

PUBLIC-PRIVATE PARTNERSHIP (P3) REFERENCE GUIDE





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Miami-Dade County Reference Guide on Public-Private Partnership (P3) Transportation Projects

1. Purpose of Public-Private Partnership Reference Guide	1
1.1. Chapter Overview	1
1.2. Purpose	1
2. Background of P3s in Transportation	4
2.1. Chapter Overview	4
2.2. What is a P3?	4
2.3. Traditional Versus P3 Procurement Approaches	6
2.4. Business Model	10
2.5. Potential Benefits and Challenges of P3s	12
2.6. Value-for-Money (VfM) Assessment	13
2.7. Essential Items to Remember	13
2.7.1. P3s Cannot Rescue a Poorly Planned Project	13
2.7.2. Build Now, Pay Heavily Later	14
2.8. What Floridians Think About P3s	14
3. P3 Examples	16
3.1. Chapter Overview	16
3.2. Examples by Mode and Type	16
3.3. Successful P3s	22

3.3.1.	Iqaluit International Airport, Canada	23
3.3.2.	I-595, Florida.....	23
3.3.3.	Port of Miami Tunnel, Florida	24
3.3.4.	Pennsylvania Rapid Bridge Replacement Project, Pennsylvania	25
3.3.5.	Goethals Bridge, New York.....	25
3.4.	P3s NOT Considered Successful	26
3.4.1.	Indiana Toll Road, Indiana	26
3.4.2.	South Bay Expressway, California.....	27
3.4.3.	Dulles Greenway, Virginia	28
3.4.4.	SH 130, Texas.....	29
3.4.5.	U.S. 460, Virginia	29
4.	Implementing P3 Transportation Projects	31
4.1.	Chapter Overview.....	31
4.2.	Global Economic Outlooks and P3s.....	31
4.2.1.	Global Infrastructure Financing.....	31
4.2.2.	Keys to Attracting P3 Investment in Infrastructure Projects	32
4.2.3.	Keys to a Successful P3.....	32
4.3.	Implementation Steps	33
5.	P3s on the Horizon	41
6.	Conclusions.....	43
Appendix A Miami-Dade P3 Task Force Report		
Appendix B Guiding Legislation		
Appendix C Summary of P3 Projects		

1. Purpose of Public-Private Partnership Reference Guide

1.1. Chapter Overview

Using Public-Private Partnerships (P3s) to deliver transportation infrastructure can offer a number of advantages to a sponsoring agency. Included are the ability to use additional financial resources plus operating efficiencies provided by the private sector to expedite developing and preserving public infrastructure. This has certainly been the case in Florida on I-595 Express and the Port of Miami Tunnel. But, it has not always been the case, like with Virginia's U.S. 460, a 55-mile connection between Petersburg and Suffolk. When the project was terminated in April, 2015, Virginia had spent \$300 million and NOTHING was built. Similar "promises made/promises broken" are evident in a number of other instances in the U.S., Europe, and Australia.

Nonetheless, even with the new federal transportation legislation, Fixing America's Surface Transportation (FAST) Act, there are not enough tax dollars to go around for all

that government needs to do, not just transportation infrastructure. So, the private sector will play an important role in advancing government projects in the future.

Opportunities to benefit through partnering with the private sector require a project of relative urgency, lack of adequate public resources to complete the project in a reasonable timeframe, and a public sponsor/champion able to develop and administer a flexible P3 contract which represents a win-win situation for **both public and private partners**.

This **Guide** recognizes that each P3 project is different, whether it be by statute/regulation, implementing agency, funding approaches, and the like. Similarly, it is recognized that each implementing agency will have a special set of steps to develop a P3 project; the guidelines presented here respect that flexibility.

That being said, a P3 by any agency should not be expected to automatically turn an infeasible project into a feasible one. It is also unrealistic to expect the private sector to be attracted by projects that do not have the potential to provide a reasonable return on investment.

1.2. Purpose

The ***Miami-Dade MPO P3 Reference Guide*** is presented to inform elected and appointed officials, and agency leaders, about P3 approaches – both those that have been successful and those which have not – based on insights provided by peer agencies in the U.S. and in other countries. Equipped with this information, public officials will be better able to evaluate whether and how to use P3 approaches to leverage public resources, secure private financing and deliver essential transportation projects, while protecting the public interest.

The objectives in developing the ***Miami-Dade MPO's Reference Guide on Public-Private Partnerships (P3s)*** are to identify:

- Public interest in the financing, construction, operation and ownership of transportation projects;
- Screening tool(s) to identify P3 project candidates;
- Guidelines for risk evaluations/assessments (understanding that each potential project will have unique decision-making);

- Value assessment guidelines to ensure all potential project costs are identified and approached consistently;
- A P3 implementation plan; and,
- Guidelines for performance-based maintenance and operations.

For the purpose of the **Guide**, P3 includes the following approaches:

- Design-Build (DB);
- Design-Build-Finance (DBF);
- Design-Build-Finance-Operate (DBFO);
- Design-Build-Finance-Operate-Maintain (DBFOM); and,
- Build-Own-Operate (BOO).

The definition of each P3 structure is included in **Table 1.1**.

The payment mechanisms are assumed to include:

- **Real Tolls** – The private partner collects all tolls as payment;
- **Shadow Tolls** – Payment is based on a pre-determined price per vehicle the Owner will pay the private partner;
- **Availability Payments** – Payments are based on the project being useful with deductions for specific deficiencies from prescribed standards; and,
- Variations of above.

It is noted a key part to fulfilling the **Guide's** purpose is work done by the Miami-Dade P3 Task Force, the April, 2016, report of which is included in **Appendix A** (included in the Flash Drive on the inside of the back cover). Its essential steps to implement a successful P3 project are presented in **Chapter 4**.

Table 1.1 | Public-Private Partnership Glossary

P3	Public-Private Partnership	Contractual agreement formed between a public agency and a private sector entity that allows for the skills and assets of each sector (public and private) to be shared in delivering a facility for the use of the general public. [Florida Department of Transportation]
DB	Design Build	Design-build is a project delivery method that combines two usually separate services into a single contract. Owners execute a single, fixed-fee contract for both architectural/engineering services and construction. The design-build entity may be a single firm, a consortium, a joint venture or an organization assembled for a particular project. Owners usually retain responsibility for financing, operating, and maintaining the project.
DBF	Design Build Finance	One contract is awarded for the design, construction, and full or partial financing of a facility. Responsibility for the long-term maintenance and operation of the facility remains with the project sponsor, so the project sponsor can defer financing – build now, pay later. The DBF partner assumes additional risks that future revenue will be forthcoming.
DBFM	Design Build Finance Maintain	One contract is awarded for the design, construction, and full or partial financing of a facility, together with maintenance. Responsibility for the long-term operation of the facility remains with the project sponsor. The DBF partner assumes additional risks that future revenue will be forthcoming.
DBFOM	Design Build Finance Operate Maintain	There is a great variety in DBFOM arrangements in the United States, and especially in the degree to which financial responsibilities are transferred to the private sector. One commonality is debt-leveraging of revenue streams dedicated to the project. Direct user fees (tolls) are the most common revenue source. Availability payments have also been used. Future revenues are leveraged to issue bonds or other debt that provide funds for capital and project development costs. Often they are supplemented by public sector grants in the form of money or contributions in kind, such as right-of-way. In certain cases, private partners may be required to make equity investments as well.
DBOM	Design Build Operate Maintain	A single contract governs an integrated partnership of design/construction responsibilities with operations/maintenance procured from the private sector, with financing secured by the public sector. DBFOM is also known by names, such as "turnkey" procurement and build-operate-transfer (BOT). The public sector secures the project's financing and retains the operating revenue risk, but receives any surplus operating revenue. In Europe, Latin America, and Asia, DBFOM is commonly used to develop new toll roads. Debt is usually raised by private concession companies that design, build, finance, and operate the projects. In the US it is often more cost-effective for public project sponsors to issue low-interest debt than their private sector partners. Federal financing tools such as private activity bonds help lower the borrowing costs for the private partner. Or a nonprofit public benefit corporation can be established pursuant to IRS Revenue Ruling 63-20. Ultimately, any cost premium from privately financing must be offset by project execution efficiencies derived from the private partner's participation, such as design or construction innovations or lifecycle operations and maintenance cost savings.
BOO	Build Own Operate	Build–operate–transfer (BOT) or build–own–operate–transfer (BOOT) is a form of project financing, wherein a private entity receives a concession from the private or public sector to finance, design, construct, and operate a facility stated in the concession contract. Fees usually increase over the long-term concession period. The rate of increase is often tied to a combination of internal and external variables, allowing for a satisfactory internal rate of return on the investment.

Source: FHWA, various

2. Background of P3s in Transportation

2.1. Chapter Overview

Chapter 2 provides a summary of the history of Public-Private Partnerships and a succinct listing of benefits and dis-benefits.

2.2. What is a P3?

The modern era of P3s in the U.S. may have begun with a 1979 document known as *Office of Management and Budget Circular A-76*. It established “federal policy regarding the performance of commercial activities” and included procedures for “determining whether commercial activities should be performed under contract with the private sector or not.”

At the state level, the first law passed to facilitate P3s was a 1989 California measure specific to transportation infrastructure. Today, Thirty-four states, plus the District of Columbia and Puerto Rico, have enacted by statute some sort of P3-enabling legislation, which create a patchwork of laws that have met with varying degrees of success. The issues typically addressed by statute, policy, or contract are shown in **Table 2.1**. Florida’s

governing law is included in Appendix B (included in the Flash Drive on the inside of the back cover).

A review of these P3 laws finds the central items they address are:

- Protect the public interest;
- Create a core group dedicated to providing P3 expertise and assistance;

- Enable a range of projects, and
- Promote best practices.

Frankly speaking, there isn’t a universally-accepted definition of a P3. The Miami-Dade County P3 Task Force defines it as a “*contractual arrangement between a public sector entity and a private sector entity to design, build, finance, operate, and maintain (D-B-F-O-M) a public infrastructure facility by the*

Table 2.1 | Issues Commonly Addressed through Statute, Policy, or Contract

ISSUE TYPE	DESCRIPTION
Primarily Statutory Issues: These issues are typically addressed through state legislation.	<ul style="list-style-type: none"> • Types of P3 agreements allowed • Authority to enter P3 agreements • Authority to approve or review P3 agreements • Types of facilities allowed
Issues Typically Addressed through Policy and/or Statute: These issues may be addressed in legislation to authorize or clarify specific capabilities, as necessary; but, the details are frequently addressed through program policy.	<ul style="list-style-type: none"> • Types of financing/subsidies allowed • Public use of proceeds • Ability to hire external advisors • Types of procurement allowed • Whether unsolicited proposals are allowed • Whether bidder stipends are allowed • Whether administrative fees are allowed • Whether to require performance security • Criteria to evaluate potential P3 projects • Criteria to select bidder
Issues Typically Addressed through Contract and/or Statute: These issues are typically addressed in contracts, although the general parameters may be set by statute or policy.	<ul style="list-style-type: none"> • Length of contract term • Toll rates and toll-rate-setting mechanisms • Allocation of risks • Revenue sharing • Dispute resolution • Buy-back provisions • Refinancing provisions • Ongoing performance audits or reports

Source: Federal Highway Administration

private sector entity with payments made to the private sector entity over the life of the P3 contract either by the public sector entity or by the general public as users of the facility, with the facility remaining in public sector ownership and control, or reverting to public sector control at the end of the P3 contract term. Public sector ownership of the facility is never relinquished by the public sector.”

Regardless of the definition, P3s generally involve the following:

- Financing from the private sector, requiring payments from the public sector and/or users over the lifetime of the project;
- Long contract periods, often around 25–30 years, and, sometimes, longer;
- Private partner funding of the design, construction and, possibly, operation and/or maintenance of the project, while the public partner concentrates primarily on defining the objectives and monitoring compliance with them; and,
- Allocation of risks between the partners.

