REPORT ONE

BEST PRACTICES

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ABSTRACT

This report summarizes the literature on the scope and outcomes of P3 projects in the US. It is intended to provide a summary of the state of knowledge of P3s, and serve as a basis for further research. The report discusses motivations for using P3s in transportation infrastructure investment and their advantages and disadvantages. A set of case studies show that most of the advantages identified are evident in project outcomes, while most disadvantages are not. Toll roads are discussed in more detail, and factors that are associated with toll road implementation and outcomes are identified. The report ends with a series of conclusions and their implications for California.

PART ONE
OVERVIEW: EMERGENCE AND OUTCOMES OF P3S IN THE US

INTRODUCTION

This report summarizes and evaluates the existing knowledge on public-private partnership (P3) development and implementation. The research supports California's efforts to expand use of P3s in California. Governments throughout the world are pursuing P3s in order to increase the efficiency of public infrastructure investments and to address shortfalls in traditional funding sources vis-à-vis growing demand for infrastructure. Both the number and variety of P3 projects have grown rapidly throughout the US over the past 25 years, and these experiences provide a rich body of information on the factors that lead to success or failure. This report summarizes the best practices.

Part One of this report begins with some background on why P3s have become more common. We discuss P3s, how they differ from traditional infrastructure delivery, and their advantages and disadvantages. We then describe and analyze a series of cases, mining them for the best practices they convey. Part Two describes current P3s across the US, and Part Three analyzes toll road experience in the US. The report concludes with some observations on P3s in the California context.

WHY P3S?

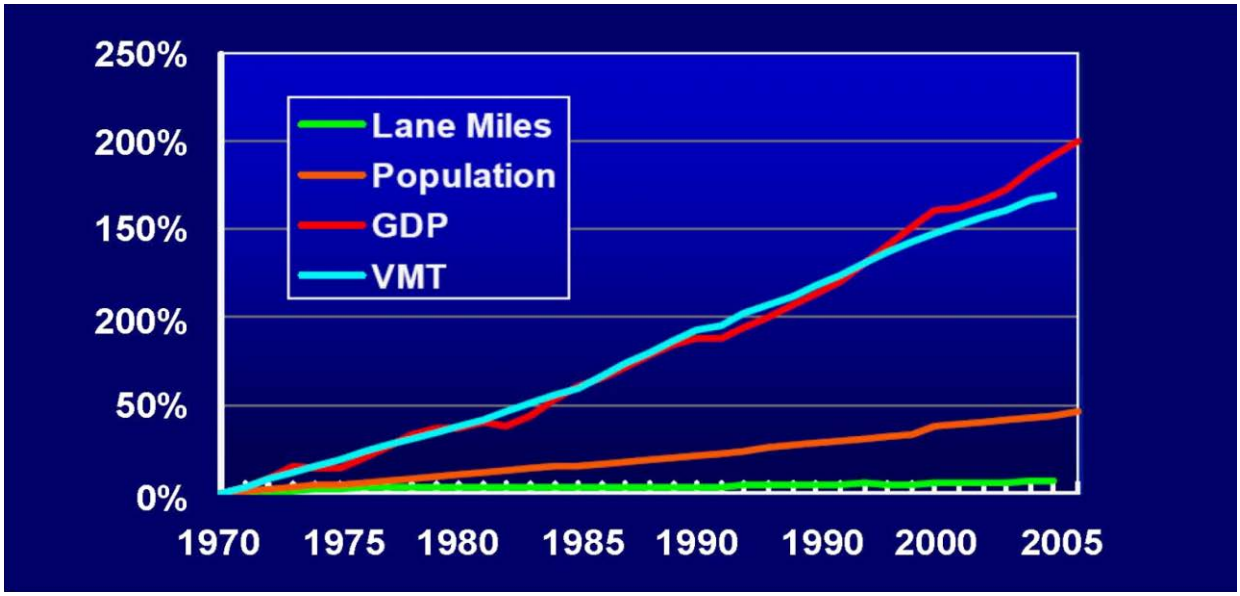
California's transportation infrastructure problems are not unique. Academicians, think tanks, and professional organizations all have studied the deteriorating transportation infrastructure and growing demands for more transit and highway investments (ASCE, 2009; USDOT 2008). Others identify shortfalls of the fuel tax and other sources of revenue, and propose various solutions (Katz and Puentes, 2005; National Surface Transportation Infrastructure Financing Commission, 2009). Funding and needs gaps loom throughout the US.

The nation's – and California's – surface transportation infrastructure problems derive at least in part from how we fund and supply that infrastructure. Although most funding for highways (78% in 2004; TRB 2009) comes from user fees, the source of these fees—fuel and

excise taxes—are not closely tied to whether users patronize a specific facility at a specific time period. Since users do not face the full cost of using highway facilities, there is excess demand during peak times.

The gap between supply and demand has also widened because the supply of highway capacity has lagged demand. The completion of the Interstate Highway Program, growing resistance to increasing highway capacity in urban areas, and declining productivity of the fuel tax have all contributed to dampening infrastructure supply (Samuel 2000; Wachs 2006). At the same time, demand – both passenger and freight – has continued to increase at about the same rate as economic growth more generally (Gross Domestic Product). Figure 1.1 shows the resulting gap for the Los Angeles Region. As demand grows and supply does not, traffic congestion increases, contributing to a further disconnect between the fuel consumption-based user fee and the full costs of urban highway use.

Figure 1.1 Highway Supply and Demand in the Los Angeles Region



Source: Los Angeles County Metropolitan Transportation Authority

Highway funding policy impacts public transit supply and demand. To the extent that highway use is underpriced, public transit must also be "underpriced" in order to attract passengers. Pressures to keep fares low also come from the broad urban policy agenda that public transit is expected to achieve: reducing congestion, serving the mobility needs of the poor,

saving energy and reducing greenhouse gases. The result is public demand for expanding public transit, while the share of costs covered by user fees (transit fares) declines. In 2006, transit fares and other user revenues accounted *on average* for just 33% of all operating and none of the capital costs of the nation's transit systems (APTA, 2008).

Traditional funding practices also contribute to the gap between supply and demand. The traditional model is "pay as you go:" facilities were constructed as funds became available, and the public sector carried out the design, engineering and construction. Pay-as-you-go eliminates public debt and interest payments, but construction begins only when funds are available for use.

An alternative model uses government debt instruments. When demand for additional capacity becomes large enough, the benefits of providing the capacity earlier can exceed the interest and other costs of debt financing. But the capacity and willingness of agencies to incur debt for transportation infrastructure finance is limited, sometimes by state regulation or by political climate. In that case, the next logical next step becomes using private equity with various funding streams – public and private – identified to pay off the debt.

Traditional infrastructure provision relies heavily on the public sector for planning, design and construction. Some researchers have argued that private infrastructure and service provision would be more efficient than traditional practices (Boardman and Hewitt, 2004; Gomez-Ibanez and Meyer, 1993; Yescombe, 2007). Public sector provision may be less efficient due to 1) lack of incentives (no profit motive); 2) lack of expertise or institutional capacity; and 3) higher labor costs.

Private sector involvement—as financier and/or builder—has the potential to address these problems. First, using private sector finance mechanisms provides more capacity in the short term than would be possible otherwise. Greater capacity for incurring debt increases the number of projects that can be delivered over a short time period. Private sector involvement in project delivery also has the potential to reduce construction, operation and maintenance costs.

Private equity requires a revenue stream that will cover project debt and generate an acceptable return on investment (ROI) for the equity partners. User fees provide a revenue stream to retire the debt and a price signal to both users and suppliers, contributing to better alignment of supply and demand. If a project is to rely on user fees for all or a large part of funding, it has to pass a market test—whether there is sufficient demand (willingness to pay) for

the added capacity. Under such circumstances, public infrastructure investment should in theory become more efficient, as we will discuss in more depth later in the report.

WHAT ARE P3s?

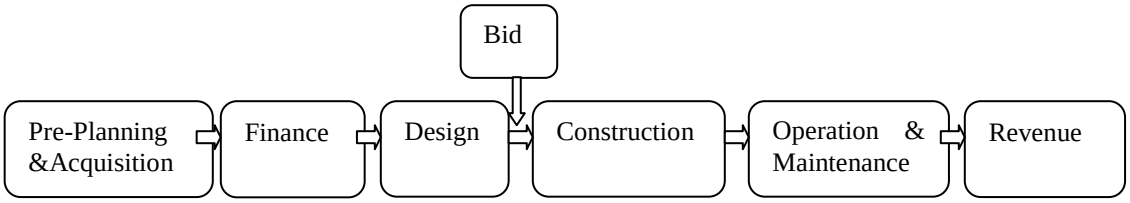
P3 refers to a wide range of contractual arrangements by which public authorities and private entities collaborate in the development, operations, ownership, and/or financing of a project or program through Public-Private Partnerships (PPPs). Therefore, P3 means different things in different situations, depending on the legal, political, and financial features of the project sponsors (Grote, 2006).

Public Development Mechanisms (PDM) and Private Finance Mechanisms (PFM) are two general models of project finance and development. PDM describes the traditional model of development for highway, bridge and tunnel construction in the US. A project or a program is planned, designed, constructed, and operated by a government agency – typically state departments of transportation or local transportation agencies. Financing comes from government grants, public loans, and tax-exempt municipal revenue bonds. Any incurred debt is retired through public revenue streams, such as the fuel tax. Using project-generated revenues (e.g. tolls) for debt retirement is uncommon, except for bridges and tunnels.

In contrast, PFMs are a special type of P3. These involve the most private sector involvement. In addition to being part of project planning, design, construction, or operation, a private entity contributes an equity share to a transportation project and has either sole or shared entitlement to project-generated revenues.

The range of P3 can be illustrated by using a flow chart of transportation infrastructure development in the U.S., as illustrated in Figure 1.2. The infrastructure development process consists of six major phases and one optional step (bid).

Figure 1.2. Transportation Infrastructure Development Process in the US



Source: Adapted from Pekka Pakkala. *Innovative Project Delivery Methods for Infrastructure – An International Perspective*. Finnish Road Enterprise, Helsinki, 2002, p.32.

1. *Pre-Planning and Acquisition:* project planning, feasibility studies, and environmental clearance, right-of-way, and other permits.
2. *Finance*: identification of source of funding and financing mechanisms
3. *Design*: engineering and architectural design of facility
4. *Bid:* an optional step when a project sponsor seeks a contractor to construct a project based on ready-to-go design.
5. *Construction.*
6. *Operation and Maintenance:* daily operations and periodical maintenance of a facility over its service life.
7. *Revenue:* revenues generated by the facility, such as tolls.

P3 may occur in any combination of the above steps. Design-build contracting is only incrementally different from the traditional model; the public agency retains control of the entire process and provides all the funding, yet they partner with private contractors for project delivery. Public agencies may also issue concessions by selling the right to manage a facility to a private entity for a specified period. Finally, a facility may be entirely private, with the private entity designing, constructing, and operating the facility over its entire service life.

As Figure 1.3 illustrates, Design, Construction, and Operation and Maintenance can be done by either government in-house work or outsourced private work, which creates the following public-private arrangements:

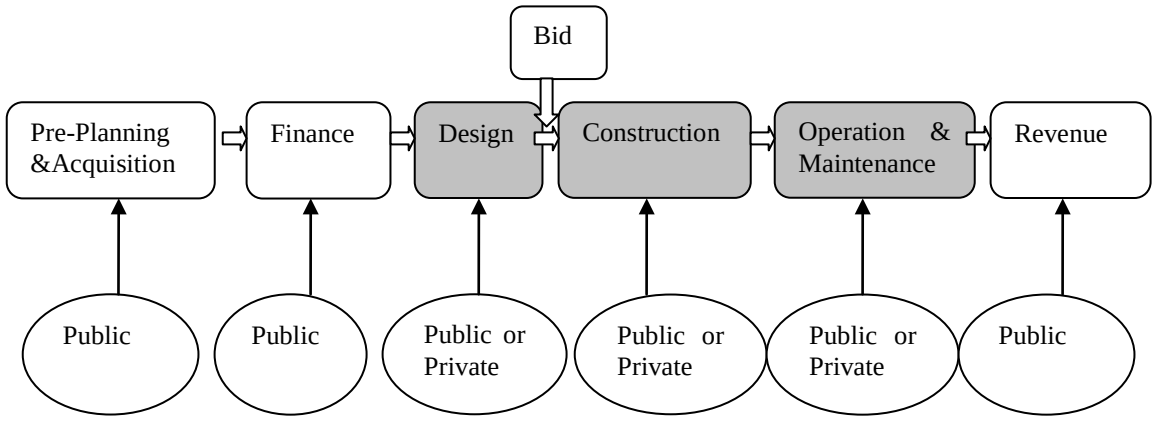
(1) Direct public provision, where the public sector does everything from planning, design, and construction to operation and revenue collection, without any private involvement;

(2) Design-Bid-Build (DBB), a widely used method for project delivery in which the public sector contracts with separate private entities for the design and construction of a project and holds a bidding process in between;

(3) Design-Build (DB), arguably a more advanced project delivery method than DBB in which the design and construction aspects are contracted with a single entity known as the design-builder in order to minimize the project risk for the public sector and reduce the delivery schedule by overlapping the design and construction phases; and

(4) Asset Operation and Management model, in which the public sector contracts out project operation and management to a private contractor and pays for the private services based on public-private agreements.

