional information about a project's conditions and environment and develop better

risk management strategies. It allows public and private entities to work jointly to increase a project's certainty and enhance its feasibility.

However, taking a progressive approach introduces both challenges and key considerations for public agencies and private developers and contractors. For instance, pricing an evolving scope of work has proven difficult; this issue is worsened by the lack of qualified independent cost estimators (ICEs) to support establishing an agreed price for a project. Additionally, a progressive approach does not relieve a public agency from performing reasonable due diligence and project preparation before selecting a private partner.

Further, interviewees indicated that the progressive process is not likely faster or less costly than a conventional procurement. Hence, a number of trade-offs are present when a public agency considers a progressive P3.

Despite the attention they have received, progressive P3s are still in their nascent stage. While this research has uncovered important factors and considerations for their potential utilization, future research can further examine strategies or methods that mitigate the challenges of progressive P3s and enhance their strengths.

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