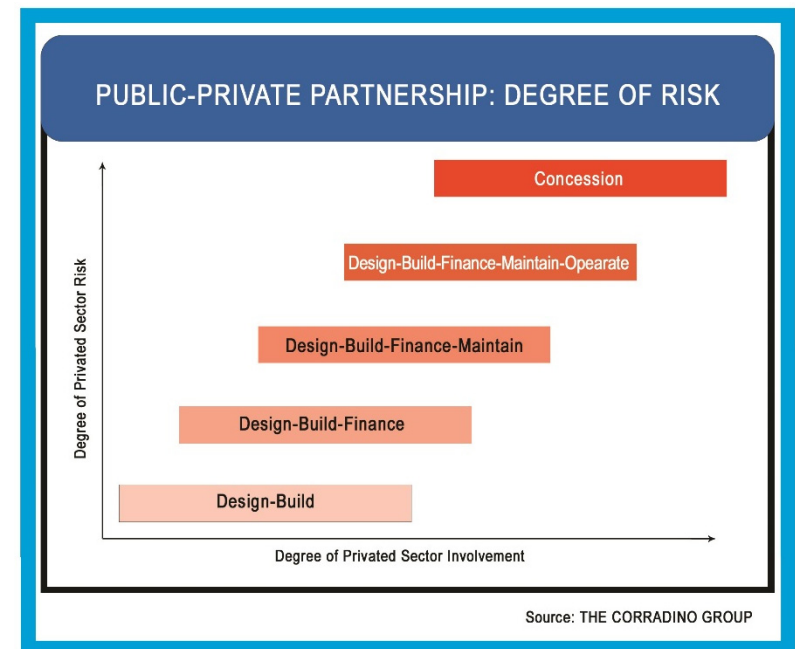
In legal terms, P3s fall somewhere between public works/services contracts and concessions. While public works/services are paid for through a fee from the public authority, in P3s, regular payment is made either by the public authority from its budget, or through direct payments by users in the form of tolls, or by some combination of the two.

The essential feature of all P3s is that some degree of risk is allocated to the private sector in the following areas:

1. **Construction:** If the product is not delivered on time, or incurs extra costs, or has technical defects, the risk is borne by the partner who pays for such unforeseen items – usually the private partner.
2. **Demand:** In cases where there are fewer-than-expected users of the infrastructure – on toll roads, bridges, or tunnels – the public partner pays a minimum fee regardless of demand, thereby assuming the demand risk.

3. **Availability:** Mainly for services to operate and maintain the infrastructure. For example, if the private partner meets safety and/or quality standards, the public sector contractually makes payments, thereby absorbing the risk of the private sector.

A “local” example of **risk allocation** is associated with the Port of Miami Tunnel where undisclosed and unforeseeable soil conditions in Biscayne Bay could have led to substantial delays and increased costs. Under the P3



agreement, the Florida Department of Transportation (FDOT) shared this risk with the private partner. The first \$10 million of additional costs due to changed geotechnical conditions were to be paid by the private partner, the next \$150 million by FDOT, and the next \$20 million by the private partner. If more costs were incurred, either party could terminate the agreement. This is not a transfer of risk to the private sector, but an allocation between the public and private partners that ensures the private sector will be motivated to minimize costs and will not be exposed to unlimited risks. That's a "true partnership."

2.3. Traditional Versus P3 Procurement Approaches

Figure 2.1 illustrates the traditional infrastructure procurement cycle which begins with evaluating needs. Next, the public sector estimates the cost and schedule of the project which is followed by approvals of budget and timelines.

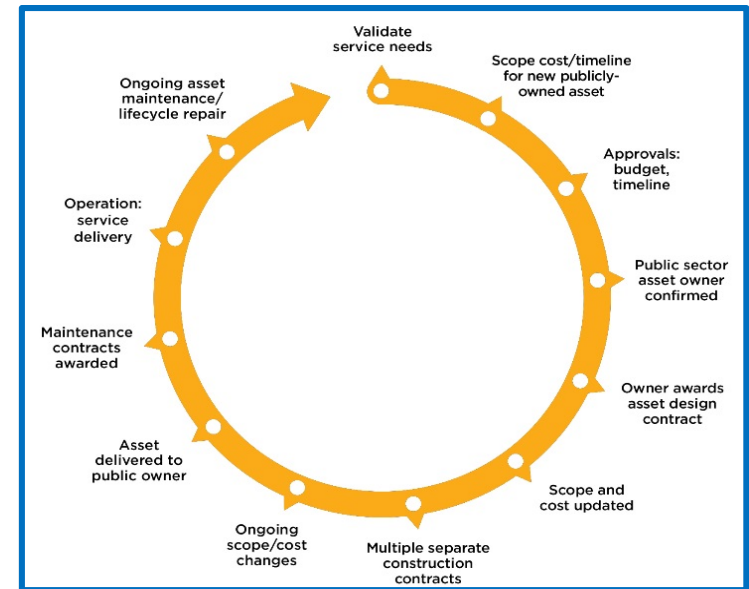
Confirmation of the responsible public sector owner is the next step. Then awarding the detailed design contract by government follows.

With detailed design and refined cost and scope in hand, the public sector moves to a series of awards of construction contracts for different parts of the project. Throughout the construction phase, scope and cost changes often occur as new information comes to light. When construction is complete, maintenance contracts are awarded to reliably, over time, deliver the public service.

The P3 approach is illustrated in **Figure 2.2**. The principal differences from the traditional approach are:

- Scoping of costs covers both construction and service delivery from the outset.
- An integrated RFP is developed at the outset for two or more of the following: design/build/finance/operate/maintain. The final scope and cost of the project are confirmed only on the basis of the winning bid.

Figure 2.1 | Traditional Infrastructure Procurement



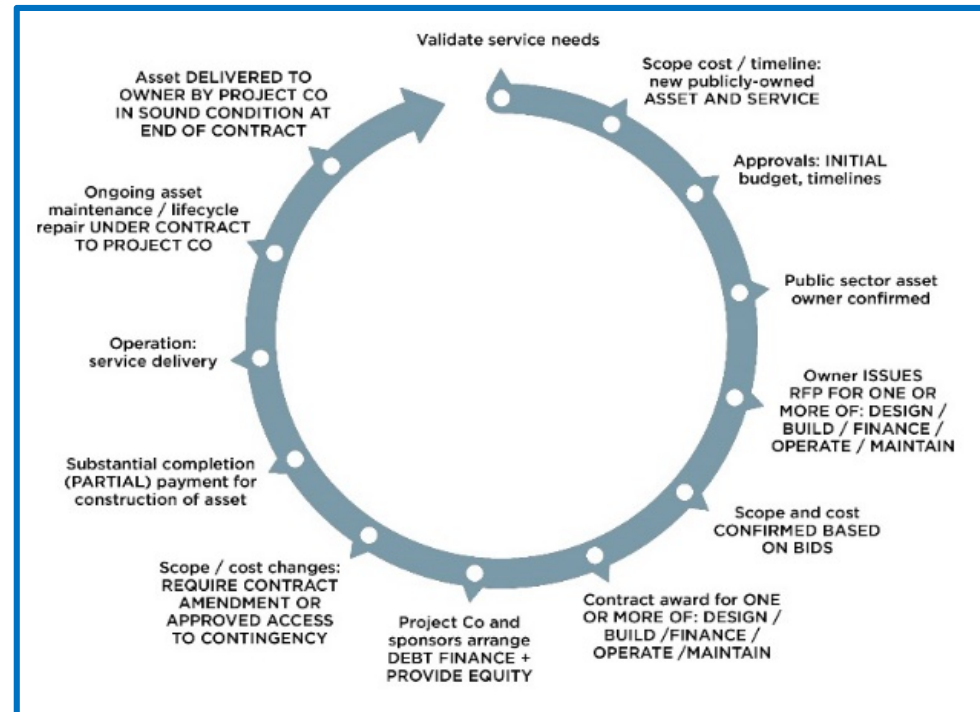
Source: Boothe, P., Boudreault, F., Hudson, D., Moloney, D., Octaviani, S. "The Procurement of Public Infrastructure: Comparing P3 and Traditional Approaches." Lawrence National Centre for Policy and Management. 2015.

- Private finance, in the form of equity plus debt, is secured after due diligence is completed by arm's-length private sector organizations, notably bond-rating agencies, banks and other financial institutions.
- If scope changes occur, they require formal and costed contract amendments or approved access to a contingency reserve.

- The asset must be delivered to the public partner by the private partner in sound condition at the end of the contract.

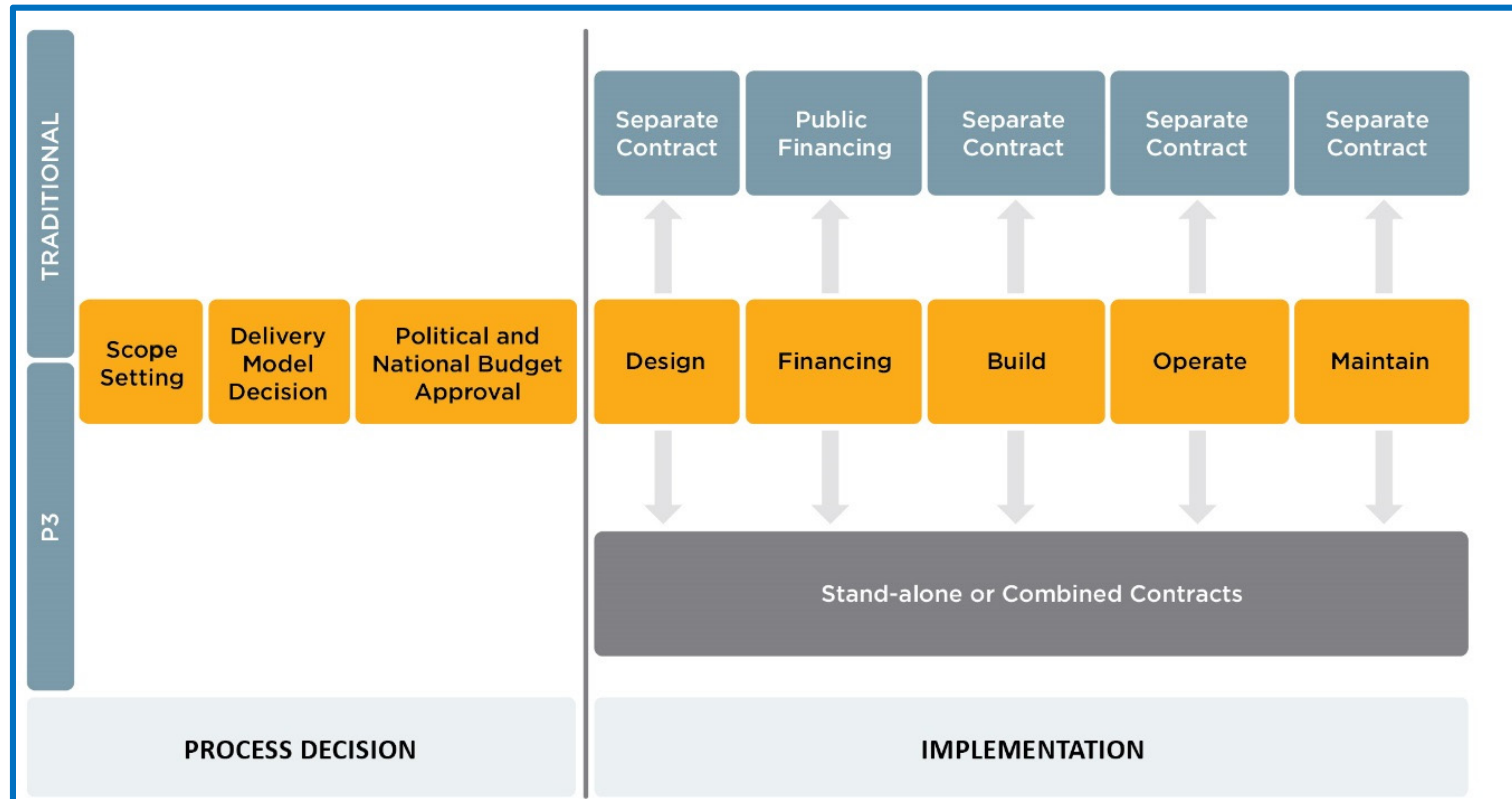
Figures 2.3 and 2.4 show the different paths possible when considering infrastructure procurement options. Each system is complex. Even within traditional or P3 procurements, no two projects are identical. Traditionally-managed projects can include provisions that are typically found in a P3 project (e.g., bonus/penalty incentives to reduce risks of delays and cost overruns), and P3 projects can take a number of forms (from Design-Build to Design-Build-Finance-Operate-Maintain).