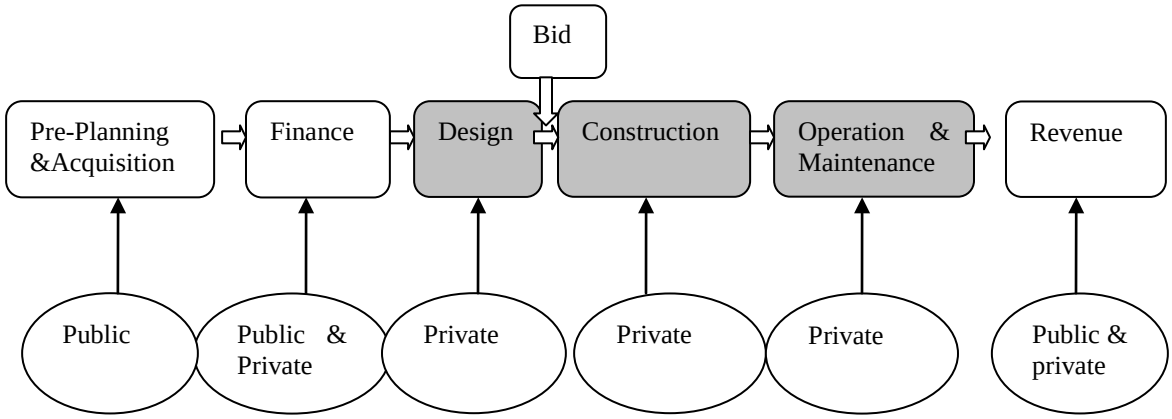
Figure 1.3. Development Process of the Public Development Mechanism (PDM)



With the PFM, shown in Figure 1.4 below, a private company provides full or partial financing and/or funding for a project and is entitled to full or partial project-generated revenues. In most cases, the public sector still plays a crucial role in the PFM, especially in planning and financing. The private sector is not capable of doing everything on its own, and the phases of Pre-Planning and Acquisition and Finance usually involve both private and public parties. For example, most toll road concessions in the U.S. have not been financed exclusively through private investment. Public funding includes government grants, public loans (such as TIFIA and SIBs), and right-of-way contribution. Second, the public sector is usually not involved in Design, Construction, and Operation and Maintenance of a private concession, leaving those tasks to the private sector.

When both public and private parties invest in a transportation project, usually both are entitled to project-generated revenues. A typical example is a toll concession that designates a portion of its toll revenues to support public transit services in the region, while the remainder remains with the concession owner to pay for operations and debt service.

Figure 1.4: Development Process of the Private Finance Mechanism (PFM)



ADVANTAGES OF THE PRIVATE FINANCE MECHANISM (PFM) MODEL

The literature identifies a number of advantages of the PFM model compared to PDM.

1. Building projects sooner than otherwise possible. Using private finance allows agencies to gain access to a new source of capital, allowing for projects to be built sooner than would be the case with traditional public finance mechanisms. In the simplest case, private finance is simply a substitute for public finance (typically government bonds), with funding ultimately coming from existing public revenue sources. Access to private capital may leverage available public funds, allowing those funds to be spread across more projects. Although most transportation investment projects are not fully self-supporting, user fees are an effective funding mechanism for a portion of the project debt. Examples include the Alameda Corridor, the I-394 MnPass project, and the Orange County Toll Roads.

2. Avoiding state budget caps. Proponents argue that private finance for transportation development can alleviate financial pressure on the public sector and keep project financing off government budgets. All U.S. states, except Vermont, have a legal requirement of a balanced

budget; some are constitutional, some are statutory, and some are derived by judicial decisions from constitutional provisions about state indebtedness (Briffault, 1996; Snell, 1996). Under the conventional PDM, governments either use tax revenues or issue tax-exempt municipal revenue bonds to pay for projects, which would show up in government budgets and impose budgetary pressure. Most public managers, agency directors, and politicians perceive that there are political benefits from keeping large capital projects like highways off the budget (Vining, Boardmand & Poschmann, 2005).

3. Possible efficiency gains in project delivery and operations. When investing in a road project, a company can become the project sponsor and assume multiple roles in project development such as design, construction, operation, and maintenance. The PFM could enable the company to complete a project at a lower cost due to the private sector's economies of scale and technical efficiency (Frantz, 1992).

4. Risk reduction in the public sector. International studies in countries that have successful experiences with infrastructure concessions, like Britain, find that a primary benefit of P3s has been the risk transfer from the government to the private sector (UKNAO, 1999; HM Treasury, 2000). First, concession transfers the risk of cost overruns to the private sector. Large public infrastructure projects have often incurred huge cost overruns and governments ended up paying far more than anticipated or budgeted (Flyvbjerg, Bruzelius & Rothengatter, 2003; Boardman, Mallery & Vining, 1994; USGAO, 2003). Also, project-generated revenues from these projects have turned out to be much lower and/or less volatile than expectations, imposing substantial financial uncertainties on governments. Private concession can effectively shift these risks and uncertainties to the private sector while the public sector still receives the desired infrastructure facilities as designated in concession contracts.

5. Defusing public opposition to the tolls and user charges. Motorists and transit users may be more likely to accept the idea that a private investor needs to raise revenues for investment returns (Vining, Boardmand & Poschmann, 2005). Members of the public may also be less likely to resist paying tolls or user charges based on the argument that they have "already paid" through taxes.

6. Taking advantage of network economies and economies of scale. The institutional capability of state and local transportation authorities may restrict both the benefits and the possible revenues from transport projects. Any given agency may be empowered to operate

within a single jurisdiction, which precludes the efficiency gains from diversity and economies of scale. For example, a state turnpike authority is unable to operate across state lines and is only allowed to develop turnpikes within the state, when the value of the turnpike most likely increases with distance and cross-jurisdictional coverage.

This limit has consequences both for the connectivity of the system and for the agency's ability to diversify its portfolio of investments. Private companies, however, can develop a portfolio of projects in different geographic locations and achieve efficiencies through operating nationally and internationally. A downturn in one project's revenues could likely be offset by stronger financial performance from projects in other locations. Portfolio diversity would allow the company to carry financially troubled projects through bad years without the large reserves or coverage ratios required by public bond rating agencies.

7. Correcting management problems within public agencies. Private companies are able to hire and retain experienced management professionals. In a public authority, the chief executive is likely to change with every change in political administration (Samuel & Segal, 2007). In addition, many chief executives of transportation agencies come to the job with little relevant experience, and their political appointment means they are unlikely to make a career of system management for a given agency. However, private companies that take on infrastructure projects can seek out leaders and staff that specialize in particular projects and locations.

DISADVANTAGES OF THE PFM MODEL

Even though many support private finance for transportation development, some scholars and practitioners oppose the PFM strategy for the following reasons.

1. Igniting rather defusing political conflicts. Private development of highways could lead to private control over public highways, which might result in a fragmented road network and even affect the integrity of regional transportation policies (Baxandall, Wohlschlegel & Dutzik, 2009). In addition, some argue that allowing any user charges or tolls will hurt poor drivers disproportionately and restrict their job access as well.

2. *False economies and spending more to get less.* Many argue that the PFM strategy will, in fact, cost government and the public more for project development. In general, it is more expensive for the private sector to raise project capital than the public sector since governments can borrow through the issuance of tax-exempt bonds (de Bettignies & Ross, 2004; Enright,

2007). Under the PDM, state or local governments can issue tax-exempt municipal revenue bonds to fund infrastructure projects and repay the public debt with revenues from tolls or taxes. In contrast, private investment in transportation projects – consisting of private equity, bank loans, and private activity bonds – involves both dividend requirements and taxation, and privately funded projects would have to generate more revenues to pay back their expensive debt. As a result, a toll project built under the PFM may be likely to charge higher tolls to repay its investment than would a publicly funded project.

3. *Inflexibility and undermining travelers' interests with long-term leases and noncomplete clauses.* Non-compete or compensation clauses in some concession contracts may incur substantial costs for government in the future, putting the public sector in a disadvantaged position (Baxandall, Wohlschlegel & Dutzik, 2009). A non-compete clause limits the public sector's ability to improve or expand the nearby competing services, in order to attract users to the privately operated services or roads. When transportation demand grows, the non-compete constraint may lead to severe congestion on both the toll road and the competing free roads.

This problem fueled much of the political controversy behind the CA 91 Express Lanes in Orange County, California. Eventually the local transportation authority, Orange County Transportation Authority (OCTA), bought the facility in order to eliminate the non-compete clause and make improvements to the adjacent freeway. After the SR 91 experience, state governments have become more cautious about using this clause. In place of the non-compete clause, some contracts now include a compensation clause, which allows governments to improve competing freeways but requires them to compensate the private investors for revenue loss. Although the compensation clause introduces flexibility, the compensation requirement could still pose a challenge to governments that need to improve regional freeways or transit.

4. Too much talk and too little work: inefficiencies due to coordination costs. Perhaps the most controversial aspect of PFMs is the subject of efficiency. The PFM model can generate significant transaction costs, which may offset any efficiency gains associated with the lower costs of private provision. In a private toll concession where cross-sectoral activity dominates the entire project development process, significant transaction costs may accrue due to partner searching, negotiation, contracting, coordinating, and almost every other project aspect involving both public and private parties.

Transaction costs have three major manifestations: contracting costs, risks associated with

uncertainties, and opportunism. First, it can take time and money to find, negotiate, contract, and monitor the private partner best suited to serve government's goals. Failing to do so can also be high cost, as unscrupulous or unsuitable private sector partners can engage in costly opportunistic behaviors at the expense of the public interest. The complexity and unpredictability of large, long-term capital projects make it almost impossible to develop a contract that precludes all possible problems. The more contractual detail, the higher the transactions costs; the less detail, the greater uncertainties.

5. Risk shifting back to governments. These uncertainties can generate rather than lessen risks. These risks are especially high for projects with high asset specificity, like most transportation projects, because most design work for these projects are not useful for other projects. Thus aborted projects and contracts can incur significant sunk costs (Williamson 1975; Globerman & Vining 1996; Broadbent, Gill & Laughlin, 2003). Agencies may face even greater risks if their staff has little experience or has poor contract management skills (Boardman & Hewitt, 2004; Leiblein & Miller, 2003).

The private sector actors have an incentive to transfer uncertainty-related risks to the public sector or a third party through a variety of financial tools. For example, a private partner might form a stand-alone corporation that is isolated from its other corporate activities (Vining, Boardmand & Poschmann, 2005), or limit its equity participation by borrowing government loans or using third-party debt financing (Roll & Verbeke, 1998).

6. Opportunism. In infrastructure concessions, the relationship between public and private partners is longer term and more complex than in conventional contracting-out situations. Opportunism might emerge, especially from the private sector side. For example, in most cases, government would not replace an inefficient or irresponsible private partner because it is generally much cheaper for the initial private partner to finish a project than to bring in a new one. This situation could get worse if the project happens to be well-publicized or under a political and/or media spotlight. The agency may not be able to stop the project even if it is failing (Ross & Staw, 1993). In these cases, the private sector partner can take advantage of the agency's commitment to continuing the project—in order to avoid looking bad in public—regardless of escalating costs, forcing government to throw good money after bad (Vining, Boardmand & Poschmann, 2005). It bears noting, however, that the same considerations apply to PDM projects as well.