Figure 2.2 | P3 Infrastructure Procurement



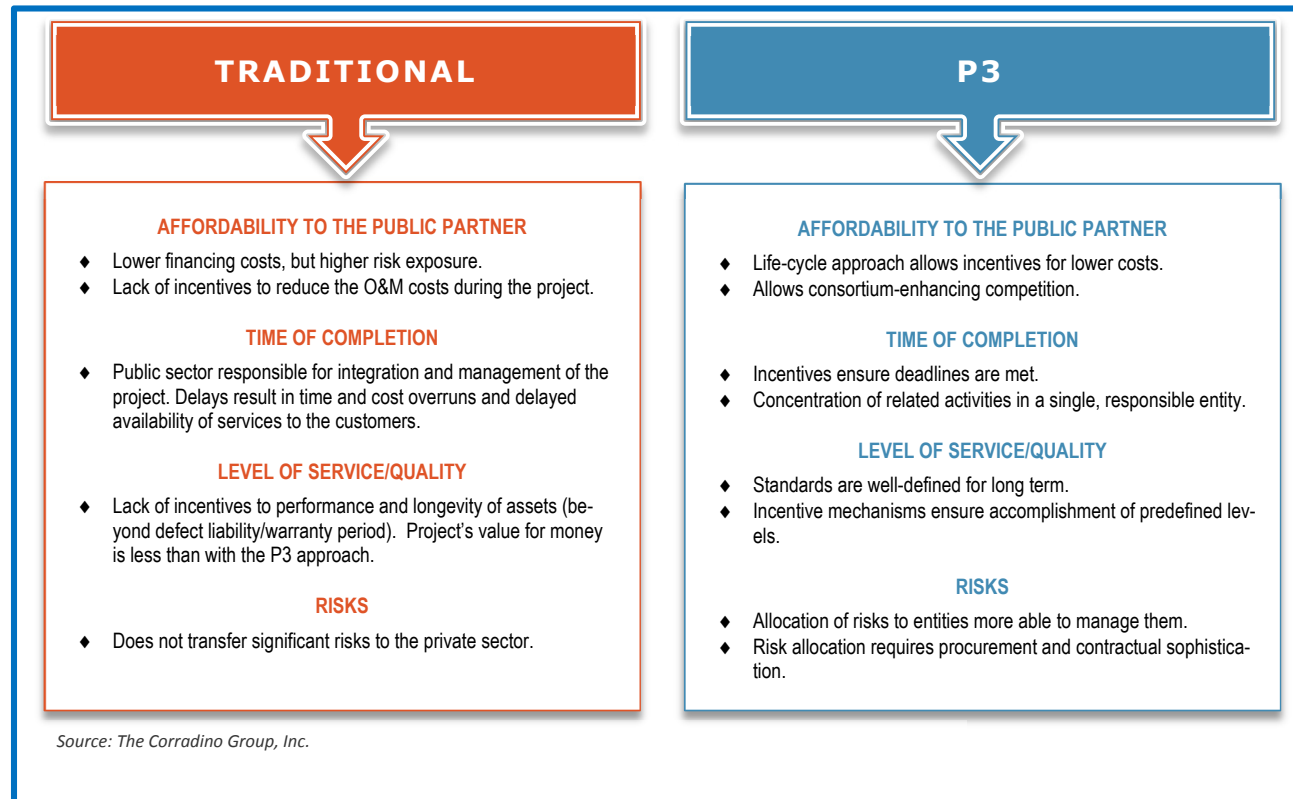
Source: Boothe, P., Boudreault, F., Hudson, D., Moloney, D., Octaviani, S. "The Procurement of Public Infrastructure: Comparing P3 and Traditional Approaches." Lawrence National Centre for Policy and Management. 2015.

Figure 2.3 | Traditional and P3 Procurement Approaches



Source: Boothe, P., Boudreault, F., Hudson, D., Moloney, D., Octaviani, S. "The Procurement of Public Infrastructure: Comparing P3 and Traditional Approaches." Lawrence National Centre for Policy and Management. 2015.

Figure 2.4 | Traditional vs. P3 Procurement Approach Characteristics



2.4. Business Model

The appropriate model to use for P3 project depends on a number of criteria that include:

- Public preference for retaining the revenue upside/downside;
- Project economics and ability of the asset(s) to generate sufficient revenue to support operations, maintenance, debt service and equity returns;
- Market conditions; and,
- Competition and monopoly aspects of the asset.

Typically, projects are structured as: 1) a Toll Revenue project; 2) an Availability Payment project; or, 3) a hybrid of the two.

In P3 projects, a range of funding sources are used, while traditional projects usually employ government bonding. The sources of revenue to pay back the bonds typically come

	Revenue Model	Benefits	Challenges
1. Toll Revenue	<ul style="list-style-type: none"> • Public authority transfers all revenue risk to private partner • Remuneration for private partner derived tolls paid by users 	<ul style="list-style-type: none"> • Public authority obtains project without the need for public funding • Revenue upside potential appeals to certain type of infrastructure investor • Allows use of certain types of financing that is normally incompatible with Availability Payment deal such as interim financing 	<ul style="list-style-type: none"> • More difficult to obtain significant levels of private financing, especially in difficult markets • Lenders less interested in exposure to revenue risk in this environment • Government may have less control over toll setting • Requirement for investment-grade traffic studies • Model more appropriate to projects where traffic is proven (i.e., historical traffic exists)
2. Availability Payment	<ul style="list-style-type: none"> • Public authority retains all revenue risk • Remuneration for private partner derived from payments from public authority for making facility available for use • Payments to private partner subject to deductions for poor performance 	<ul style="list-style-type: none"> • Government maintains sole control of toll setting • Public authority retains potential revenue upside and revenue risk • Eliminating revenue risk allows bidders to utilize significantly higher levels of leverage • Lenders more willing to participate in Availability Payment transactions 	<ul style="list-style-type: none"> • Some investors are only interested in revenue upside • Public authority required to provide funding for the entire life of the concession
3. Hybrid Approach	<ul style="list-style-type: none"> • Revenues to private partner a mix of tolls and government payments • Often includes a cap and a floor 	<ul style="list-style-type: none"> • Government support is sized to allow toll revenues to support project • Private partner still retains some revenue risk and upside potential • Lenders more willing to participate than in a pure revenue deal • Approach can be tailored to fit specific situation to best suit all stakeholders 	<ul style="list-style-type: none"> • Revenue risk component will likely limit allowable leverage relative to an Availability Payment transaction • Investment-grade traffic study required • Public authority required to provide payments to the project

Source: The Corradino Group, Inc.

from the general fund and, sometimes, special taxes authorized through referendum and/or Tax Increment Financing District - - TIF –which is similar to [value capture](#) strategies used around stations of fixed guideway transit systems. Through these mechanisms, governments divert future property tax revenue increases from a defined area or district to a project of public purpose. Although bond financing imposes interest and other debt-related costs, bringing a project to construction more quickly than otherwise possible can sometimes offset these costs. Delaying projects can impose costs that derive from a variety of sources: inflation; lost travel time; freight delays; wasted fuel; and, forgone or deferred economic development.

P3 funding sources for transportation projects, other than tolls associated with the project, include:

- **Transportation Infrastructure Finance and Innovate Act (TIFIA):** TIFIA provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. TIFIA credit assistance provides improved ac-

cess to capital markets, flexible repayment terms, and, potentially, more favorable interest rates than can be found in private capital markets for similar instruments. TIFIA can help advance qualified, large-scale projects that otherwise might be delayed or deferred because of size, complexity, or uncertainty over the timing of revenues.

- **Private Activity Bonds (PABs):** PABs are issued by a public, conduit issuer on behalf of a private entity for transportation projects, allowing a private project sponsor to benefit from the lower financing costs of tax-exempt bonds.
- **Grant Anticipation Revenue Vehicles (GARVEEs):** GARVEEs are debt-financing instruments – such as a bond, note, certificate, mortgage, or lease – that has a pledge of future Title 23 federal-aid funding.
- **TIGER Discretionary Grants:** TIGER grants fund capital investments in surface transportation infrastructure and are awarded by U.S. DOT on a competitive basis for projects that will have a significant impact on the nation, a metropolitan area, or a region. The TIGER

grant program focuses on capital projects that generate economic development and improve access to reliable, safe, and affordable transportation for communities, both urban and rural. TIGER funding is provided for in the Consolidated Appropriations Act, 2016.

- **State Infrastructure Banks (SIBs):** SIBs are state-run revolving funds that make loans, provide credit enhancements, and other forms of non-grant assistance to surface transportation projects. The SIB program allows states to capitalize revolving loan funds with regularly apportioned federal-aid (Title 23) highway funds. Separate transit and rail accounts may also be capitalized with Title 49 federal-aid funds.
- **Capitalized Interest:** This is an account created in a business' financial statement that holds a suitable amount of funds meant to pay upcoming interest payments. This type of interest is seen as an asset and, unlike most conventional types of interest, is expensed over time.

2.5. Potential Benefits and Challenges of P3s

The financial crisis that began in 2008, often referred to as the “Great Recession,” brought about renewed interest in P3s throughout the world. Facing constraints on public resources, while recognizing the importance of investing in infrastructure, governments turned with increased frequency to the private sector as an alternative source of funding and to:

- Supplement limited public sector capacities to meet the growing demand for developing infrastructure;
- Incentivize the private sector to deliver projects on time and within budget;
- Introduce technology and innovation in providing better public services through improved operational efficiency; and,
- Extract long-term value-for-money through appropriate risk allocation to the private sector over the life of a project – from design/construction to operations/maintenance.

There are a number of challenges associated with P3s:

- While the private sector can make it easier to obtain financing, it will only be available where the operating cash flows of the private partner are expected to provide a return-on-investment (i.e., the cost has to be borne either by the public or the government through subsidies).
- Some projects may be easier to finance than others, particularly where proven technology is involved and/or the extent of the private partner’s obligations and liability are clearly identifiable.
- Some projects may be more politically or socially challenging to introduce and implement than others – particularly if there is an existing public sector workforce that fears being transferred to the private sector or, otherwise, losing jobs.
- There is no unlimited risk bearing – private companies will be cautious about accepting major risks beyond their control. If they bear these risks, then the price for the project will reflect it. The

private partner will also expect a significant level of control over operations, if it is to accept significant risks.

- The private partner will do what it is paid to do and no more; therefore, incentives and performance requirements must be clearly set in the partnership agreement. Focus should be on performance requirements that are output-based and can be monitored.
- Government must retain sufficient expertise in the implementing agency and/or by contracting with outside experts to understand the P3 arrangements, carry out its obligations, monitor performance of the private partner, and enforce the private partner’s obligations.

Given the long-term nature of P3 projects and their associated complexity, it is difficult to identify all possible contingencies during project development. It may be that the parties will need to renegotiate the contract to accommodate these contingencies. It is also possible that some of the projects may fail or may be terminated prior to the projected term of the project, for a number of reasons including changes in government policy, failure by the private partner or the government

to perform their obligations, or due to external circumstances, such as *force majeure*, i.e., *Acts of God*. While some of these issues can be addressed in the P3 agreement, they, and others, must be managed during the course of the project.

2.6. Value-for-Money (VfM) Assessment

It must be recognized at the outset of considering P3s that they involve equity plus loans to provide funds for the private partner, which is more expensive than public sector borrowing. Long before the Great Recession financial crisis, this was an issue. It still is.

The expected return to investors typically ranges between 12% and 15%, which is higher than government's financing rate. With this in mind, a Value-for-Money (VfM) analysis is essential in deciding whether to pursue a P3. A VfM analysis compares the aggregate benefits and costs of a P3 procurement against those of the traditional public alternative. The VfM analysis is used to assist in:

- Selecting a project's preferred procurement option (i.e., traditional procurement or P3) and assessing its affordability; and,
- Selecting the preferred bidder and negotiating with it prior to finalizing the P3 agreement.

The methodology for carrying out a VfM analysis varies, but its major elements generally involve:

- Creating a **Public Sector Comparator** (PSC) which estimates the life-cycle cost of procuring the project through the traditional approach, including operating costs and costs of risks, which are not typically considered in traditionally-procured projects;
- Estimating the life-cycle cost of the P3 alternative; and,
- Completing an "apples-to-apples," risk-adjusted cost comparison.

It is important to clarify that VfM assessment of P3s is distinct from a benefit-cost analysis, which involves a comprehensive assessment of the full range of economic costs, risks, and

benefits and takes into account less quantifiable impacts, including external costs and benefits. In contrast, VfM analysis assumes that the decision has been made that a project is a good use of societal resources, and the question that remains is which procurement method will deliver the greatest value.

VfM assessment of P3s is also distinct from the process of establishing whether or not government can afford a project. There is no reason to presume that a project that represents good value for money will be affordable, or that an affordable project will represent good value for money. Financial assessment of a given project is more likely to address affordability.

2.7. Essential Items to Remember

2.7.1. P3s Cannot Rescue a Poorly Planned Project

Infrastructure projects, whether done by a P3 or by the traditional process, sometimes suffer from governance problems including poor planning, the lack of capacity of public agencies to oversee projects, and lack of transparency. P3s can make these problems more difficult to resolve because of their complexity

and lack of transparency. P3s, when handled badly, multiply the usual problems that plague infrastructure construction.

Due to the complexity of P3 arrangements, and the possibility of hiding behind “commercial confidentiality” as an excuse for failing to provide public information, there is, all too often, relatively little public scrutiny during the preparation of the projects. Where there have been successes in stopping poor deals, these have mostly taken place after the contracts have been signed, representing a waste of time and money for everyone.