CASE STUDIES

In this section we present case studies of the more common types of P3 projects. They are selected to illustrate both successful and less successful experiences. One problem with examining these case studies arises from the fact that few people study projects that get suspended or never progress beyond the proposal stage. Thus potential lessons to be learned from such projects are seldom available. In addition, project inventories as we have constructed often include projects that are in the planning or financing stages for many years. Of the projects that are not yet under construction, some are unlikely to ever be built. Case studies of such projects are also rare. Therefore, the case study literature covers projects that are at least successful enough to have advanced to construction. As such, we were constrained in choosing from what cases were available in existing P3 literature, which consists mostly of projects that have achieved at least some modicum of success.

That said, however, learning can occur from both successes and failures, particularly from analyzing what went wrong with a given project and juxtaposing it with what went right with another. It is in that spirit that these case studies were chosen – to provide a usefully wide range of projects with varying outcomes, contract types (DB, DBF, DBOM, DBOM+F, concession, etc), infrastructure project types (tolled highway, multimodal infrastructure, managed lanes, etc), and regional and political contexts. The cases were also selected to offer maximum learning value for future P3 development and implementation in California, including as many California projects as possible from the P3 literature. The 12 selected case studies are summarized in Table 1.5 below. Brief descriptions are presented in Appendix A.

Table 1.5: Selected Case Studies

Name	Location	Size	Project type	Total Cost	Status	P3 type	Finance/funding
Anton Anderson Memorial Tunnel	Whittier, AK	2.5 mi	Rail/hwy tunnel	$80 million	Open, 2000	DB+ OM concession	Capital: 80% fed, 20% state infra. bank; funded by hwy user tolls
Route 28 Phase II Expansion	Fairfax / Loudoun Counties, VA	6 grade – separated intrchngs	Hwy intrchngs	$200 Million	Open, 2007	DB	TID tax: 75% TID revenues; Capital: 25% state
Route 3 North Rehab.	Burlington, MA	21 mi	Hwy rehab, widening	$388 million	Open, 2006	DBF (originally DBOM+F)	Debt: 63-20 bonds by private team – lease back to MA
South Bay Expressway (SR-125)	San Diego County, CA	9.5mi	Toll hwy	$635 million	Open, 2007	DBFO	Debt: 63% private bank, 22% TIFIA; Equity: 15% private
Chicago Skyway	Chicago, IL	7.8 mi	Toll road	$1.83 billion	Open, 2005	Operating Lease	Debt: 61% private bank; Equity: 39% private
I-595 Corridor Improvements	Broward County, FL	10.5mi	Hwy / managed lanes	$1.8 billion	Under const. (Exp. 2014)	DBOM+F	Debt: 43% private bank, 34% TIFIA Equity: 12% private; Capital: 11% state
Pocahontas Parkway	Richmond, VA	8.8 mi	Toll hwy	$381 million	Open, 2002	DBFO	Debt: 93% private 63-20 bonds, 5% state infra bank Capital: 2% fed.
CA 91 Express Lanes	Orange County, CA	10 mi	Toll hwy	$130 million	Open, 1995	BTO	Debt: 77% private bank, 7% subord. to OCTA Equity: 16% private
Dulles Greenway	Loudoun County, VA	14 mi	Toll road	$350 million	Open, 1995	DBFO	Debt: 89% private Equity: 11% private
Foley Beach Expressway	Baldwin County, AL	13.5 mi	Toll roads, toll bridges	$44 million	Open, 2000	BOO	Debt: 82% private Capital: 18% fed. and state
I-394 MnPass	Minneapolis MN	11 mi	Toll hwy	$12.5 million	Open, 2005	BTO	Capital: 80% state, 20% private
SH-130 Segments 5/6	Central TX	40 mi	Toll hwy	$1.3 billion	Under const. (Exp. 2012)	Concession	Debt: 53% private, 33% TIFIA; Equity: 14% private

EVALUATION OF THE CASE STUDIES

We evaluate the case studies in the context of the advantages and disadvantages discussed earlier in this report. To what extent are the arguments identified in the literature on P3 consistent with actual experiences? Tables 1.6 and 1.7 provide a summary. Almost all projects have

been built sooner than would have been the case otherwise. Clearly, funding constraints and foregoing projects on the public sector side are a major motivation. In most cases, public capital is part of the funding package, with the private portion filling the "gap," or providing the up-front financing, to be funded by tolls or other revenue streams. Most projects also claim some form of efficiency, typically through the use of DB, which typically shortens construction time. It bears noting that DB does not require private partners; rather, when private partners are involved, DB is the dominant form of project delivery.

Table 1.6: Advantages of P3s for Case Study Projects

Project	Build project sooner	Avoid state budget caps	Efficiency gains	Public sector risk reduction	Defuse opposition to tolls	Network and scale economies	Mgmt within public agencies
Anderson Tunnel, AK	X		X	X		X	
Rte 28, VA	X		X	X	X	X	X
Rte 3, MA	X						
SR 125, CA	X			X			
Chicago Skyway	N/A		X	X	X		
I-595, FL	X	X	X	??			
Pocahontas Pkwy, VA	X	X		X			
SR-91, CA	X	X	X	X	X		
Dulles Grnwy, VA			X	X			
Foley Beach, AL	X	X		X			
I-394, MN	X						
SH-130, TX	X	X	X	X			

A third common advantage is public sector risk reduction, through provision of private equity or other means. The extreme case is when all financial risk is born by the private sector, as in the cases of Chicago Skyway or SR-125. In these cases the private entity is vulnerable to financial losses, but these may eventually get shifted back to the public sector if the project

remains in public ownership. Although it is frequently argued that it is easier for a private operator to charge tolls (or higher tolls), this point did not come up very often in the case studies. For Route 28, the TID taxes made it possible to charge those who were most likely to benefit from the increased road capacity. Finally, management problems within the public sector were rarely identified as a motivation or justification for P3s.

Table 1.7 shows that the disadvantages of P3s largely fall into three categories. Political conflicts have emerged as a result of project delays and environmental issues (SR-125), terms of the P3 (Chicago Skyway), outcomes resulting from contract provisions (SR-91), conflict of interest questions (Foley Beach), or opposition to the concept of tolls (SR-91, I-394). Contract inflexibilities include overly-long leases (Chicago Skyway) and non-compete clauses and their potential impacts. Risk shifting to the public sector may be the most difficult to determine, as these risks often depend on the future revenue stream. Lower than expected ridership (and hence toll revenue) has affected several projects.

In Minnesota, the public sector is incurring a larger share of revenue losses because the private entity has first access to revenues. The state has had to step in to resolve financial problems in two of the Virginia projects, and the recent bankruptcy of SR-125 will likely lead to some form of public intervention. In the case of I-595, the state carries the risk of any shortfalls in toll revenues because the payment schedule is tied to performance and not strictly to toll revenues.

Table 1.7 also suggests that many of the concerns about P3s have not been born out in practice. Only the Route 3 project experienced serious contract management problems, and the lengthy delays caused by an inefficiently-managed environmental review process were identified as a serious problem in only one case (SR-125). We have little information on the extent of cost savings or losses. In areas with a lot of latent demand, building sooner generates cost savings from avoided congestion and other losses.

However, none of the case studies provided sufficient financial data to determine whether the selected financial arrangements generated lower total costs compared to some other public sector alternative. Finally, none of the case studies emerged as projects that could not be justified or should have been abandoned. Rather, the involvement of private sector capital requires a more serious consideration of project viability by all parties.

Table 1.7: Disadvantages of P3s for Case Study Projects

Project	Political conflicts	False economies	Inflexibility	Inefficiencies & transaction costs	Risk to public sector	Opportunism
Anderson Tunnel, AK						
Rte 28, VA						
Rte 3, MA		X		X	X	
SR 125, CA	X		X	X	X	
Chicago Skyway	X	X	X		X	
I-595, FL					X	
Pocahontas Pkwy, VA			X		X	
SR-91, CA	X		X		X	
Dulles Grnwy, VA					X	
Foley Beach, AL	X					
I-394, MN	X				X	
SH-130, TX				??	??	

Although this point has not been discussed in the literature, the history of these case studies suggests another dimension of uncertainty: exogenous changes in the larger environment. The financial crisis and economic recession were not anticipated in anyone's project forecasts. The decline in economic activity has had a direct effect on project revenues, in some cases threatening the viability of the entire project. We believe it unlikely that any major transportation facility would be closed down as a result of a bankruptcy, so it will be interesting to see how, for example, SR-125 continues to operate. This is a form of residual risk that, with public facilities, is ultimately borne by the public sector.

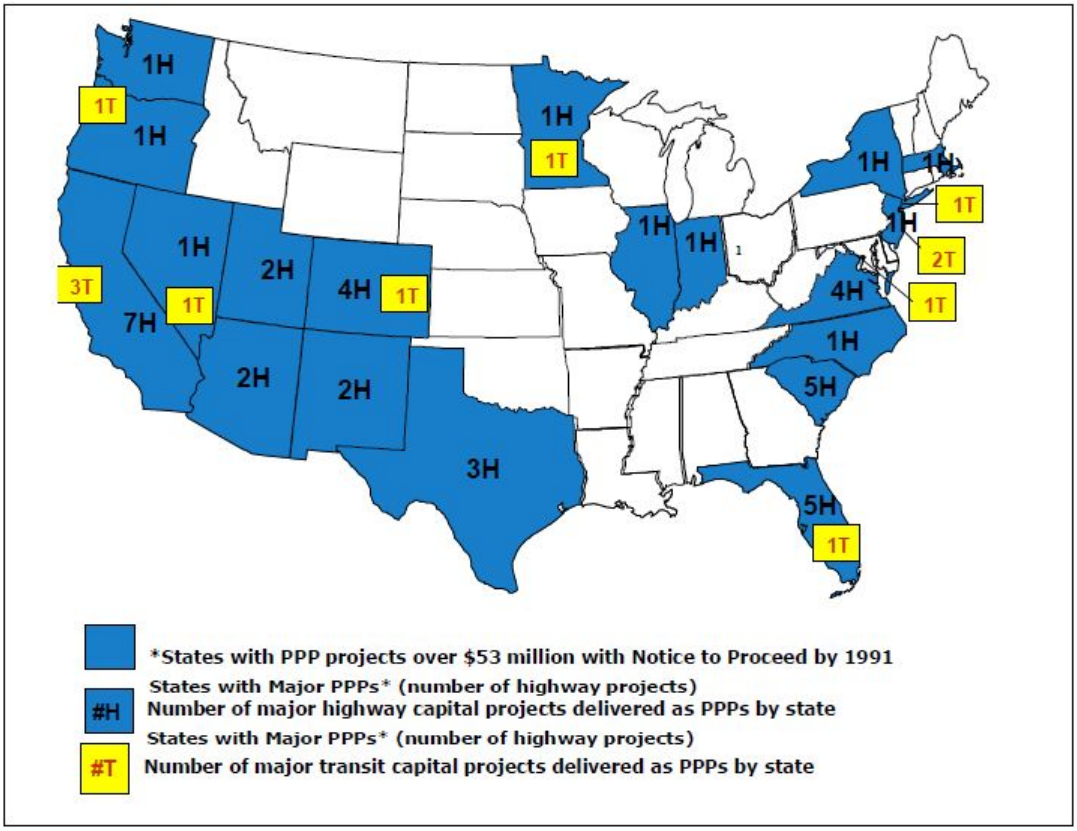
PART TWO
P3S IN THE US

A recent set of reports commissioned by the FHWA provides a rich source of data on P3 projects both within the US and around the world (ACT 2007a, 2007b, 2007c). This section provides summary information drawn from these reports. A national survey of transportation projects since 1991 which have advanced to the Notice to Proceed stage and have capital costs of at least $53 million shows that 44 highway projects and 12 transit projects have utilized “some kind of P3 approach” (ACT, 2007b, p.2-27).

Collectively, the group of highway P3 projects totals $22.4 billion of major transportation infrastructure investments, while the 12 transit P3 projects represent a combined $7.9 billion. Together, both sets of projects add up to $30.3 billion worth of major transportation infrastructure investments in the US delivered by P3 since 1991.

This amounts to a small share of total capital investment. A recent CBO report (2007) states that the cumulative total of P3 investment through 2006 is about $48 billion, while public investment from 1985 to 2004 amounted to $1.6 trillion. Figure 2.1 shows the geographic distribution of the 56 projects. Projects are distributed across 19 states, and California has the highest number of both highway and transit projects. The bulk of these contracts are DB (39 projects, or 70%), followed by concession (6 projects or 11%), and DBFO and DBF each with 3 projects, or 5% each, of the total

Figure 2.1: Distribution of Highway and Transit P3 Projects by State



Source: United States, Federal Highway Administration. *Case Studies of Transportation Public-Private Partnerships in the United States*. Washington: AECOM, 2007, p.2-27.

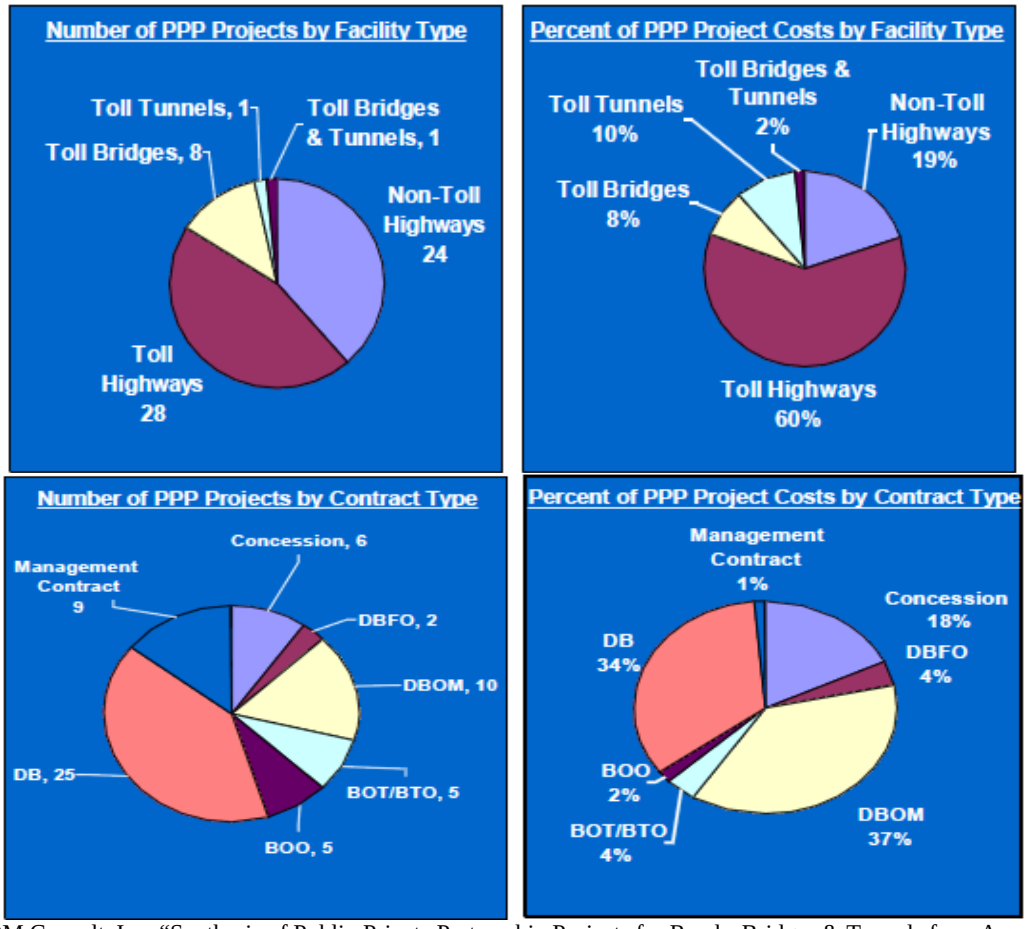
Between 1985 and 2004, "there were 62 P3 road projects planned and funded in the United States representing $42 billion" (ACT, 2007a, p.59). The first panel of Figure 2.2 shows the number of road-related P3 projects by type and the share of total costs by type. Most are highway projects, and most of those are toll roads. Figure 2.2 also shows that the toll tunnel is the largest project, accounting for 10% of the total, or around $4.2 billion. Toll highways also tend to be larger. P3 toll highway projects accounted for 62 percent of total cost and, at slightly above $900 million each, were "about three times the cost of non-toll highway projects in the P3 project database" (ACT, 2007a, p.59).

The second panel of Figure 2.2 shows that DB contracts represent the largest share of contracts at 40 percent of the total, though only 34 percent of total project cost. As evidenced by data from US highway and transit P3 since 1991 as well as from US road P3 since the late 1980s, DB contracts have dominated US P3. Not only have most US P3 since the late 1980s been completed as DB, but also "globally, the United States has had the vast majority of the DB and Management Contract road projects," along with the less-used BOO which "was also used

more in the US than elsewhere, particularly for small projects involving toll bridges" (ACT, 2007a, p.59).

Returning to the road P3 project data from 1985-2004, DBOM accounted for 37 percent of total P3 project costs during the period, despite only representing 16 percent of all road P3 projects, because DBOM projects, at $1.6 billion each, are about three times the size of their DB counterparts (ACT, 2007a). Finally, while there were fewer US concessions and DBFO, "their average cost was significantly higher than their DB counterparts, particularly Concession contracts at about $1.3 billion each" (ACT, 2007a, p.59).

Figure 2.2: Highway-related Projects by type, share of total costs

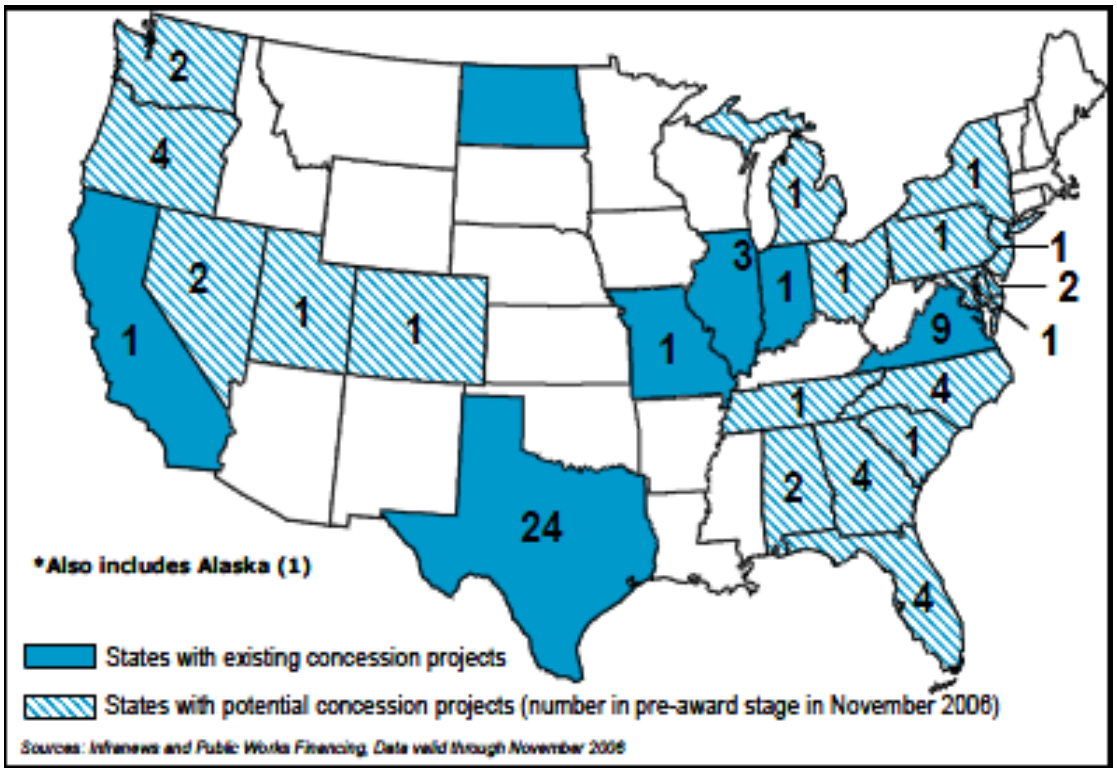


Source: AECOM Consult, Inc. "Synthesis of Public-Private Partnership Projects for Roads, Bridges & Tunnels from Around the World –1985-2004", prepared at the request of the Federal Highway Administration, August 30, 2005.)

Most recent toll road P3 have been concession arrangements, while the majority of the rest have been DB P3. This trend in toll road P3 has been mirrored by transportation P3 in other modes as well. By the end of 2006, agencies were considering at least 74 highway and transit

projects that were likely to have a concession arrangement. Figure 2.3 shows the geographic distribution of concession projects as of 2006. Texas is clearly dominant, with 24 of the 39 projects. North Carolina and Indiana are the only other states with more than one project. Figure 2.3 also shows that the concession model is spreading to many other states.

Figure 2.3: Distribution of Existing and Proposed Concession Projects by State



Source: *State of New Jersey Asset Evaluation Program-Phase 1 Report*. UBS Investment Bank, November 15, 2006, p. 54.

PART THREE

TOLL ROADS IN THE US

In this section we focus on the most common type of P3 in the US, toll road projects. The large number of these projects provides a unique opportunity to systematically examine the factors associated with success. According to a 2009 study commissioned by FHWA (Perez and Lockwood, 2009) and our follow-up search, a total of 230 new toll road projects moved into various stages of development between 1992 and 2008. Notably, these projects provided or will provide new toll capacity and therefore do not include the lease of existing public toll roads to private operators, such as the Chicago Skyway and the Indiana Toll Road.

In practice, the PFM has led to two types of toll roads: privately-owned toll roads and private toll concessions. With the former, a private entity owns the toll road right of way and assumes full ownership-like responsibility for the road project (TOLLROADS News, 1998). This scenario often includes land development cases, where a land investor/developer builds a toll road in order to provide convenient access to its land, to enhance land values, and to generate toll revenues to repay road investment. Hence, this type of road is often called a developer toll road. This strategy has been used in several projects, including four small toll roads in Alabama (Emerald Mountain Parkway, Alabama River Parkway, Black Warrior Parkway Bridge, and Foley Beach Expressway) and the Poinciana Parkway in Florida.

Toll concession is another type of PFM which can use various models, such as Build-Transfer-Operate (BTO) and Design-Build-Finance-Operate (DBFO), depending on the specific partnership arrangements. In a toll concession, a company receives a concession from the public sector to finance, design, construct, and operate a toll facility for a specified period of time, often as long as 30 to 50 years in the U.S.. The company then collects project-generated revenues to repay the private investment. Facility ownership reverts to the public sector at the end of the concession period (ACT, 2007a).

Overall, among the 230 toll road projects developed between 1992 and 2008, 134 were or will be developed under the PDM with only public funding; 27 were or will be developed under the PFM, funded partially or fully with private funding; another 21 will possibly involve private finance; and the remaining 48 were undetermined. Table 3.1 summarizes state toll road activity

for 161 projects, excluding those with uncertain financing decisions. Not all U.S. states built toll roads in the past two decades – 23 states built at least one toll road, and 9 used private finance.

Toll road projects are concentrated in a few states. California, Florida, and Texas together developed 102 toll roads, representing 63% of all projects in the country. Meanwhile, projects involving private finance are concentrated in Alabama, Florida, Texas, and Virginia. These four states developed 20 out of 27 projects with private financing. This concentration suggests that some features of these states might be of particular importance to attracting private investment, such as a rapidly growing urban population. Appendix B further summarizes the 27 projects that have involved private finance since the passage of ISTEA. It provides information on project details (name, location, size, initiation year, current status, open date, and facility type) and P3 arrangements (project type, contract term, public and private partners, cost and percentage of private finance, and financial structure).