A trained and knowledgeable staff within public authorities is essential for developing and managing P3 projects. Low capacity results in failure of a P3 to protect the public interest, lack of ability to enforce contractual provisions and, in the end, a lower-quality product.

A few examples each of P3s considered to be successful and unsuccessful are covered in **Chapter 3**.

2.7.2. Build Now, Pay Heavily Later

One of the chief misconceptions about P3s is that they somehow generate extra financial

resources for projects that would otherwise have to wait several years to be implemented. This claim encourages decision-makers to carry out projects that may not be affordable – and it is usually several years before anyone realizes the damage done.

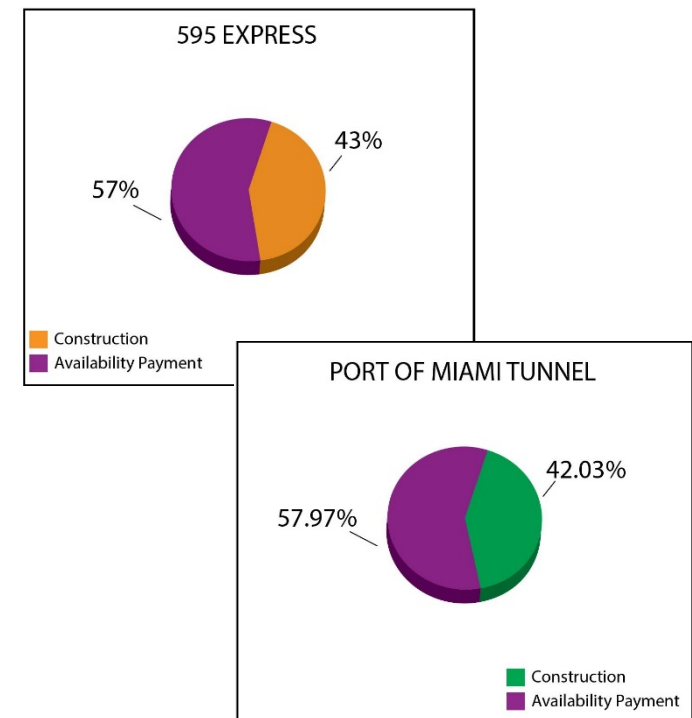
The questions that must be answered are: How much future commitment of funds is too much? And, is it justified to commit others to pay significant sums of money for the next 30 years, or so, on something they might never have considered a priority?

Although financing projects always leads to some commitments, the time period in question is generally much longer for P3s than for Traditionally-procured public sector projects, with a corresponding greater potential for today’s decision-makers to create a long-lasting burden for tomorrow’s political leaders.

The VfM analysis will clearly illustrate the relationship between the cost to construct a project and the “availability payments” required to operate and maintain it for dozens of years

and pay the profit to the Private Partner for the work and risks it takes.

The graphics here illustrate the relationship between those two forms of payment for Florida’s 595 Express and Port of Miami P3 availability payment projects. In essence, they involve about 50% more in payments by the owning agency after construction is completed than payment for building the project.



Source: The Corradino Group, Inc.

2.8. What Floridians Think About P3s

Data from a 2012 Mason-Dixon Polling & Research statewide survey of voter opinion in Florida on the concept of P3s indicates the following:

There is a low level of familiarity with the concept – 64% reported being “not too familiar” or “not familiar” with P3s. However, when informed of the P3 definition, voters were supportive of the concept by a margin of 62% to 42%. In fact, voters viewed P3s as the preferred policy of sustaining services while reducing government costs versus the other options of eliminating or reducing services (61% chose P3s).

Positive perceptions where the benefits of P3s resonate with voters are:

- Comparative Efficiencies of Private Sector (60% agree);
- Benefit of Reducing Government “Red Tape/Bureaucracy” (60% agree); and,
- Benefit of Creating Private Sector Jobs (66% agree).

Potentially damaging criticisms of P3s were also surveyed. These are:

- Can Lead to Favoritism/Corruption (64% agree);
- End Up Costing More (61%); and,
- Profit Motive (62% agree).

The public is predisposed to believe that P3s can lead to favoritism/corruption and higher costs, and that the only concern of private firms is profit, not public service. This is not a surprising finding because institutional trust of all sectors – public, private, and non-profit – is low. In recent years, the public has seen media coverage of companies receiving government bail-outs (GM and Wall Street), special treatment (Solyndra), and there have been a series of high-profile corporate misconduct scandals. The public is skeptical of government-business relationships.

In summary, the 2012 Mason-Dixon survey indicates Florida citizens, while wary, feel that P3s have potential.

3. P3 Examples

3.1 Chapter Overview

This chapter lists dozens of projects by type – roads, bridges, etc. – and by P3 approach – Design-Build, Design-Build-Finance, and so on. Then a discussions of successful P3s and those that can be considered unsuccessful are presented.

3.2 Examples by Mode and Type

Table 3.1 lists over 90 Public-Private Partnership projects. by infrastructure type. Summary descriptions and Web links to more complete information on each project are included in Appendix C (included in the Flash Drive on the inside of the back cover). In summary, Table 3.1 shows:

- Almost three dozen of the P3 are road projects, only two of which are Build-Own-Operate:
- ✓ Twenty-six are equally split between Design-Build-Finance-Operate and Design-Build-Operate-Maintain (DBOM).

- ✓ One road project is Design-Build and one is Design-Build-Finance, four are DBFM.

- Five of seven bridge/tunnel projects are DBFM or DBFOM. One is Design-Build and the last is DBOM.
- Two of the 19 transit projects listed in Table 3.1 are terminals. The remainder are fixed guideway projects. Of the latter, seven are MagLev systems, two of which are “under development” and two of which were never built. The largest number of projects (ten) are DBFOM.
- Two of the five Bus Rapid Transit projects are in the U.S. The three non-U.S. BRTs were all developed as DBFOM P3s.
- Of the five airport-related P3s, four are DBFOM. One is a DBF and another a DBFM.
- Of the two water port projects listed, one is DB and other is DBFM.
- Nine of the Park-and-Ride projects involve a private sector investment in the

form of a free parking area on their property for commuters.

In total, 38 projects are DBFOM, 15 are DBOM. The third most frequently used P3 structure (ten projects) is DBFM.

Table 3.1 | Public-Private Partnership Summary Matrix

		P3 Type <i>(Notes with hyperlinks to projects are in Appendix C)</i>					
		DB	DBF	DBFM	DBFOM	DBOM	BOO/BOOT
ROAD							
1.	I-69 Section 5, IN					X	
2.	Southern Ohio Veterans Memorial Highway, OH					X	
3.	Dulles Toll Road, VA					X	
4.	I-495 Beltway HOT Lanes, VA					X	
5.	I-95 HOV/HOT Lanes, VA					X	
6.	I-77 HOT Lanes, NC					X	
7.	I-4 Ultimate, FL					X	
8.	I-595 Express Corridor Improvements, FL					X	
9.	IH 635 Managed Lanes, TX					X	
10.	North Tarrant Expressway, Segment 1 & 2A, TX					X	
11.	North Tarrant Expressway, Segment 3A & 3B, TX					X	
12.	SH 130, TX					X	
13.	SR 125 South Bay Expressway, CA (now Public OM)						X
14.	91 Express Lanes, CA (now Public OM)				X		
15.	Presidio Parkway, CA	X					
16.	The Highway 63 Transportation Corporation, MO		X				
17.	Pocahontas Parkway, VA				X		
18.	NM Corridor 44 Project, NM			X			
19.	Route 3 North, MA				X		
20.	SR 57, Orange County, CA				X		
21.	Indiana Toll Road, IN				X		
22.	US 460, VA				X		

Red: U.S. Blue: Non U.S.

Table 3.1 | Public-Private Partnership Summary Matrix (*continued*)

		P3 Type (Notes with hyperlinks to projects are in Appendix C)					
		DB	DBF	DBFM	DBFOM	DBOM	BOO/BOOT
23.	<i>Highway 407 East Phase 1, Ontario, Canada</i>			X			
24.	<i>UK National Roads Telecommunications Services</i>					X	
25.	<i>Toll Roads PR-22 and PR-5, Puerto Rico</i>				X		
26.	<i>A4 German Autobahn Toll Concession, Germany</i>				X		
27.	<i>A7 German Autobahn Toll Concession, Germany</i>				X		
28.	<i>A8 German Autobahn Toll Concession, Germany</i>				X		
29.	<i>A59 Freeway Upgrade, Netherlands</i>			X			
30.	<i>M4 Motorway, Australia</i>						X
31.	<i>M5 Motorway, Australia</i>				X		
32.	<i>M3 Motorway, Ireland</i>				X		
33.	<i>Windsor-Essex Parkway, Canada</i>			X			
34.	<i>Regina Bypass, Canada</i>				X		
35.	<i>D1 Motorway, Phase 1, Slovakia</i>		X				
BRIDGE/TUNNEL							
36.	<i>Ohio River Bridges – East Bridge, KY/IN</i>				X		
37.	<i>Pennsylvania Rapid Bridge Replacement Project, PA</i>			X			
38.	<i>Goethals Bridge Replacement, NY</i>			X			
39.	<i>Downtown Tunnel/Midtown Tunnel/MLK Extension</i>				X		
40.	<i>Port of Miami Tunnel, FL</i>				X		
41.	<i>Teodoro Moscoso Bridge, Puerto Rico</i>					X	
42.	<i>Kicking Horse Canyon Bridge, Canada</i>	X					

Red: U.S. Blue: Non U.S.

Table 3.1 | Public-Private Partnership Summary Matrix (*continued*)

		P3 Type (Notes with hyperlinks to projects are in Appendix C)					
		DB	DBF	DBFM	DBFOM	DBOM	BOO/BOOT
FIXED GUIDEWAY TRANSIT							
43.	Grand Central Station, NY (Transit)		X				
44.	Union Station, Washington, DC (Transit)				X		
45.	WAVE Streetcar, Ft. Lauderdale, FL (Transit)	X					
46.	Denver Eagle P3 Rail (Transit)				X		
47.	Las Vegas Monorail, Nevada (Transit)				X		
48.	Orlando International Airport to I-Drive, FL (MagLev/Light Rail)					not built	
49.	Florida MagLev 2000 (MagLev)				not built		
50.	Northeast Corridor, Washington, DC to NY (MagLev)				under development		
51.	VivaNext, York Region, Ontario, Canada (Transit)		X				
52.	London, UK, Underground Major Regeneration Scheme (Transit)			X			
53.	High-speed Rail, Stockholm Central Station to Arlanda Airport (Transit)				X		
54.	Dutch High-speed Rail – Zuid (Transit)			X			
55.	Edmonton LRT, Canada (Transit)				X		
56.	Winnipeg Capital Integration Project (Transit)				X		
57.	Barrie Transit Facility Renovation, Ontario (Transit)				X		
58.	Magnovate, Canada (MagLev)				under development		
59.	Incheon International Airport, Incheon, South Korea (MagLev)						X
60.	Regional Commuter MagLev, Leningrad, Russia (MagLev)				X		
61.	skyTran, Tel Aviv, Israel and Lagos, Nigeria (MagLev)				X		
62.	Beijing Subway System Daitai Line (S1), China (MagLev)						X
FREIGHT RAIL							
63.	Chicago Region Environmental and Transportation Efficiency Program (CREATE)	X					
64.	Reno Rail Access Corridor, Nevada	X					
65.	Detroit Intermodal Freight Terminal Project				X		

Red: U.S. Blue: Non U.S.

Table 3.1 | Public-Private Partnership Summary Matrix (*continued*)

		P3 Type (Notes with hyperlinks to projects are in Appendix C)					
		DB	DBF	DBFM	DBFOM	DBOM	BOO/BOOT
AIRPORT							
66.	JFK Terminal 4, NY		X				
67.	LaGuardia Airport, NY			X			
68.	Puerto Rico Marin International Airport				X		
69.	Iqaluit International Airport, Canada (Iqaluit, NU)				X		
70.	Delhi, Hyderabad, Mumbai, and Bengaluru, India				X		
71.	Costa Rica Quiros Airport New Passenger Terminal				X		
WATER PORT							
72.	Port of Galveston Cruise Terminal, TX	X					
73.	Seagirt Marine Terminal, MD			X			
BUS RAPID TRANSIT							
74.	US 36 Bus Rapid Transit, CO	X					
75.	I-95 Bus Rapid Transit, FL	X					
76.	Bogotá, Columbia BRT				X		
77.	Cape Town, South Africa BRT				X		
78.	Haifa, Israel				X		
PARK-AND-RIDE							
79.	Park-and-Ride System Enhancements – I-66, Outside Capital Beltway, Virginia				X		
80.	Hamilton Parking Garage, NJ				X		
81.	Alabama Park-and-Ride ¹						
82.	California Park-and-Ride ¹						
83.	Maine Park-and-Ride ¹						
84.	Massachusetts Park-and-Ride ¹						
85.	Michigan Park-and-Ride ¹						
86.	Nevada Park-and-Ride ¹						
87.	Florida Park-and-Ride ¹						

¹ Private investment is in the form of free parking area for commuters on private property.