Table 3.1. Summary of Concession, Toll, or P3 Activity by State between 1992 and 2008

State	Projects with Private Finance	Projects with Only Public Funding	Total Projects	Percentage of U.S. Total
Alabama	4	0	4	2%
Arkansas	0	1	1	1%
California	3	15	18	11%
Colorado	1	4	5	3%
Delaware	0	2	2	1%
Florida	4	26	30	19%
Georgia	0	1	1	1%
Illinois	0	6	6	4%
Kansas	0	1	1	1%
Louisiana	0	2	2	1%
Maine	0	2	2	1%
Maryland	0	1	1	1%
Minnesota	1	1	2	1%
Mississippi	1	0	1	1%
New Jersey	0	2	2	1%
N. Carolina	0	2	2	1%
Oklahoma	0	3	3	2%
Pennsylvania	0	6	6	4%
S. Carolina	0	2	2	1%
Texas	5	49	54	34%
Utah	1	3	4	2%
Virginia	7	2	9	6%
Washington	0	3	3	2%
(23 states)	**27 (9 states)**	**134 (21 states)**	**161 (23 states)**	**----**
	17%	83%	----	**100%**

THE 27 TOLL ROAD PROJECTS INVOLVING PRIVATE FINANCE

Project size. These projects vary significantly in project size, as measured by lane-miles (Table 3.2). Sixteen projects have a project size smaller than 50 lane-miles, 6 projects are between 51 and 100 lane-miles, 1 is between 101 and 150 lane-miles, 3 are between 151 and 200 lane-miles, and only 1 is a large-scale project, with lane-miles of 840.

Table3. 2. Projects with Private Finance Involvement by Size (Lane-Miles)

Project Size	Frequency	Percent	Valid Percent
0~50	16	59.3	59.3
51~100	6	22.2	22.2
101~150	1	3.7	3.7
151~200	3	11.1	11.1
Over 200	1	3.7	3.7
Total	27	100.0	100.0

Project initiation. These projects were initiated over the last two decades (Table 3.3). Here the Initiation Year is defined as the time when a project's feasibility study gets endorsed or approved, or the final Environmental Impact Study (EIS) is approved and Record of Decision is received. Only a few projects began before 1990, and most of the 27 were initiated between 1996 and 2005.

Table 3.3. Projects with Private Finance Involvement by Initiation Year

Initiation Year	Frequency	Percent
1985-1990	3	11.1
1991-1995	3	11.1
1996-2000	7	25.9
2001-2005	8	29.6
2006~	6	22.2
Total	27	100.0

Operating status. As August 2010, 13 projects are open, two of which have shifted to public ownership (CA 91 Express Lanes in California and Camino Columbia in Texas). Six projects are under construction, two are in the design and finance process, another two are in the middle of environmental assessment, three are still in the planning stage, and one project (Mississippi Airport Parkway Project) was suspended in September 2009.

Context. Seventeen of the 27 projects (63%) are greenfield projects, two are brownfield projects, and 8 are High Occupancy Toll (HOT) projects.

Project type. The projects can be sorted into five categories by project type: developer toll roads, concessions, public roads, public concessions, and undetermined/suspended (see

Table 3.4). Six projects in Alabama, Florida, and Texas are privately owned toll roads, also known as developer toll roads. Fifteen out of the 27 projects are private concessions, in which a private developer finances, designs, constructs, and operates a toll facility for a specified period of time, often as long as 30 to 50 years in the U.S. The concessionaire collects project-generated revenues to repay private investment, and transfers the facility back to the public sector after the period ends. The I-495 Capital Beltway HOT Lanes project has unusually long concession duration. The private developer, Fluor Daniel/Transurban, has an 85-year concession, 5 years for construction and 80 years for operation.

Two projects, Daniel Webster Western Beltway Part C in Florida and I-394 MNPASS in Minnesota, used private finance but are operated as public toll roads. The I-595 Express in Florida used the first availability payment-based P3 in the U.S. In this case, the concessionaire will finance, design and build the project, and operate and maintain the system under a long-term 35-year agreement with FDOT. The concessionaire will finance the project funding shortfall up front and be repaid through availability payments (shadow tolls) when the completed project opens to traffic. Payments will generally be based on the "availability" of the project to vehicular traffic and the concessionaire's conformance with the operation and maintenance criteria established in the concession agreement. FDOT will retain control of the toll revenue and toll rates.

Last. but not least, the case of Dulles Toll Road Rail Link constitutes another type of P3s: public concession. Fairfax commercial landowners contribute financially to the project through a special tax district. VDOT offers Metropolitan Washington Airport Authority a permit to operate and improve the Dulles Toll Road and meanwhile develop the Dulles Corridor Metrorail Project, and the contract term is for 50 years. In essence, the Airport Authority is receiving a concession from a state transportation agency.

Table 3.4. Projects with Private Finance Involvement by Project Type

Project Type	Frequency	Percent
Developer toll roads	6	22.2
Concessions	15	55.6
Public roads	2	7.4
Availability payment concession	1	3.7
Public concessions	1	3.7
Suspended projects	2	7.4
Total	27	100.0

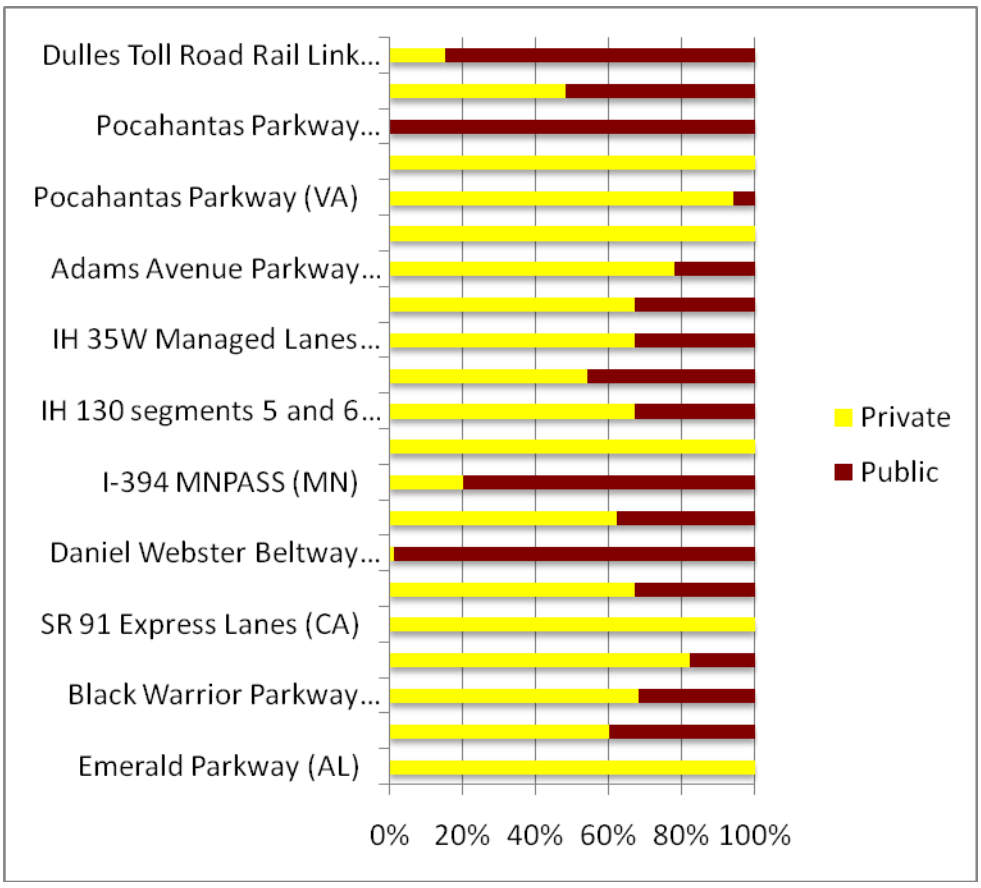
Project costs and financing percentages. Table 3.5 summarizes project capital costs. About one third are small-scale projects of less than $100 million in current dollars, and about one third are large projects (over $1 billion). The largest project is the Dulles Toll Road Rail Link, with an estimated cost of $5.2 billion.

Table 3.5. Projects with Private Finance Involvement by Project Cost (millions of current dollars)

Project Cost ($ millions)	Frequency	Percent
Less than 100	10	37.0
101~500	5	18.5
501~1000	5	18.5
1001~2000	4	14.8
2001~5000	2	7.4
Over 5000	1	3.7
Total	27	100.0

Most of the 27 projects received a significant portion of their capital from the public sector, especially the larger projects (See Figure 3.6). Only five out of the 27 projects were fully privately funded. They are all small-to-medium-scale projects, costing between 4 and 350 million in current dollars, with a mean of $123.7 million dollars. Eleven projects received or will receive between 54% and 94% of funding from private sources; they have a wide cost range, from $12 to $2678 million in current dollars.

Figure 3.6. Percentage of public and private funding



In addition, five projects received or will receive less than half of their project capital from private sources. Notably, the Pocahontas Parkway Extension received 48 million dollars in TIFIA loans and no private investment, but this project belongs to a larger Pocahontas Parkway takeover by Transurban for a 99-year lease. Transurban agreed to take over and refinance the Pocahontas Parkway with private financing under the condition of receiving TIFIA loans to cover the Extension and other parts of the deal as well.

Initiation year. Generally speaking, the initiation year seems to be correlated with several other factors, probably because the changes projects experienced over time have followed particular trends (Table 3.7). Over time, private finance has been used in larger-scale projects, with more lane-miles and greater capital requirements. With the increasing capital requirements, private entities could no longer provide all or most of the project capital, and increasing the public sector's contribution became necessary. Therefore the percentage of private finance in

these projects has gradually decreased over the last two decades.

Table 3.7. Correlation between Initiation Year and Private Finance Percentage, Cost, and Size

Initiation Year	Frequency	Average Percentage of Private Finance	Average Cost (millions in current dollars)	Average Size (Lane-miles)
1985-1990	3	89	373	45.3
1991-1995	3	65	353.2	46.7
1996-2000	7	81.3	83.4	31.3
2001-2005	8	37.8	983.3	83.1
2006~	6	52.8	2138.9	210.6
Total	27			

WHICH STATES HAVE SUCCEEDED IN GETTING PRIVATE FINANCE?

Wang (2010) has analyzed how state governments manage private finance in transportation using data on projects initiated since the 1991 ISTEA. The decisions hinge on social, fiscal, political, legal, and economic factors, such as the state's demand for road capacity, debt situation, political ideology, P3 legislation, turnpike experience, market conditions, and project-specific attributes. The dataset for Wang (2010) describes 155 projects, among which 27 are partially or fully-funded with private funding. Using a statistical model, Wang shows that both state fiscal, political, and economic conditions at the macro-level and project characteristics at the micro-level affect the private finance decision.

Umbrella debt limits. Umbrella debt limits on the total of a state's General Obligation and revenue bonds had a significant, positive impact on the private finance decision in the states under analysis. A debt ceiling constrains revenue bonds issuance for the development of public roads and therefore increases the likelihood of turning to use private finance.

Political climate, ideology, and unions. Political variables, like state political ideology and public employees were significantly associated with the private finance decision. As expected, conservative states have a greater implementation of private transport finance. The effect of public employees was, however, not as predicted. The model expected a negative relationship, anticipating that states with a higher percentage of public employees would be less likely to use

private finance due to stronger opposition from public employees and their unions. Instead, the results found a positive association—meaning that the more public employees there are, the greater the likelihood of private finance involvement. It may be that states with a large percentage of public employees already have relatively high labor costs and therefore face formidable pressure to downsize the government and, thus, turn to the private sector.

Population characteristics and income. State per capita personal income is a significant determinant. States with wealthier residents were more likely to attract private investment in transportation, which would align with the theory that companies seek out metropolitan markets where comparatively affluent travelers may be willing to pay for travel time savings and premium services.

Project initiation. The research provides strong support for the effects of project initiation time and project sponsorship on the decision to involve private finance. First, project initiation time significantly affected states' willingness to seek private finance, but in an unexpected way. The model expected a positive sign based on the hypothesis that recently initiated projects are more open to the option of private finance due to an increasing interest in P3s in the past two decades. Instead, the research shows a negative relationship. Over time, state agencies have perhaps become more cautious about private finance due to the adverse publicity around several problematic pilot projects. For example, the Dulles Greenway in Virginia encountered severe revenue shortfalls, and environmental controversy nearly ended the South Bay Expressway project in California (USGAO, 2004). Pilot projects are always in the spotlight, and the problems with them are also widely publicized. These situations may have triggered even more discussion and reconsideration of the private development of transportation.

Project sponsorship. Project sponsorship also had a statistically significant impact on the decision to secure private finance. Compared to "with only state DOT sponsorship", a project with "no public sponsorship" and only private sponsorship would certainly involve private finance since it is the only financial source; a typical example is a developer toll road. Sponsorship from local transportation agencies reduces the likelihood of private finance involvement because regional transportation agencies bring in local political and financial support, which reduces the need for private finance. Similarly, sponsorship from a professionalized turnpike authority comes with valuable knowledge and substantial experience developing and operating public toll roads, thus reducing the likelihood of using private finance.

Irrelevance of growth pressures. For a very long time, people have tended to believe that states with faster economic development and population growth experience more transport demand and are therefore more likely to use private finance. However, this study found that neither economic development nor population growth had a significant impact after considering them separately as an indicator of state road demand. It may be that both indicators do not fully capture the effect of state road demand and that a more relevant indicator is needed. Another possibility is that state road demand is less relevant to the financing decision of a project; it is not that economic or population growth would not create extra road demand, but that the growth would not affect states' preference between public and private funding.

P3 legislation does not lead to more P3 projects—surprisingly. Secondly, P3 legislation seems to be an insignificant factor in the private finance decision, a finding that contradicted prevailing beliefs. Anecdotally, staff from both the public and private sectors tend to argue that strong and effective P3 legislation promotes P3 projects and toll concessions. The results from Wang (2010), however, do not show that significance. Perhaps the existing state P3 legislation is neither "strong" nor "effective," and these have not promoted P3 projects particularly well. For example, the FHWA pointed out that the P3 legislation of Alabama and Arizona was not appropriate to use as a model for P3 enabling legislation (FHWA 2009). It is quite clear that policy research and practice around P3 projects is still evolving.

PART FOUR
CONCLUSIONS AND LESSONS LEARNED FOR CALIFORNIA

This report has covered many topics and has provided a comprehensive overview of P3 activity in the US. In this section we present some conclusions and discuss their implications for California.

P3s constitute a small share of all transport infrastructure

P3s, though growing in numbers, remain a small part of total infrastructure investment and continue to be concentrated in relatively few states. The most common type of P3 is the DB, which represents an incremental change in transportation infrastructure investment practices. While DBs may lead to cost savings from a shorter and more efficient design and construction process, they do not take advantage of the potential of private capital. P3 that involve private capital are a small share of all P3 projects, and the most common type of P3 project involving private capital is the toll road. However, most toll roads continue to be built using public capital.

P3s have been discussed and promoted for more than two decades. Over these decades, traditional sources of transportation funding have become increasingly inadequate, strengthening both the rationale and incentive for utilizing P3s. On balance, it appears that most P3s are successful, in the sense that infrastructure gets built sooner than anticipated, public-private partnerships seem to function relatively well, and most project sponsors have positive perceptions of project outcomes. It is therefore important to consider why use of P3s, particularly P3s that involve private capital, continues to be relatively rare. If California is to increase P3s, barriers must be identified and addressed. In addition to differences in perspective regarding the role of the private sector in public service provision, there other explanations, from lack of information on the cost-effectiveness of P3 projects, to perceived threats to public sector jobs.

Lack of public funds is a key factor in P3 use

The case studies and the toll road analysis showed that limited funds were a key factor in motivation use of P3s that involve private capital. State debt limits impose a constraint on bond financing, and tight state and local budgets make debt service from general funds unattractive.

Private markets provide another avenue for capital. Given that demand has far outstripped capacity expansion in recent decades, the ability to add capacity sooner than otherwise possible leads to significant savings in avoided congestion and other externalities. These benefits are realized even if the private debt is to be paid off by public funds (e.g. gas tax revenues).

Most P3 projects that involve private capital also involve user fees, and user fee reveneues are often less than anticipated

As noted in the introduction, user fees provide both a funding stream and a price signal to users. The user fee helps to align costs and benefits, allocating scarce road capacity to those who value it the most. Private financing brings the discipline of the market to the investment; there must be sufficient demand to generate the revenue stream required to retire the debt and generate a reasonable return on investment. Thus use of P3s has the potential to greatly improve the efficiency of the transportation system. Our case studies revealed that while adequate revenues were anticipated at the time of the project decision, demand projections proved to be overly optimistic in several cases. California's toll roads are illustrations of the problem: only SR 91 has consistently performed as forecast. When revenues are short, potential consequences for the public sector are significant. Important topics for future research include understanding why revenue forecasts are so often overestimated, and what methods might be developed for more reliable forecasting.

P3s are more likely in a friendly political climate, and P3 projects are often political issues

The toll road analysis showed that tolls roads are more likely in states that are historically conservative, all else equal. These are often right-to-work states with more flexible labor laws and less powerful public employee groups. California is one of the most liberal states, with powerful and politically influential public unions. It is not surprising that all of California's toll road projects are located in the more conservative southern half of the state. The political climate of California suggests that P3 projects will be justified by factors beyond cost savings or advancing projects.

Major infrastructure projects are politically visible by their nature: they involve large sums of (usually public) funds and have significant local impacts. They are often contentious; for example highway projects of any type are controversial in California. Tolls also remain

contentious. Although the empirical evidence is clear that tolls help to utilize transportation resources more efficiently, political acceptance remains a problem. The case studies show that P3s often become politically contentious. The environmental review process became the focus of political conflict in the case of SR 125. The non-compete clause in the SR 91 project eventually led to the buyout by the public sector. The Chicago Skyway has become more contentious over time, as the consequences of a 99 year lease for a major public facility started to emerge. The visibility of major projects, the political climate in California, and California's early experiences with toll projects pose significant challenges to implementing new toll projects in the state.

Risk allocations and risk outcomes may differ

Risk allocation is a major topic in the P3 literature. The case studies suggest that financial arrangements are based on practical considerations: what are the financing options, and how can the deal be put together? Because the focus tends to be on the "deal", financial risk allocation is likely a secondary consideration, and this may be one explanation for the frequency of unanticipated financial outcomes.

Contractual arrangements on construction, performance, etc., are more measured. Project sponsors typically have extensive experience in design and construction, allowing establishment of performance objectives, etc., based on practical experience. The case studies suggest that risks of non-performance are small. Contracts often include provisions that make delays costly (fines for exceeding deadlines, bonuses for completing construction early, etc.), and most projects have been completed on time and within budget.

Risk issues emerge in two areas. First, there is risk associated with the uncertainty of expected demand. Whether funding is to come from direct tolls or shadow tolls, any downward deviation in demand imposes risk on the party dependent upon the revenue. The case studies show that revenue expectations are often optimistic. In the case of a shadow toll arrangement where the public agency commits to a payment schedule to the private entity, the public agency incurs the loss. In a concession structure, the concessionaire incurs the loss. However, even in the case of concession, the public sponsor incurs risk, because any financial failure would impose responsibility on the public sector to solve the problem.

Related to demand is the exogenous influence of economic and population growth or decline. Most long-term forecasts assume constant growth rates over the life of the contract or concession and hence don't take into account economic crises. Nor do forecasts take into account the possibility that localities will downzone, or its particular industry mix is in long-term decline. The current recession has negatively affected the toll road business along with the rest of the economy, but unlike many other businesses, it has few options to adjust. Again, even in the case of concessions, public sponsors incur risk.

We don't know a lot about financial costs and savings

To estimate the extent to which a given P3 arrangement generates cost savings relative to other alternatives requires information on both the details of the actual project and the potential alternatives. As noted above, financial arrangements seem to be based on practical considerations. For example, the Route 28 project went forward because there was a tax revenue source in place (the TID) that could be tapped. The project itself was sized to fit the funds available. The only cost comparison came when bonding options were considered. Furthermore, private funding is frequently viewed as gap funding – the last increment needed to make the project viable. This is quite different from comparing a set of alternatives with different finance and funding arrangements. Finally, we found little discussion of how a project was evaluated during the selection process. The concept of a comparator, or how to judge the cost-effectiveness of a P3 option against a base case, was not in evidence.

Strictly speaking, any major investment should pass a cost/benefit test, with full costs and benefits considered over the life of the project. The conventional transportation planning process does not include cost-benefit analysis. Rather, system improvements are identified to accommodate expected demand, subject to a budget constraint. Another area of research is how P3 alternatives could be more fully evaluated in the transportation planning process.

Use of P3s is not associated with restructuring investment policy towards a more efficient model

The case studies provide little indication that improving the efficiency of the transportation system is an objective of P3 utilization. Thus the major benefit of P3s is not being pursued. As long as private capital is being sought mainly to offset shortfalls in public funding sources, its

main effect is to build more infrastructure. But public funds, however limited, will always go to the highest priority projects. Thus the supply of private funds simply allows lower priority projects to be built. Financing arrangements that rely on market demand impose a limit on such projects, but when public agencies commit to a payback schedule independent of user fees, there is no such limit.

One might argue that in California, the backlog of infrastructure projects is so large that any project that has made it through the planning and budgeting process is justified. However, investment plans themselves are developed from the current policy structure. A challenge for California is to determine how user fees might be more broadly considered in order to best leverage existing funding resources.

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APPENDIX A
CASE STUDIES

Case Study 1: Anton Anderson Memorial Tunnel – Whittier, Alaska

Background

The fast-growing port at Whittier, Alaska – on Prince William Sound – is the most important facility for barge/railroad freight transfer between Alaska, Canada and the continental United States (ACT, 2007b, p.3-4). Despite the port's growing popularity, it remained effectively disconnected from the key Alaskan cities by highway – the railroad was the only land-based mode of transportation to or from Whittier. After considering several options in the mid-1990s, the Alaska Department of Transportation and Public Facilities (ADOT&PF) decided to extend the Portage Glacier Highway to the Maynard Mountain Tunnel and retrofit the existing 2.5 mile rail tunnel to permit dual use. The proposal was for a one-lane combination highway and rail tunnel through which both motor vehicles and trains could alternatively travel. Alaska chose to deliver the project through the state's first P3 primarily based on expediting the project and optimizing risk management (ACT, 2007b, p.3-6).

Contract, Financing, Funding

The DB contract was awarded to Kiewit Construction Company in 1998, who in turn hired Hatch Mott MacDonald to design the renovated tunnel facility and VMS, Inc. to operate it. HDR Alaska, originally retained by ADOT&PF to prepare the project's environmental impact statement, also assisted ADOT&PF with contract management.

The contract was awarded to Kiewit for four years – the first two years were intended for tunnel construction while the second two were intended for the first two years of the facility's operation. At the conclusion of the contract, the facility was turned over to ADOT&PF. VMS received a six-year, nine month O&M contract, to begin at the end of Kiewit's contract.

The financing strategy – using state infrastructure bank loans to match federal grants – was chosen in large part because the tunnel project, valued at a total of $80 million, "represented a large expenditure for Alaska with its limited population and tax base" (ACT, 2007b, p.3-13). This approach was thought to provide the most resources for the project at the least financial risk to the state. Currently, federal funds continue to fund the project along with the toll revenues – until the toll revenues can sustain facility O&M costs on their own.

Outcomes

Construction began in September 1998 and was completed after just 22 months. ADOT&PF imposed ambitious operating requirements for the project, given the area's physical geography, which in turn led to a stringent set of KPI for the Kiewit team to achieve. According to ACT (2007b), the private partners met or exceeded the agency's standards through project innovations. Additional benefits include:

- design and construction the tunnel in just under a year and half; months;
- project delivery $2.6 million under budget
- passenger travel to Whittier grew immensely, increasing revenues from recreational boating and other tourist activities, so that project expediting brought substantial public benefits.

In general, the evaluations of the project report that ADOT&PF is "satisfied with the performance of the project and plans to employ design-build for project delivery in future construction projects" (ACT, 2007b, p.3-14).