Red: U.S.

Blue: Non U.S.

Table 3.1 | Public-Private Partnership Summary Matrix (*continued*)

		P3 Type (Notes with hyperlinks to projects are in Appendix C)					
		DB	DBF	DBFM	DBFOM	DBOM	BOO/BOOT
BIKE SHARE							
88.	Bike Share Programs, U.S., Worldwide, and Miami						
89.	Nice Ride Minnesota						
90.	Broward County Bike Share Program						
91.	Bay Area Bike Share Program						
TOTALS		8	5	10	38	15	4

Red: U.S. Blue: Non U.S.

3.3. Successful P3s

Before summarizing a few P3 transportation projects that are viewed as successful by the industry, one must look to Canada keeping in mind that Canada is smaller in population than California, but hundreds of P3 projects are underway or completed. Canada's experience reflects "two sides of the P3 coin." On the positive side, the success rate of Canadian P3 projects is considered to be 99%+.¹ A key reason for this performance is that a general public consensus has been achieved on the advantages of P3s. Essentially, the Public-Private Partnership procurement method has been "depoliticized," which has resulted in P3s producing predictable, positive results.

A study of the ten-year economic impact of Canadian P3s prepared for the Canadian Council for Public-Private Partnerships (revised in June 2014),² found that over 500,000 full-time equivalent jobs were created; 291,000 of them through direct employment.

¹ Canadian Council for Public-Private Partnerships (revised in June 2014), by Syed M. Ali Zaidi, P.Eng. PM (Stanford), Ph.D., Director, Strategic Partnerships, Alberta Infrastructure, Government of Alberta, Canada

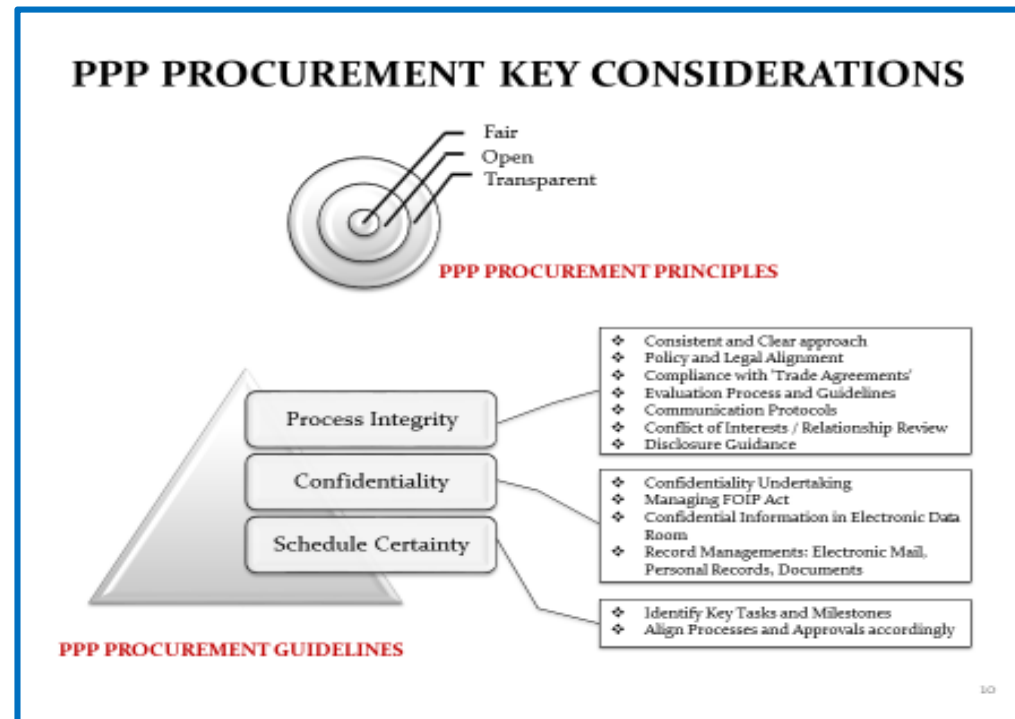
² InterVISTAS Consulting, Inc. "10-year Economic Impact Assessment of Public-Private Partnerships in Canada"

Nearly \$32.2 billion (Canadian) in total income and wages were paid and \$92.1 billion (Canadian) in total economic output was contributed to the national economy.

Nonetheless, it must be recognized that in April, 2016, the Alberta Minister of Infrastructure and Transportation questioned the "... overall benefit that is received by P3s" and indicated "... the design-build and operate model is not something I want to proceed with at this time." The Ministry noted on its

Web site that it will only move forward on new P3 projects "if value for Alberta taxpayers can be shown." A 2014 Value-for-Money assessment of P3s to design, build, finance, and maintain 19 schools determined it would cost more over 32 years than the traditional design-bid-build approach.

With this background, the description of a unique Canadian airport project is presented first in describing those P3s considered successful.



Iqaluit International Airport, Canada



3.3.1. Iqaluit International Airport, Canada

Iqaluit is in the Canadian territory of Nunavut. The Iqaluit International Airport Improvement Project (No. 69 on Table 3.1 and Appendix C) demonstrates that P3s can be successful even in remote and small places (the population of Iqaluit is fewer than 7,000 people).

The project includes the design, construction, financing, operation, and maintenance of the airport, including the rehabilitation of existing runways, new and existing taxiways and aprons, airfield lighting, and a new air terminal building. The private partner, Arctic Infrastructure Partners (AIP) – made up of Bouygues Building Canada Inc., InfraRed Capital Partners Limited, and Sintra – will operate and maintain the existing airport during construction of the new facilities and for 30 years

after construction is completed in 2017. The government will continue to own the airport during the entire period and will be responsible for ensuring the facility operates in the public interest.

The procurement process for the project was completed in fewer than 15 months. The capital cost is \$300 million. PPP Canada will contribute \$73 million and Arctic Infrastructure Partners will contribute \$227 million through equity and debt. This last contribution will be repaid as part of the Availability Payments from the public partner to AIP over the life of the contract.

3.3.2. I-595, Florida

As of March, 2016, Florida DOT has seven P3 transportation projects under construction, two in operation, seven completed but with no private partner involved in the ongoing

operation/maintenance, and one in procurement. The two in operation involving private partners, I-595 and the Port of Miami Tunnel, are of international significance to the P3 industry.

Five years after starting work on the first availability payment P3 in the U.S., the I-595 P3 project opened on schedule to the day, March 26, 2014, at a design-build cost of \$1.22 billion (No. 8 on Table 3.1 and Appendix C). That number includes \$7.6 million in owner changes, no contractor changes, and no contractor claims. Work involved widening, rebuilding, and adding managed and reversible lanes to 10.5 miles of the I-5 mainline between the I-75/Sawgrass Expressway, the I-95/595 interchange and 2.5 miles on Florida's Turnpike in a densely-populated corridor west of Fort Lauderdale.

I-595, Florida



The concession holder, I-595 Express, was formed by ACS Infrastructure Development Inc. All of the completion risk was transferred from the concessionaire to its sister company, Dragados, in 2009. The concessionaire sold half of its equity interest to TIAA-CREF in 2011.

ACS funded construction in the midst of the Great Recession. The financing included a \$603 million TIFIA loan at 3.64% over 34 years. A “club” of 13 banks provided the senior debt financing, which is backed by the completion payment and availability payments from FDOT.

FDOT is to make its \$685 million in payments starting with \$174 million on June 24, 2014 (i.e., 90 days after project completion). The first availability payment was also made in June, 2014, and will continue through 2044.

FDOT agreed to pay I-595 Express a bonus of up to \$50 million for meeting eight performance milestones, including timely completion. All milestones were met and the \$50 million is to be paid in installments over the first five years of operation.

Dragados USA subcontracted work to 275 local contractors. An average of 2,000 workers per month were employed over 49 months;

and, it substantially exceeded FDOT’s targets for disadvantaged businesses and trainees.

3.3.3. Port of Miami Tunnel, Florida

The Port of Miami Tunnel P3 is a 30-year availability payment concession that added an additional access route to one of the busiest ports in the U.S. (No. 40 on Table 3.1 and Appendix C). The Port of Miami Tunnel provides an alternative route to the port which is located on an island in Biscayne Bay previously linked to the mainland by a single bridge. Freight and cruise ship traffic shared the single point-of-entry, causing significant congestion. By 2030, truck traffic is forecast to double.

In 2009, FDOT entered into a concession agreement with Miami Access Tunnel LLC, a consortium of Meridiam Infrastructure and Bouygues Travaux Publics, S.A. The \$1.1 billion project was financed with a combination of \$341.5 million in senior bank debt, a \$341 million TIFIA loan, an equity contribution of \$80.5 million, and \$309.8 million in FDOT funds.

The P3 was designed to transfer the responsibility to design-build-finance-operate-and-maintain (DBFOM) the project to the private sector. Under the concession agreement, FDOT made payments to the concessionaire during construction, upon the achievement of contractual milestones.

When construction was completed in 2014, FDOT began making availability payments to the concessionaire contingent upon lane availability and service quality. The tunnel will be returned to FDOT in first-class condition at the end of the contract in October 2044.

Port of Miami Tunnel, Miami



3.3.4. Pennsylvania Rapid Bridge Replacement Project, Pennsylvania

This P3 project involves replacing 558 structurally-deficient bridges across Pennsylvania under a design-build-finance-maintain (DBFMO) P3 arrangement between PennDOT and Plenary Walsh Keystone Partners (No. 37 on Table 3.1 and Appendix C). It includes the Plenary Group US, Ltd., Walsh Investors, LLC, Walsh Construction, and Granite Construction Company. The concessionaire is also responsible for maintaining traffic during construction, demolishing the existing bridges, and then maintaining the bridges for

25 years following construction. PennDOT retains ownership of the structures. Most of the old bridges in the program range from 40 to 75 feet in length and are located in rural regions of the state. All work is anticipated to be complete by December, 2017. The construction cost is \$899 million.

This is the first project under Pennsylvania's 2012 P3-enabling legislation and the largest road project in Pennsylvania history. Batching the projects allows the bridges to be replaced and maintained at an average cost of \$1.6 million each as compared to \$2 million each if completed by PennDOT. The concessionaire is subcontracting rehabilitation work to a total of 11 local contractors and will use locally-based staff to perform long-term maintenance.

Pennsylvania Rapid Bridge Replacement Project



3.3.5 Goethals Bridge, New York

The Goethals Bridge/I-278 connection of Staten Island, New York, to New Jersey provides critical access for millions of travelers and billions of dollars of trade (No. 38 on Table 3.1 and Appendix C). This is the first new bridge constructed in New York City by the Port Authority since 1931. The existing bridge will be replaced with a new six-lane, cable-stayed structure directly south of the existing bridge. The current bridge will be demolished upon completion of the new structure.

The work is being done under a 40-year concession, a first for the Port Authority, through a DBFM P3 with the NYNJ Link Partnership. The Port Authority continues to operate the

Goethals Bridge Replacement Project, NY



facility, set and collect tolls. It will make annual availability payments of \$56.5 million to the concessionaire.

NYNJ Link is comprised of Macquarie Infrastructure and Real Assets Inc. and Kiewit Development, together with lead contractors Kiewit Infrastructure, Weeks Marine, and Massman Construction. NYNJ Link is financing the \$1.44 billion project with \$453 million of a tax-exempt Private Activity Bond, a \$474 million TIFIA loan, and \$107 million in private partner equity. It is projected that the project will create 2,250 direct construction jobs, and \$872 million in regional economic activity. It is also projected that the Port Authority will save 10% in combined construction and maintenance costs over the life of the agreement versus the Port Authority's own project estimates, while minimizing impact to the agency's debt capacity. The Port Authority also believes the incentives included in the contract will speed the delivery of the completed bridge by at least six months compared to the Port Authority's own construction estimates.

3.4. P3s NOT Considered Successful

Offered here are examples of P3 projects that began auspiciously, but failed to meet expectations for a variety of reasons.

The majority of these and other "unsuccessful" projects were begun prior to the use of availability payments. A principal cause of the poor results is overly optimistic traffic/revenue forecasts and bad private sector decisions.

3.4.1. Indiana Toll Road, Indiana

The Indiana Toll Road Project (No. 21 on Table 3.1 and Appendix C) is an early example (2006) of what was once considered a "successful" P3. It was the first for Indiana. It involved leasing the Toll Road in exchange for an upfront payment of \$3.8 billion. Two overseas companies – Cintra Concesiones de Infraestructuras de Transporte, a unit of Madrid-based Ferrovial, and Macquarie Infrastructure Partners, an investment fund managed by Macquarie Group of Sydney, Australia – won the right to operate the road. The companies each owned a 50% stake of the project, which was backed by several overseas banks and other investors. Their

\$3.8 billion bid was \$1 billion more than the next-highest offer.

The Indiana Department of Transportation (INDOT) invested its new-found

revenue in *Major Moves*, a comprehensive statewide transportation construction and improvement program. The most notable beneficiary is I-69 construction in southwest Indiana.

By 2007, the Indiana deal was still not profitable. Observers pointed to a risky financing scheme and faulty traffic projections. INDOT had released a traffic analysis, performed by a private company, prior to the sale showing expected traffic increases of 22% every seven years. After the concessionaire took over the lease in 2006, traffic volumes, in fact, declined.

In this case, the public sector was generally shielded from losses (estimated at \$100 million a year in operating costs) because the lease agreement contained numerous protections for the taxpayer and travelers and

Indiana Toll Road, Indiana



ensured the continued successful operation of the road. But, the private investors did not get past the debt they incurred in winning the bid. Annual debt payments were met only by borrowing more money. In 2014, the Indiana Toll Road Concessionaire filed for bankruptcy. The project emerged from bankruptcy in May 2015. The group known as IFM Investors bid \$5.72 billion to take over the Indiana Toll Road lease through a competitive bidding process. The lease has 65 years remaining.

Macquarie has invested heavily in infrastructure. Among their other projects that have performed badly are the Dulles Greenway Toll Road (an extension of the original toll road serving the airport of that name in Washington D.C.), and the South Bay Expressway, a 13-mile toll road east of San Diego. In each case, overly optimistic traffic/revenue projections were a principal cause of failure.

For the Indiana Toll Road, Macquarie and Ferrovial each contributed \$374 million in equity. But the other \$3+ billion was borrowed from seven European banks, six of which have since been bailed out by their respective governments, which means their tax payers.

3.4.2. South Bay Expressway, California

The South Bay Expressway (SBX) toll road is a 9.2-mile, privately-developed southern extension of SR 125, extending from SR 905 in Otay Mesa, near the International Border with Mexico, to San Miguel Road in Bonita, California (No. 13 on Table 3.1 and Appendix C). The SBX connects the only commercial port-of-entry in San Diego to the regional freeway network.

SBX was developed pursuant to California's P3 legislation passed in 1989. Under the original franchise agreement, the private developer raised capital and constructed the road in exchange for a 35-year toll concession. The SBX was to be financed, built, maintained, and operated under a contract between California and the Parsons Brinckerhoff Company.

Controversy had plagued the project for decades. Parsons Brinckerhoff encountered significant environmental and community opposition, finally selling the nearly finalized plans to Macquarie Infrastructure Partners in 2003.

On March 22, 2010, the privately-owned toll road operator and TIFIA borrower, SBX LP, applied for reorganization under Chapter 11 of the U.S. bankruptcy laws. The principal cause

South Bay Expressway, California



was a bad traffic forecast. The forecasters blamed the economic downturn of the Great Recession, including reduced housing development and reduced truck traffic from Mexico. The same forecaster as on the Indiana Toll Road offered the same reasons for underestimating toll revenue.

Under the bankruptcy reorganization plan, TIFIA's secured claim was \$99 million and the unsecured claim was \$73 million, or 42% of the \$172 million outstanding balance, essentially becoming a taxpayer responsibility. All future toll revenues were to be shared pro rata between TIFIA (32%) and the lenders (68%).

Soon after SBX LLC emerged from bankruptcy, the San Diego Association of Governments (SANDAG) purchased the P3 concession for \$344.5 million in cash and debt, which was significantly more than the road's value as assessed during the bankruptcy.

This deal ended costing the project's private creditors and the federal government tens of millions of dollars. As a result of the bankruptcy, the U.S. DOT was forced to cut its claims against the company. The Congressional Budget Office indicated *"... the new financing and ownership structure required by the bankruptcy court imposed a loss of (\$73 million) on federal taxpayers."*

3.4.3. Dulles Greenway, Virginia

The Dulles Greenway is a 14-mile, limited-access highway extending from the state-owned Dulles Toll Road, which carries traffic between Washington's Capital Beltway and Dulles Airport, to Leesburg, Virginia (No. 3 on Table 3.1 and Appendix C). The two roads connect at a toll plaza where drivers pay one toll, which the operators of the two facilities divide.

The Greenway was privately financed and constructed from 1993 to 1995 as a Design

Build Finance Operate (DBFO) P3, and had an initial agreement for operational responsibilities to revert to the Commonwealth of Virginia in 2036. To finance the Greenway, the limited private partnership, TRIP II, put up \$40 million in equity, and secured \$310 million in privately-placed taxable debt. Ten institutional investors led by CIGNA Investments, Prudential Power Funding Associates, and John Hancock Mutual Life Insurance Company, provided \$258 million in long-term, fixed-rate notes (due in 2022 and 2026). Three banks (Barclays, NationsBank, and Deutsche Bank AG) agreed to provide part of the construction funding and \$40 million in revolving credit. Loans were to be repaid with toll revenues, and the financing was secured by a first mortgage and security interest in the developer's right, title, and interest in the facility.

When the Greenway opened in September, 1995, traffic fell short of projections. Tolls were reduced to attract more drivers, but

Dulles Greenway, Virginia



revenues did not increase. Then tolls were increased in July, 1997, and the speed limit was increased from 55 to 65 miles per hour. Still facing financial challenges, TRIP II restructured its debt in 1999 including a time extension of an additional 20 years to 2056. In September, 2004, variable peak and discounted off-peak tolls were introduced to manage peak-period congestion.

In September, 2005, Macquarie Infrastructure Group (MIG, now Macquarie Atlas Roads) agreed to purchase TRIP II for \$617.5 million. In December, 2006, MIG completed the sale of 50% of its economic interest to Macquarie Infrastructure Partners (MIP). Subsequently, MIG holds a 50% economic interest in the Greenway. These machinations by and between Macquarie entities were designed to spread the losses to several companies.

The maximum toll schedule was set by the Virginia State Corporation Commission (SCC) to the end of 2012. From 2013 through 2020, tolls can escalate annually at the higher of CPI plus 1%, or real GDP, or 2.8% per annum. After 2020, tolls are to be set by the SCC on application.

The toll structure has been subject to challenges in the legislature and courts. The SCC

ruled in September, 2015, in favor of the Dulles Greenway's owners and operators in a complaint that was brought by State Representative David I. Ramadan (R-Loudoun) and the Loudoun County government over the road's steadily rising toll costs.³

Complaints against the toll rates do not appear to be diminishing.

3.4.4. SH 130, Texas

SH 130 is a 91-mile toll road providing an east-side bypass of Austin that was designed to relieve congestion on the parallel, heavily traveled, I-35 (No. 12 on Table 3.1 and Appendix C), which passes through Austin's downtown. It is the primary north-south route through Central Texas.

Segments 1 through 4 of SH 130 are part of the Central Texas Turnpike System opened in stages between 2006 and 2008 and operated by the Texas Department of Transportation (TxDOT). On March 22, 2007, TxDOT signed a Comprehensive Development Agreement

SH 130, Texas



(CDA) with the SH 130 Concession Company LLC to design, build, finance, operate, and maintain Segments 5 and 6, a 41-mile extension of SH 130 under a 50-year concession from the date of opening (October, 2012). These sections of SH 130 were the first privately developed and operated toll road in Texas. This is a \$1.33 billion project.

The SH 130 Concession Company was a partnership between Spain-based Cintra and San Antonio-based Zachry American Infrastructure. It opened its southern portion of SH 130 with an agreed 85 mile-per-hour speed limit that some believed was intended to attract traffic from I-35. Lower-than-expected traffic led to immediate shortfalls in revenue. A year after the road opened in 2012, Moody's Investors Service severely downgraded the company's debt. It released a report eight

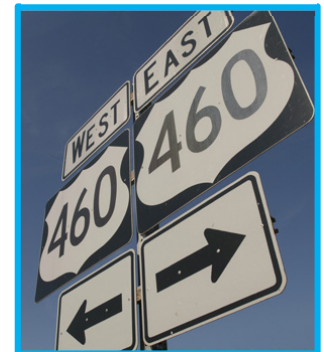
months later warning that the company was dangerously close to defaulting. In early March, 2016, the SH 130 Concession Company filed for Chapter 11 bankruptcy.⁴

The company said that, while its current debt payment schedule is "unsustainable," it hopes to announce a resolution to its financial troubles in the coming months and points to gradual traffic increases as reason for confidence.⁵

3.4.5. US 460, Virginia

The Virginia Department of Transportation (VDOT) developed the U.S. Route 460 Corridor Project to improve the 55-mile road between Petersburg and Suffolk, Virginia (No. 22 on Table 3.1 and Appendix C). The objectives were to enhance travel safety and time efficiency; expand westbound hurricane-evacuation routes; stimulate business development in the region; enhance connections among the region's military installations; and, accommodate greater freight traffic from the Port of Virginia.

US 460, Virginia



³ https://www.washingtonpost.com/local/legal-battle-over-greenway-tolls-is-likely-to-head-to-a-higher-court/2015/09/18/9867d714-5d48-11e5-b38e-06883aacba64_story.html

⁴ <http://www.texastribune.org/2016/03/02/sh-130-toll-road-files-bankruptcy/>

⁵ Op. cit./

A two-year competitive P3 procurement process successfully reached financial close in December, 2012, with award to US 460 Mobility Partners (a partnership of Ferrovial Agroman S.A. and American Infrastructure). Subsequently, the project was cancelled due to environmental impacts, the mitigation of which the U.S. Army Corp of Engineers refused to accept, and the failure of the contract to address how this would be covered. So, in July, 2015, the new Virginia Governor announced that his administration had reached an agreement with the concessionaire, which would return \$46 million to taxpayers and cancel an additional \$103 million claim the company had filed under the contract.

The fact remains that Virginians spent hundreds of millions of dollars (including its costs) on a project that will never be built because state officials negotiated a contract that left Virginia at risk when the environmental circumstances were too great to overcome. The P3 contract did not allow a way to mitigate the impact of this failed project.⁶

Since then, reforms enacted by the Virginia legislature require three key items:

1. An independent screening committee, with representation from the General Assembly, to decide if a transportation improvement should be financed as a P3 project, with meetings open to the public.

2. Risk transfer from the taxpayers to the private sector. Decision makers will have access to all the risks involved in a potential P3 deal so they can make the right decision.
3. Clear lines of accountability. The Secretary of Transportation will be required to sign a document attesting that the project qualifies as a P3 project.

Virginia's experience and the legislation it ultimately passed provide a guide for governments embarking on P3s.

⁶ http://www.virginiadot.org/newsroom/statewide/2015/gov_mcauliffe_announces_settlement84156.asp

4. Implementing P3 Transportation Projects

4.1. Chapter Overview

Chapter 4 presents the steps to realize a successful Public-Private Partnership. Much of the work on implementation steps has already been accomplished by the Miami-Dade County P3 Task Force, the report of which is included in Appendix A and summarized here. Preceding that, an overview of the global economy that drives P3 projects is provided.

4.2. Global Economic Outlook and P3s

The housing bubble, the banking and financial crisis, and the resulting Great Recession, beginning in 2008, significantly affected government finances worldwide. The effects of declining government revenues cascaded throughout U.S. state and local governments affecting service levels, public employees, and citizens. Some believe that the financial situation of state and local governments is now in a “new normal” state characterized by smaller government, lower revenues and expenditures, and fewer public employees.

Global GDP growth for 2016 is projected to be no higher than 2015, which was the slowest

pace in the past five years. Forecasts have been revised down given a host of negative data, with slowing growth in emerging markets and very modest recovery in advanced economies, like the U.S. and Europe.

Higher domestic debts (combined public and private debt) have continued to build over the last eight years, surging to all-time highs as a percentage of GDP.

The U.S. alone added more federal debt in just over three years (2007 to the third month in 2010) than had been accumulated in 217 years, for an outstanding debt load of approximately \$13 trillion. The interest required on such debt is weighing heavily on budgets and diminishes the public sector’s ability to fund infrastructure.

In the U.S., the domestic recovery continues to have momentum, with employment gains realized that bolster household demand; however, the employment gains are primarily in the lower-paying service sector, and the labor force participation rate of 62.9% is the lowest since the late 1970s.

The above conditions, coupled with the drop in commodity prices, especially oil, are contributing to uncertainties in the financial mar-

kets. Government policies encouraging investor confidence will continue to play a major role in the ability to finance public infrastructure in these uncertain financial times.