Case Study 2: Route 28 Phase II Expansion – Fairfax and Loudoun Counties, VA

Background

This case is a follow-up to an earlier project that widened Route 28, which provides highway accessibility near Washington Dulles International Airport, from two lanes to six in the late 1980s and early 1990s. The Phase II project originally sought to convert ten at-grade intersections to grade-separated interchanges while also widening a number of connecting roadways along the already-congested stretch of Route 28 that divides Fairfax and Loudoun counties. The congestion was particularly bad around the corridor's many at-grade intersections during peak travel periods (ACT, 2007b).

Again, the rationale for private involvement centered on expediting project delivery. The Virginia General Assembly, in 1987, granted cities and counties in the state permission to create special taxing districts specifically to get projects delivered faster. Fairfax and Loudoun counties formed the first transportation improvement district (TID) the following year to initially expand Route 28; that same process was used for the Phase II project, in conjunction with newly-passed P3-enabling legislation in 1995 (ACT, 2007b). The two counties enacted a special levy to fund the project (20 cents on every $100 of property value) inside the TID. The

counties also issued bonds to fund the project cost with debt service to be paid by the TID levies and guaranteed by the state if revenues fell short (ACT, 2007b, p.3-63).

Contract, Funding, Financing

Clark/Shirley (along with Dewberry & Davis for project design) won the DBF contract in mid-2001. The team formed a 63-20 public-purpose, tax-exempt corporation to finance the project with funding from TID revenues. The contract was signed in September 2002 and was scaled down to $200 million in improvements over four years, including construction of just six grade-separated interchanges.

Clark/Shirley was responsible for "all right-of-way acquisition, utility relocation, site development, and construction services for the project;" ultimately, the design-build team bore "the risk of project delivery at a guaranteed price by a fixed delivery date" (ACT, 2007b, p.3-67). VDOT, meanwhile, was responsible for helping to provide some funding for the project and to provide "project management support to ensure the project's timely and satisfactory completion" (ACT, 2007b, p.3-67).

State budget resources were scarce – and had been for a long time – which initially led to the Phase II project being delayed. As such, the state's financing strategy reflected an understanding that innovative project finance was needed in order to combat such a marked lack of resources. The 63-20 non-profit corporation formed by the project developers was to issue private bonds to finance the project, with long-term funding ultimately coming from TID taxes – minimizing public sector financial risk.

But, as the project progressed, financing costs began to escalate and Fairfax and Loudoun Counties realized that they could issue bonds and effectively offer "cheaper debt" than the private 63-20 corporation. In the end, despite a very tight budget, the two counties issued bonds on behalf of the project instead of the 63-20 corporation in order to save money. The result was a savings estimated at $150 million (ACT, 2007b, p.3-68).

Outcomes

Clark/Shirley completed construction and opened the six planned grade-separated interchanges and the Loudoun County Parkway.

- there were measured benefits in traffic speeds along the 28 corridor;
- the project was delivered more quickly than otherwise possible given the state's funding constraints; and

— the refinancing done by the county partners was done smoothly and effectively and did not adversely affect the partners or their willingness to form future partnerships.

Case Study 3: Route 3 North Rehabilitation – Burlington, MA

Background

Route 3, a state highway in Massachusetts linking Boston's northern suburbs to New Hampshire, was originally built in the 1950s as a limited access four-lane divided arterial highway. Due to increasing volume of both cars and trucks during the 1980s and 1990s, the highway began to significantly deteriorate – but the state's highway agency, part of the Executive Office of Transportation (EOT/MassHighway), was forced to postpone much-needed rehabilitation of the roads and bridges on Route 3 because of budget constraints. Those budget constraints only grew worse because funding for the Central Artery/Tunnel project (the "Big Dig") displaced funding for other projects, like Route 3. Special legislation was passed in late 1999 to enable EOT/MassHighway to seek a private sector partner and push the Route 3 work along—another case of P3 expediting the project.

Contract, Funding, Financing

EOT/MassHighway sponsored the project. The Modern Continental Construction Company, Inc. led the selected contractor team which consisted of nine other firms, responsible for all project tasks outside of construction – such as traffic management, legal counsel, and finance. The private consortium took on a 63-20 designation, which allowed for the tax-exempt bonds to cover the project through construction, and the debt would be covered through bonds tied to an annual payment schedule.

There is a crucial distinction between the EOT/MassHighway approach and traditional issuance of government bonds funded by state tax revenues. Because of significant budget constraints imposed by the Big Dig, EOT/MassHighway officials felt that the long term project costs would be greatly reduced if the 63-20 corporation issued debt to finance the project rather than the state. In fact, the consortium took pains to reduce the costs of borrowing by buying bond insurance – resulting in a AAA rating – along with scheduling payments late in the state's fiscal year to avoid drawing on their debt service reserves

EOT/MassHighway then funded the project and planned to pay the debt through a lease-back schedule, rather than bond revenues. The lease-back arrangement was intended to

buffer the private investors from risk, but it wound up overburdening the state with funding-related risk in the long-term (ACT, 2007b).

Outcomes

The project began in August 2000 and was scheduled to be completed by February 2004 – 42 months later. Conflicts between EOT/MassHighway over the project's scoping, schedule, and costs held up construction. Discord worsened as these conflicts became more difficult to resolve and schedules compliance become a problem as well, along with issues of non-conforming work and project cost increases. (ACT, 2007b).

ACT (2007b) argues that the particular P3 arrangement required a shift in culture for the public and private sector partners. The shift did not help ease the environment of mistrust between agencies and private contractors, and the mistrust worsened when the Modern Continental Team sought more flexibility in the cost and schedule adjustments. Additionally, most of the financial risks in the project were placed on the state, through the lease-back payment schedule with the Route 3 Improvement Association.

Though delivered on budget, the project was delayed almost two years and took 22 months more than the original project schedule to complete. The Modern Continental Team was collectively fined $3.8 million in liquidated damages – one percent of the project cost as stipulated in the original contract. They did not take advantage of any of the private development rights they were afforded, and whose revenues were intended to help offset project cost to the state.

Case Study 4: South Bay Expressway (SR-125) Toll Road – San Diego County, CA

Background

The area served by SR-125 saw, over the course of the mid-to-late 1980s, the development of the Otay Mesa Port of Entry which led to a marked increase in commercial truck traffic. Otay Mesa is now the largest commercial crossing along the California-Mexico border and handles the second highest volume of trucks and third-highest dollar value of trade among all US-Mexico land border crossings. The project was slated to complete a network link in the San Diego highway system. In addition, the project was designed to alleviate traffic congestion on the I-5, I-805, and Otay Mesa Road. Agencies also sought congestion relief for surface streets in Chula Vista and Bonita through the project (ACT, 2007b).

Planning for the South Bay Expressway corridor began as early as the late 1950s, but through the next thirty years, the project would be continually dropped from the state's larger highway system plans because the funds were not available to finance it. The project was authorized as P3 under the state's initial P3 legislation, AB 680, given California's inability to fund the project through conventional means.

Contract, Funding, Financing

Parsons Brinckerhoff joined Egis Projects and a handful of other partners to form California Transportation Ventures Inc. (CTV) – a consortium to deliver the project from finance, design, and construction all the way through to operations and maintenance. Caltrans reached agreement with the consortium in June 1991, awarding CTV a 35-year franchise to operate the facility once it opened to the public. Following the termination of the contract, control of the facility would revert back to Caltrans.

California specified that the project be built through the awarding of a franchise contract to a private partner, to help conserve the state's already-scarce infrastructure funding resources. The project was financed through a mix of private and TIFIA loans and equity; the revenue would be provided through tolls. The area had been a high-growth, high-demand area, and as a result the agency partners expected that the investment would yield a solid ROI.

Outcome

Construction began in 2003 and was completed in late 2007, several months behind the anticipated construction schedule, and a full 16 years after the franchise agreement with CTV was originally signed. As late as that was, the state's own funding situation suggests that had the state not found a private partner, the project might have been delayed even longer—as late as 2020 or later according to project evaluators (ACT, 2007b).

The project was delayed in part because of the lengthy and controversial environmental review process that took 9 years. It suffered from a number of significant setbacks, including required planning for endangered species, major lawsuits, and even some opposition from Federal agencies as well. In this case, the contract put the responsibility for completing environmental review squarely on the consortium.

As the project's momentum lagged during the environmental review process, CTV sought to limit their investment in the project and sold their stake to new investors, with Macquarie Infrastructure Group (MIG) taking an 81.6 percent stake in CTV. Over time, MIG acquired the

remaining 18.4 percent of CTV from various minority interests to become the sole stakeholder in the project, renaming the project South Bay Expressway LP (SBELP).

After a few years of operation, the traffic numbers have been much lower than originally estimated – especially following the financial crisis beginning in late 2008. In spring 2010, SBELP filed for bankruptcy protection, casting a shadow of uncertainty over the future of the South Bay Expressway P3.

Case Study 5: Chicago Skyway – Chicago, IL

Background

Chicago, after building the Skyway in the mid-to-late 1950s, defaulted on its Skyway bond payments in the 1960s and was forced to subsidize its O&M costs. Skyway bondholders took the city to court several times in hopes of raising toll rates and getting the facility to pay down its debt service. However, the higher tolls caused traffic to drop dramatically, and decreased demand prompted a proportional decline in toll revenues. The facility fell into disrepair because maintenance costs could not be covered.

The Skyway seemed to be on the rebound in the mid-to-late 1990s, however. Increased traffic growth brought in more toll revenue, which allowed for facility improvements at the same time that congestion increased on parallel routes. The city invested $300 million to reconstruct the roadway between 2001 and 2004, which significantly reduced the O&M costs of the facility's steel structures. With the Skyway newly-rehabilitated and generating revenues, the city of Chicago opted to capture the revenue stream up-front by offering a long-term lease on the facility, whereby the lessee would be allowed to increase tolls according to a prescribed schedule (ACT, 2007b, p.3-38).

Contract, Funding, Financing

Chicago chose the Cintra-Macquarie consortium's (Skyway Concession Company, LLC) bid in October 2004, with the deal itself closing the following January. The consortium financed the upfront sum through a mix of equity, bank loans, and taxable debt – later refinancing in August 2005 when the partners issued $1.4 billion in AAA-rated bonds. The change allowed the shareholders to recover $400 million in capital finance. The lease covered a period of ninety-nine years and would terminate on January 24, 2104. Cintra-Macquarie paid the city of Chicago an upfront payment of $1.83 billion. The agreement held that the consortium was

responsible for O &M and, in return, was entitled to the facility's toll and concession revenues. The city of Chicago retained ownership and policing responsibility of the facility.

Outcome

The Skyway has been hailed as the "the first totally privatized toll facility in North America" (ACT, 2007b, p.3-40). It allowed the City of Chicago to fast-track neighborhood improvement and debt reduction programs that it otherwise would not have been able to pursue. The upfront payment allowed the City to pay down its long-term debt, which then led to an increase in Chicago's credit rating—and a lowering of its future capital costs. In addition to the benefits to the city of Chicago, project evaluators concluded that the

- the Skyway has been well-maintained and has been kept up with the agreement's provisions;
- the concessionaires have increased the facility's capacity; and
- patrons have benefited from lower wait times and higher traffic speeds as a result of the consortium's investments.

Like the SR-125 South Bay Expressway project in California, the financial crisis has hit traffic volume and annual ridership numbers – and therefore toll revenues – extremely hard. The consortium has seen a dramatic drop-off in traffic since 2008 and a major decrease in toll revenues.

Furthermore, Macquarie has itself been devastated by the financial crisis in other ways. The company looked for a rapid sell-off of underperforming assets like the Chicago Skyway, but found it difficult given the long-term focus of the almost century-long lease on the facility. The future of Skyway operations is, given the current economic outlook and the ailing economic state of the chief members of its private consortium, very uncertain.

Case Study 6: I-595 Corridor Improvements – Broward County, FL

Background

Originally opened to traffic in 1989, the I-595 Corridor has seen dramatic traffic growth (AASHTO, 2010). To accommodate rapid traffic growth along the corridor, the Corridor project will widen the I-595 mainline, as well as its access roads and ramps from the I-75 interchange to the I-595/I-95 interchange. The centerpiece of the project consists of the construction of three at-grade reversible express toll lanes – 595*Express* – which will serve traffic to/from I-75 from/to

SR7 and connect to the Florida Turnpike (AASHTO, 2010). The managed lanes will use dynamic tolling, and reverse directions during peak travel periods to optimize traffic flow.