4.2.1. Global Infrastructure Financing

Regardless of economic trends, developed countries need to rebuild existing infrastructure, which in many cases is reaching the end of its useful life. Simultaneously, emerging economies still face pressure to develop new infrastructure. As their economies grow, there is a natural trend towards increased auto ownership which necessitates building roads and bridges.

The needed investment in infrastructure points to government practices and policies that attract more private capital, as governmental budgets are insufficient to meet the needs. Transportation infrastructure investment is projected to increase between 2014 and 2025 at an average annual rate of 5% worldwide. Water ports are predicted to grow the fastest at 5.8% per year, while airport investment is expected to slow to an annual rate of 2.6%. Roads and bridges will likely remain the area of largest investment, especially in developing countries; growth in the

U.S. and Canada is expected to be at an annual rate of 3%.

The global financial situation has reinforced the belief that infrastructure investment is a strong asset class. This is particularly true in the U.S. and Canada. With reduced yields and volatility in many other asset classes, including the stock market, private investment in infrastructure projects remains attractive.

4.2.2. Keys to Attracting P3 Investment in Infrastructure Projects

While infrastructure investment is an attractive asset class, P3 failures, like those noted earlier, have caused investors to be more cautious. Properly planned and researched projects supported by the public sector's willingness to absorb a certain level of risk is the key to attracting P3 investment in infrastructure. Proper planning includes removing political obstacles, addressing technical challenges including design, environmental permitting, and garnering public sector support.

Governments have often lacked the experience to prepare for the projects which is why there have been a number of P3s started and stopped over the last ten years. The key is government's long-term commitment to a

specific infrastructure project. Many times, proper planning takes longer than the political champion's term in office, which results in starting and stopping of much-needed infrastructure projects.

4.2.3. Keys to a Successful P3

The following principles guide achieving a successful P3:

- **Do Your Homework!** Thorough preparation is the first step in a successful P3 process. This is especially important in choosing a P3 structure for the right reasons.
- **Manage the Deadlines.** For the public sector, extending deadlines means delaying the service for the public good. For the private partners, failure to meet deadlines can produce adverse financial consequences.
- **Be Aware of the Politics.** The P3 partners must be able to respect and respond to the politics surrounding a project so everyone benefits. This was not the case on the Chicago Skyway P3 project.

The Skyway is an eight-mile toll road that links downtown to the Illinois-Indiana state

line. In 2004 the city issued a request for qualifications that led to five qualified bidders for a 99-year lease of the Skyway. The bidders competed for the operations and maintenance of the highway in exchange for future toll revenues according to a predetermined toll schedule.

There were three active bidders and an undisclosed reservation price estimated to lie in the range of \$700 to \$800 million. The winning bid of \$1.83 billion was submitted by Cintra-Macquarie. The other two bids were more than \$1 billion lower.

A few political notes in this case are: 1) major toll increases were pushed into the future,

Chicago Skyway, Illinois



past the time of retirement of the then-current mayor; 2) before leasing the Skyway, the city procured an exemption from leasehold tax for the facility, thus raising its current value at the expense of future revenues; and, 3) the original lease was for 55 years, but the final lease was extended (at the insistence of the winning bidder) to 99 years, an extension that might loom large in future renegotiations, but whose current present value is just \$3 billion.

The short-term political benefits of the program were important. These included pushing toll increases into the future, plus using government's new income to retire Skyway bonds and city debt. The remaining \$475 million went into a discretionary fund, of which the city of Chicago had spent 83% as of 2010.

This P3 was financially convenient for the city but it generated the amount of revenue received from the winning bidder under implausibly-optimistic expectations of traffic growth. In the end, the three tenets listed above were not followed by each of the "PARTNERS." If a true "PARTNERSHIP" is the goal, the one-sided Skyway arrangement gives P3s a bad reputation. P3s are not about "GOTCHAS."

4.3. Implementation Steps

With authorization of counties to use P3s by virtue of Florida Statute § 336.71, the Miami-Dade County Board of County Commissioners (BCC) passed Resolution No. R-150-15 on February 3, 2015, and amended it on September 1, 2015, to create the P3 Task Force to advise the BCC and the county mayor on the county's use of P3s. The resolution specified the following general powers and duties:

1. Recommend to the BCC the ordinances, resolutions, regulations, implementing orders, and administrative practices that will advance P3s.
2. Review and assess timelines and legislative recommendations or any other goals, tasks, or deliverables set forth in the county's P3 plan.
3. Focus on improving county practices and policies that would foster P3s as opposed to identifying potential infrastructure projects.
4. Concentrate on changes in county ordinances, resolutions, regulations, implementing orders, and administrative practices that will advance

P3s; eliminate the identification of specific P3 projects.

5. Provide a written report describing the P3 Task Force's findings and recommendations (Attachment A).

That report was delivered officially to the BCC in April, 2016. It defines a recommended P3 procurement process from conceptual development to commercial and financial close by a process that can be adapted to specific projects as they are conceived and developed.

The Task Force defines the term "public infrastructure" to include *"facilities or projects that serve a public purpose, including, but not limited to, any ferry or mass transit facility, vehicle parking facility, airport or seaport facility, rail facility or project, fuel supply facility, oil or gas pipeline, public housing facility, recreational facility, sporting or cultural facility, school or educational facility, water, wastewater, or surface water management facility or other related infrastructure, telecommunications facility or system, general government and criminal/civil justice facility, or any other public facility or infrastructure that is used or will be used by the public at-large or in support of an accepted public purpose or activity, or shall be an improvement, including equipment, of a building that will be*

principally used by a public entity or the public at-large or that supports a service delivery system in the public sector or as designated as qualifying projects by the BCD.”

Table 4.1 outlines “steps” in a P3 project cycle in the U.S., the U.K., and Canada. Also, on **Table 4.1** are steps offered by Miami-Dade County’s P3 Task Force.

Before a county can approve a P3, it must conduct a noticed public hearing and determine that the P3 project:

- Is in the best interest of the public;
- Would only use county funds for portions of the project that are part of the county road system;
- Would have adequate safeguards to ensure that additional costs or unreasonable service disruptions are not realized by the traveling public and citizens of the state;

- Upon completion, would be owned by the county; and,
- Would result in a financial benefit to the public by completing the project at a cost to the public significantly lower than if the project were constructed by the county using the normal procurement process.

Generally speaking, it can take up to two years to complete the steps to a contract to do a P3, with the average experience being closer to 18 months.

Table 4.1 | Alternative Implementation Steps

U.S./FHWA	U.K.	Canada	Miami-Dade
Phases 1 & 2: Preparation & Business Case	Phase 1: Preparation		Phase 1: Preparation & Planning
A. Establish Work Group	A. Initial Planning		A. Form P3 cell within Government
B. Establish Legislative Authority			B. Engage P3 Advisors to be Part of P3 Cell
C. ID Projects			
D. Establish Project Goals	Phase 2: Business Case	Phase 2. RFQ Stage	Phase 2: Project Screening
E. Hold Industry Meetings	A. Prepare Business Case	A. Announce Project	A. Assess Project P3 Feasibility
F. Examine Revenue Options	B. Prepare Tender Notice	B. Hire Advisors	B. Prepare Statement of Need
G. Evaluate Risks		C. Prepare Draft Agreement	C. Begin Outreach
H. Establish Public Sector Comparator		D. Hold Informational Meeting	
I. Conduct VfM		E. Issue RFQ	
J. Determine Go/No		F. Shortlist Proposers	
Phase 3a: RFQ	Phase 3a: RFQ		Phase 3a: RFQ
A. Develop RFQ	A. Pre-qualify Bidders		A. Conduct VfM
B. Issue RFQ	B. Shortlist Bidders		B. Host Industry Review Workshop(s)
C. Evaluate Qualifications/Select Proposers			C. Issue RFQ
D. Develop Agreement			D. Review P3 Qualifications
			E. Shortlist P3s
Phase 3b: RFP	Phase 3b: RFP	Phase 3. RFP Stage	Phase 3b: RFP
A. Develop RFP	A. Conduct Bidding Process	A. Issue RFP	A. Develop and Issue RFP
B. Issue RFP	B. Select Bidder	B. Conduct Bidding Process	B. Conduct One-on-One Meetings
C. Evaluate Proposals/Select Private Partner		C. Select Bidder	C. Review Alternate Technical Concepts
			D. Determine Successful Bidder
Phase 3c: Negotiate Agreement	Phase 3c: Negotiate Agreement	Phase 3c: Negotiate Agreement	Phase 3c: Negotiate Agreement/Contract
Phase 4: Implement Project	Phase 4: Implement Project	Phase 4: Implement Project	Phase 4: Implement Project

Source: The Corradino Group, Inc.

Drawing from the Task Force's report, the following steps are summarized here (*Figure 4.1 and Table 4.2*).

Phase 1: Planning Project

Preparing and planning for transportation projects, large or small, most often begins at the Miami-Dade County Metropolitan Planning Organization (MPO) (*Figure 4.1*). The process starts with determining if a project is feasible and, if so, including it in the Unified Planning Work Program – UPWP. The MPO is then responsible for evaluating and prioritizing projects to develop the Long Range Transportation Plan, which usually spans 25 years into the future. Then the TIP (Transportation Improvement Plan) is formed of the highest priority projects which can be implemented in the immediate future. The LRTP and, therefore, the TIP must be “cost feasible”; i.e., funds must be identified to ensure a project can be implemented. In this manner, the MPO's plans are not a “wish list.”

Projects identified as P3 candidates are then to be scrutinized by a team comprised of implementing agency staff and other P3 professional, as needed, covering the technical, financial, and legal disciplines.

Phase 2: Screening Project

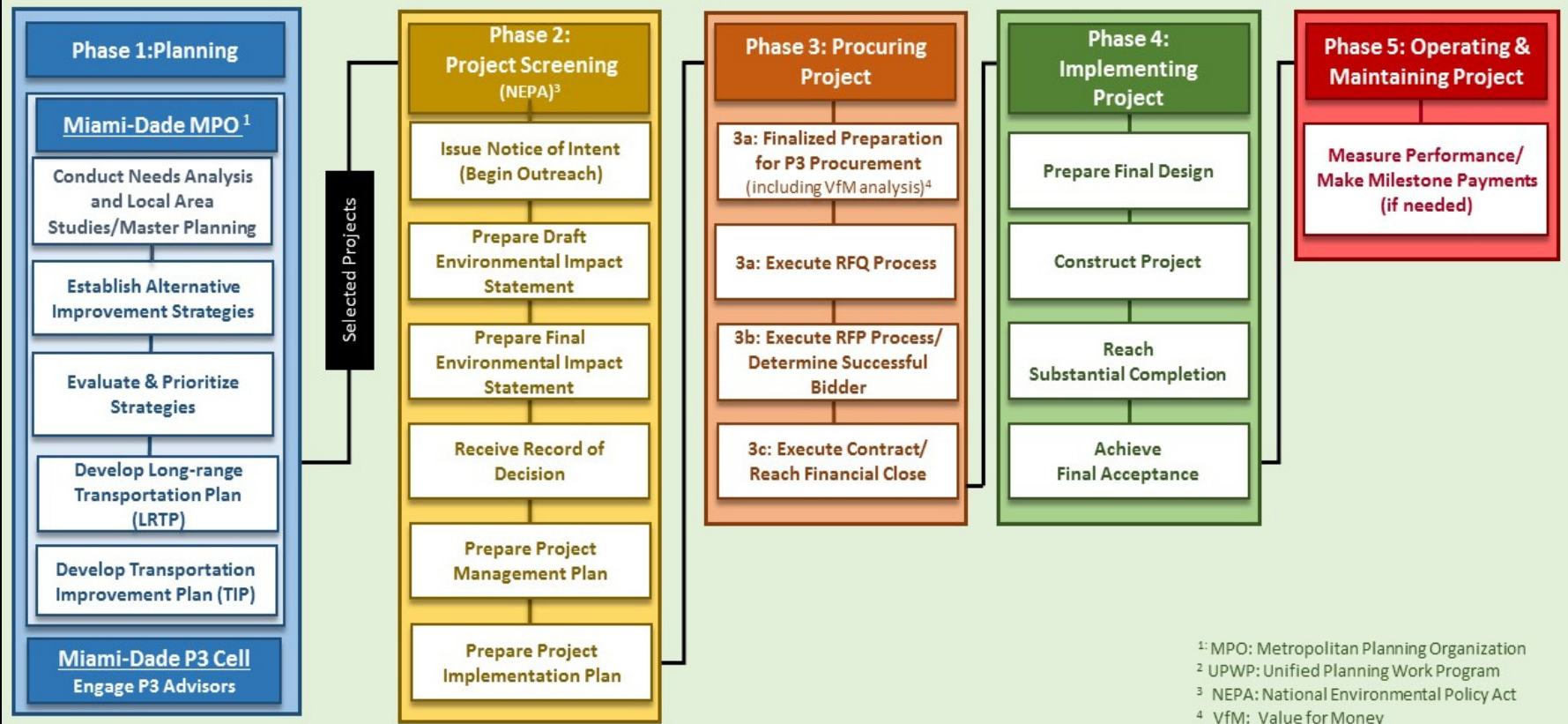
Project Screening typically involves the following:

- Assess project feasibility for P3 delivery:
 - ✓ Prepare preliminary studies and analyses to facilitate the feasibility assessment.
- Prepare a Statement of Need, including a project description and summary, the project's position as a critical asset, the rationale for P3 delivery, and the public interest underpinning the project;
- Begin outreach to the public and the industry to fully vet and understand a specific project and its potential for P3 delivery; and,
- Prepare a draft and final environmental document (most likely an Environmental Impact Statement) and secure federal approval in the form of a Record of Decision (ROD). Once approved, a Project Management Plan and a Project Implementation Plan must be prepared and gain approval of the USDOT. With that, the project enters **Phase 3: Procuring Project**.

Phase 3: Procuring Project

This phase is usually comprised of three parts: a Request for Qualifications, a Request for Proposals, and Contract Execution. In entering this phase, it must be recognized that the Private Partner will expect right-of-way/project property to be provided at no cost to it. The Public Partner often owns the ROW needed for the project and, where it doesn't, it has the power of condemnation to acquire more for the greater public good. Likewise, the Private Partner expects project utilities to be provided by the owner; many states have laws that require private utility companies to adjust their facilities that are needed for a public project at the utility company's expense.

Figure 4.1: P3 PROCESS
for a
SELECTED TRANSPORTATION PROJECT



Source: The Corradino Group, Inc.

Table 4.2 | P3 Steps as Determined by MDC P3 Task Force

PHASE		PARTICIPANT	
		Public Sector	Private Sector
1.	Preparation & Planning	<ul style="list-style-type: none"> Form P3 cell within Government Engage P3 Advisors to be Part of P3 Cell 	
2.	Project Screening	<ul style="list-style-type: none"> Assess Project P3 Feasibility Prepare Statement of Need Begin Outreach 	
3a.	RFQ Process	<ul style="list-style-type: none"> Conduct VfM Host Industry Review Workshop(s) Issue RFQ Review P3 Qualifications Shortlist P3s 	<ul style="list-style-type: none"> Participate in Workshop(s) Comment on RFQ Submit Qualifications
3b.	RFP Process	<ul style="list-style-type: none"> Develop and Issue RFP Conduct One-on-One Meetings Review Alternate Technical Concepts Determine Successful Bidder 	<ul style="list-style-type: none"> Participate in One-on-One Meetings Submit Proposal Submit ATC(s)
3c.	Contracting	<ul style="list-style-type: none"> Negotiate and Execute Comprehensive Agreement Reach Financial Close 	<ul style="list-style-type: none"> Negotiate Comprehensive Agreement
4.	Implementing	<ul style="list-style-type: none"> Manage P3 Contract Measure P3 Performance Deliver Successful P3 Project 	<ul style="list-style-type: none"> Deliver Successful P3 Project

Source: The Corradino Group, Inc.

Phase 3a. The Request for Qualifications (RFQ) Process

- Conduct a Value for Money analysis (VfM) by a qualified Financial Advisor.

“Value for money” means that the agreement with the private partner will result in a net benefit to users of the project in terms of cost, delivery, price, quantity or risk transfer, or any combination thereof. The VfM includes, at a minimum:

- ✓ A quantitative financial model comparing the costs and benefits of the project on a time-adjusted life-cycle basis to determine to best delivery approach for the project;
- ✓ A cost-benefit analysis, including an assessment of opportunity costs, a risk matrix, and consideration of the results of all studies and analyses related to the project; and,
- ✓ Assumptions for the cost of labor as may be required by the Comprehensive Agreement, and other factors that may increase costs for the private entity.

After a draft RFQ and the VfM have been completed, an industry review workshop(s) is to be conducted at which interested parties can review the proposed documents and provide feedback.

Two very important provisions of the RFQ are cited by the Task Force:

1. Labor Considerations for Operations and Maintenance: The following, or similar language, shall be included in the RFP for a P3 that will include operations and maintenance:

“Concessionaire shall, and shall cause the O&M Contractor and all Contractors that will perform Operations or Maintenance Work, to exercise good faith efforts to execute and deliver to Owner by Final Completion a Labor Peace Agreement, similar to what is used at the Miami-Dade County Airport, with a labor organization that (a) contacted Concessionaire and the O&M Contractor, in writing, before Financial Close and (b) is actively engaged in representing or attempting to represent individuals that are to perform the Operations and Maintenance Work for the Project, as deter-

mined by the Mayor or his representative. Concessionaire and each such Contractor shall be bound by the terms of such Labor Peace Agreement, which agreement shall be valid and enforceable under 29 U.S.C. § 158 and shall, at a minimum, prohibit any and all such labor organization(s) and its members from engaging in any picketing, work stoppages, boycotts or other interference, economic or otherwise, affecting the O&M Work or the qualifying project.”

2. Workforce Provisions: Proposers shall comply, and require all Contractors to comply, with the Responsible Wages Ordinance (Miami-Dade Code of Ordinances 2-11.16):

“During the life of the concession agreement, all construction work that is not covered by the terms of the O&M agreement and includes altering, repairing, maintaining, improving, or demolishing a project shall require the contractor and all subcontractors to comply with the requirements of the Responsible Wages Ordinance (Miami-Dade Code of Ordinances 2-11.16). These projects shall utilize the same scoring criteria for bids referenced above in respect to

10% of the score pertaining to work-force plans and utilization of disadvantaged workers.”

Phase 3b: The Request for Proposal (RFP) Process

The key items in developing and issuing the RFP include:

- A detailed description of the current state of any planning, environmental or design studies that have been conducted along with future planned activities;
- An analysis, as prepared by the County and professional service advisors, that sets forth any initial conversation or due diligence that has been conducted with potential sources of debt or credit assistance, along with any requirements or prohibitions on project delivery methods tied to such funds; and,
- A specific timeline for each phase of the procurement process including but not limited to: document review, questions and answers period, one-on-one meetings and ATC discussions.

- One-on-one meetings to review alternative technical concepts that the private sector proposer expects will enhance the value of the project.
- Successful bidder determination:
 - ✓ Selected for the best value over the life of the contract – lowest life cycle cost combined with best design should be incorporated in scoring methodology.

Phase 3c: Execute Contract/Reach Financial Close

In this phase, the form of a Comprehensive Agreement, having been included in RFP documents, should not be subject to any material changes during the final negotiations of the Comprehensive Agreement. And it must be consistent with the provisions of Sec. 287.05712, FS.

Any arbitrary request to reduce the price subsequent to receipt of the final proposal shall be construed as a request for a material change and is not permitted; as such, the P3 proposer shall have no obligation to comply.

Based on the executed agreement, the full funding of the project, i.e., “Financial Close” can be achieved.

Phase 4: Implementing Project

Implementing a P3 requires final design to be completed to the satisfaction of all parties. Then, construction involves achieving milestones at which the private partner will receive substantial monetary payments for successful completion. Meeting those milestones leads to substantial completion of the project. Following a number of reviews, in the field and of project records, final acceptance of the project can/will occur.

Phase 5: Operating and Maintaining the Project

If the P3 arrangement includes transfer of Operation and Maintenance responsibilities to the private partner, monitoring/performance measurement will be continuously undertaken by the public partner so any “availability payments” can be paid in part or in full.

5. P3s on the Horizon

What will our infrastructure look like in ten years – 20 years – 40 years?

Technology advancements are having a significant impact on the transportation industry. This is causing a shift in the way automotive vehicles are manufactured, as well as the way we will plan, design, and construct our infrastructure (roads, bridges, and transit systems) in the future.

Infrastructure advancements will result from automotive vehicles becoming driverless (autonomous). Automobiles being produced today include semi-autonomous features including collision avoidance, parking, advanced detection of trouble ahead, on-board wireless (Wi-Fi) connections, touch screens, and more. By adding computers, or on-board units (OBU), with Wi-Fi connections, sensors, cameras, and detectors, vehicles can: communicate, calculate, process data, optimize route planning, avoid crashes, detect trouble ahead, and provide other driver-assist functions. As vehicles with this technology further evolve, they will become fully autonomous. Eventually, the computers can also perform all of these tasks simultaneously and as quick as the human brain.

So, what will the infrastructure of the future look like? Research presents several items to consider:

- Because autonomous vehicles will not drift within their lane, existing design standards could be revised that would narrow the minimum width of a travel lane. If a passenger vehicle requires a minimum 12-foot-wide lane by current design standards, but only nine feet of width is needed to accommodate the vehicle itself, it will no longer be necessary to provide an extra one to two feet of width for a driver's margin of error. Shoulder widths, median widths, and clear zones can also be reduced. The existing roadway can be re-striped, potentially creating enough additional width within the existing roadway to add another travel lane or turn lane without the need to widen the existing pavement.
- Fleets of autonomous vehicles will be able to travel in platoons, where they could be separated by only a few feet, as compared to the recommended vehicle spacing. This will increase the capacity of a roadway, reducing the need for expansion/widening, or delaying expansion/widening by several years.
- Traffic signals, as they exist today, would no longer perform the function of controlling traffic at an intersection, as this task will be handled by "virtual signals", where vehicles would communicate with each other to go through an intersection safely. Traffic signals would remain in place as a backup in the event that autonomous connectivity fails.
- Roadway signs and message boards will evolve to communicate with the vehicle itself. The need for roadway signage could be eliminated; however, message boards and alerts/updates via radio will remain to serve as backup in case of failure of communication between connected vehicles. Nonetheless, technology can transfer information of these messages from a traffic management center directly to the vehicle itself, via wireless communication, dedicated short-range communications (DSRC), cloud-based communications, or even technologies that do not yet exist.

Increased usage of shared connected and autonomous vehicles (CAVs) serving as driverless public transit vehicles would significantly

decrease the need for parking lots and parking garages. The private sector will take the lead in making these changes come about. Research is no longer the exclusive field of public institutions. Google, Tesla, Uber and others are speeding ahead to advance tech-

nological innovations which return a profit and will set the pace of change in many fields of communication, including transportation. As a principal source of the future's infrastructure – connected and autonomous vehicles, message boards, signs, and much more

– the private sector will likely be more eager to partner in building roads, bridges, airports, and transit vehicles, and operating all of these, because they will create them.

6. Observations

If there are essential items at the core of engaging in Public-Private Partnership they are:

- A “political champion” is a must;
- The public must be engaged early and often throughout project development;
- Equity issues must be addressed early in the planning process;
- Schedule deadlines must take into consideration the complexity of the project elements; and,
- Staffing and resources must be assigned from inception/approval of the project.

To elaborate ... Much of the attention given to P3s occurs during the procurement process and when the project is completed. However, those contractual arrangements usually last decades and require open and sustained engagement of the public and private partners and the community. To ensure a successful P3, the public sector needs a “champion” to address and articulate each

project essential. He/she needs a core staff dedicated to P3 analysis and advancement. This includes: implementing a continuous engagement strategy; employing a strong monitoring process to adapt to changes; and, learning/adjusting throughout the process.

The public sector must dedicate sufficient staff and resources to ensure the private sector fulfills its obligations, as codified in the project’s Comprehensive Agreement. Formalized processes to report progress and performance, and steps to remedy any challenges are often the most intensive parts of P3 contract negotiations. After that, the public sector must maintain frank and productive communication with the concessionaire. Interactions must allow the partners to identify potential problems before they become a source of discord or, even, a legal dispute. And, transparency has to establish a heightened community awareness of the project’s value and the challenges it faces. Open communication ensures the public knows how resources are being spent. Conducting regular community meetings, making progress and performance reports widely-available, and directly providing the community information and access to project personnel, such as a

Public Information Officer (PIO), are keys to transparency and success.

Over the course of 20-, 30-, or even longer contracts, changes will occur. Demographic shifts, new technologies, emerging economic trends, climate change, and a wide variety of other factors may alter the original assumptions underlying an infrastructure P3. These issues can be identified through continued dialogue with the concessionaire and the broader community, so the public and private sectors are able to adapt their strategy to serve new realities.

In summary, infrastructure P3s are technically, economically, politically, and contractually challenging undertakings. Enthusiasm for this complex procurement model reflects growing demand for infrastructure investment, the search for new tools, and a great deal of optimism. In a tax-averse and politically-gridlocked environment, P3s are appealing as solutions to very tangible infrastructure problems. Yet, P3s are not a substitute for direct public sector investment in infrastructure and, in fact, are highly dependent on public revenue and expertise to operate effectively.