Contract, Funding, Financing

The 35-year contract was awarded to the private consortium I-595 Express LLC – consisting of Dragados USA, AECOM, HNTB, and Roy Jorgensen Associates – with financial close on the project occurring in March 2009. Though the Florida Department of Transportation (FDOT) will retain toll revenue and set the toll rates, the contract stipulates monthly availability payments based on performance criteria stipulated in the contract. FDOT has stated that the consortium will not receive payments until the facility is in operation; there are also bonuses for construction milestones.

Given the state's limited resources to fund and finance new infrastructure, the DBOM+F contract was authorized to save available capital, and to allow for significant private investment. The private consortium's financing of the project is a mix of bank and TIFIA loans as well as private equity, with long-term funding payments coming from FDOT through the performance-based availability payments and bonuses.

Outcome

Construction on the I-595 Corridor improvements began in June 2009, and it is expected to be complete by spring 2014. By withholding compensation to the private consortium, FDOT created strong incentives for I-595 Express LLC to complete the project as soon as possible and within the design and quality specifications set in the contract. Though the project is ambitious, FDOT has sought to minimize its risks by setting clear criteria for performance payments to the private consortium, as if KPI are not met, the contract allows for downward adjustment of the availability payments (AASHTO, 2010).

Case Study 7: Pocahontas Parkway – Richmond, VA

Background

The Pocahontas Parkway links I-95 in Chesterfield County, VA with I-295 south of Richmond International Airport in Henrico County, VA. The long-planned project was intended to serve development anticipated to occur because of airport and urban growth pressures (Wang, 2010). Though the Virginia Department of Transportation (VDOT) approved the route and completed the environmental regulatory work for the project in the mid 1980s, it could not

progress because of funding issues. Following the passage of enabling legislation (the same that allowed for the Route 28 P3), VDOT sought to complete the project as a P3, forming the Pocahontas Parkway Association (PPA) with Fluor Daniel (FD) and Morrison Knudsen (MK) in 1997.

Contract, Funding, Financing

The contract stipulated that PPA finance, construct, and operate the facility, while FD/MK would jointly serve as the design-build contractor. VDOT owns the right of way and paid for all preliminary planning and regulatory work a decade prior to the project's construction. PPA is responsible for operation and maintenance, intended to be funded through PPA's toll revenues, after payment of project debt service and operating expenses (Wang, 2010). The contract established the first two years of toll rates, which were then determined by PPA and could be adjusted by VDOT. Also, the contract contained a non-compete clause, only protecting PPA from publically-funded competing service, like a parallel roadway (Wang, 2010, p.148).

VDOT faced steep funding shortages that kept delaying the project. Instead of public procurement, the state proceeded with innovative 63-20 financing and issued tax-exempt bonds to minimize the state's economic risk. The 63-20 loans were supplemented with loans from the state infrastructure bank and a small amount of federal funds as well. Funding over the long-term was tied to toll revenue and, in turn, traffic levels on the Pocahontas Parkway.

Outcome

As with the other projects we have described, the P3 allowed the state to go forward with the Parkway project when it might not otherwise have been able to do so. The project is one of only two such 63-20 corporations in the country.

Again, however, the Parkway has had lower revenue and traffic numbers than forecasted. The negative impacts of the September 11 terrorist attacks were particularly acute at Richmond International Airport, which in turn had a strong negative impact on demand for the Pocahontas Parkway.

In June 2006, VDOT entered into an agreement to award Transurban USA the rights to "enhance, manage, operate, maintain, and collect tolls on the Parkway for a period of 99 years," in addition to defeasing all of PPA's underlying debt (Wang, 2010, p.150). VDOT lost its rights to toll revenue, though it did receive an upfront payment of $611 million. In terms of toll regulation, VDOT created a comprehensive toll schedule for the facility to apply until 2016, and

has set ceilings on future toll increases allowed by Transurban beyond that point as well. Presumably, Transurban expects sustained growth in the region and is hoping that that growth will lead to increased traffic numbers – and increased toll revenues– seen on the Parkway over the long-term.

Case Study 8: CA 91 Express Lanes – Orange County, CA

Background

CA-91's Express Lanes were additional capacity built in the median of the existing SR91 between Orange and Riverside counties in southern California (Wang, 2010). The express lanes were built to serve as a high-occupancy toll (HOT) lane and provide congestion relief from the free lanes which serve commuters between job-rich Orange County and residential areas of the Inland Empire. The priced sections of the SR-91 project consist of two lanes plus a carpool lane in each direction.

The CA-91 Express Lanes project was one of the first two of four projects proposed via California's passage of AB 680 in 1989. Caltrans experts ranked potential projects and analyzed each in terms of transportation need served, ease of implementation, and the private partner's experience, among other factors. The CA-91 Express Lanes project was chosen as one of the two to be built in 1990.

Contract, Funding, Financing

The California Private Transportation Company (CPTC) received the contract to build the CA-91 Express Lanes. The CPTC was a private consortium of Level 3 Communications, Cofiroute Corporation, and Granite Construction. The contract stipulated that Caltrans would take on project ownership once the project was completed, while OCTA contracted to do environmental studies with the developer (Wang, 2010). The private consortium would design, finance, construct, operate, and maintain the toll facility, and they would retain the franchise for 35 years. The CPTC was allowed to set its own tolls, but the state put a 17 percent cap on the rates of return and redirected the excess into state highway coffers.

The consortium was also allowed to generate revenue, albeit a relatively unsubstantial amount, from leasing rights to other auxiliary service providers like gas stations and restaurants along the sides of the toll road. Finally, the contract contained a non-compete clause which

disallowed any public improvements along the corridor until 2030 within a 1.5-mile buffer (Wang, 2010).

The project was financed by CPTC through a mix of bank loans, private equity, and taxable debt to minimize both financial risk to the state as well as the state resources consumed on the project. That toll rates were unregulated save for the ceiling on rate of return instituted by Caltrans indicates that tolls were expected to be the major source of long-term project funding and payment of project financing.

Outcome

The project was the first of its kind the US in two major ways:

— It was the first experiment with variable pricing; and

— It was the first fully automated toll collection facility in the world (Wang, 2010).

Nonetheless, the noncompetition clause proved to be restrictive for the state.

The clause prohibited Caltrans' multiple efforts to make vital improvements to the CA 91 corridor in the late 1990s, leading to legislative attempts to void the clause. Those legislative attempts failed, which led to OCTA paying CPTC $210 million to buy back the facility in 2002; the facility has operated as a public toll road under OCTA's purview since January 2003.

The conflict surrounding the project's non-compete clause has been debated extensively and used as an exemplar of multiple problems, such as a mismatch between regional and state goals, information asymmetries between governments and their partners, allegations of profiteering, and problems with forecasting growth and development. It particularly highlighted the point that such rigid non-compete clauses, though intended to more efficiently allocate risk, can very well redirect risk back onto the public sector with seriously adverse consequences.

Case Study 9: Dulles Greenway – Loudoun County, VA

Background

The Dulles Greenway project began in 1986 with a group of investors who eventually organized themselves into the Toll Road Investors Partnership II (TRIP II). They proposed to connect the state-owned Dulles Toll Road with the western suburbs of Washington DC in Loudoun County, Virginia via a 14-mile route (Wang, 2010). The Virginia Assembly then passed the Virginia Highway Corporation Act of 1988, which authorized private involvement in highway/toll road projects to expedite project delivery and, specifically, the Dulles Greenway.

Contract, Funding, Financing

TRIP II was composed of Virginia family, the AIE Limited Liability Corporation, and Brown and Root of Houston, Texas. The consortium received the contract in 1993 and was responsible for ownership, design, construction, finance, operation and maintenance of the facility (Wang, 2010). The facility, upon completion of its construction, would be owned and operated by TRIP II for 42.5 years with the Virginia Department of Transportation (VDOT), meanwhile, responsible for construction oversight and inspection; the Virginia State Corporation Commission (VSCC) was responsible for regulating toll rates (Wang, 2010). Ultimately, the rate of return for the project's toll rates was limited at 18 percent by VSCC.

As the Dulles Greenway was the first of several P3 projects following enabling legislation passed by the state legislature in the late 1980s to break the backlog of infrastructure projects caused by a significant funding crunch, the private consortium financed the project through a mix of private equity and taxable debt. The private developer thought that the long-term growth of the region would lead to a consistently high demand for the facility and, as such, consistently high toll revenues and a solid return on investment.

Outcome

The Dulles Greenway project defaulted in July 1996, within a year of its opening because usage was significantly lower than expected (Wang, 2010). In addition to citing a major slowdown in regional development resulting from the local real estate meltdown associated with the Savings and Loans Crisis, the developer argued that VDOT's improvements to SR7 affected the Greenway's revenues (Wang, 2010). No non-compete clause was included in the contract, but TRIP II appeared to believe that the state would not make improvements to parallel routes ahead of schedule. The Dulles Greenway languished financially for roughly another decade – despite a restructuring of the consortium's debt and an extension of its concession term – before being purchased in August 2005 by Macquarie Infrastructure Group.

Case Study 10: Foley Beach Expressway – Baldwin County, AL

Background

In May 1996, then-Governor Fob James oversaw Alabama's passage of P3-enabling legislation, allowing the Alabama Department of Transportation (ALDOT) to license toll roads and bridges for private investment/involvement (Wang, 2010). The first project was itself

composed of three individual components: the 7.5 mile Foley Bypass freeway, a 5 mile privately designed/funded/built road, and a 1 mile Intra-Coastal Waterway Bridge privately developed and owned which was to be operated for a toll. The whole group of projects was meant to alleviate traffic problems on Alabama 59 and to enhance capacity during hurricane evacuations.

Contract, Funding, Financing

The City of Foley and the Baldwin County Bridge Company (BCBC) reached an agreement on their BOO contract in the middle of 1996; BCBC itself was a private company "owned by three sons of the former governor Fob James and owners of the long-established bridge contractor McInnis Corp of Mobile, AL" (Wang, 2010, p.151). BCBC was responsible for ownership of the bridge, as well as design, construction, finance, and operation of all elements of the project, including the bridge. The City of Foley, meanwhile, owned the Foley Bypass, and partially funded it as well. The project was a toll road that also involved real estate funding, but it did not include a concession, any revenue regulation or a non-compete clause.

The project was financed through the sale of BCBC private bonds and a mix of FHWA grants and funds from the City of Foley. The financing strategy was employed to make the Foley Bypass more attractive to BCBC by lessening the risks to be borne by the private consortium in operating the unprofitable Foley Bypass along with the profitable bridge element of the project. The City funds helped contribute to the long term funding strategy of the project, as the Foley Bypass, though unprofitable, was considered a chief mechanism of increasing traffic – and, accordingly, toll revenues – on the Foley Bridge.

Outcome

The financial contributions of the public sector toward "the unprofitable Foley Bypass" ultimately increased the bridge's profitability while "the city's Foley Bypass was built for much less by folding it in with the investor's design and construction contract" (Wang, 2010, p.152). The project's advocates suggest that, because not all partners received federal money, parts of the project were exempted from a number of regulatory procedures, including environmental analysis. The shorter process, it is argued, saved money compared to public sector projects (Wang, 2010).

It is unclear, in the end, whether this P3 can be replicated in other parts of the country. Environmental assessment was waived entirely with a $7 million grant from FHWA; the owners are so well-connected politically that it is difficult not to suspect the circumstances of the deals

made in this project. Despite the murky political circumstances surrounding the project, one of the Governor's sons – Tim James – is running for governor in 2010; one of the accomplishments claimed by his campaign concerns the Foley Beach Bridge.

Either way, in 2005 Macquarie acquired BCBC and the Foley Beach Bypass, toll bridge, and access road for $95 million – more than double the initial investment – and packaged the expressway with other toll facilities it had bought in Alabama. Macquarie then sold the lot to Alinda Roads, LLC shortly thereafter.

Case Study 11: I-394 MnPass – Minneapolis, MN

Background

This project on I-394 converted HOV to dynamically-priced HOT lanes. The lanes are free to HOVs and motorcyclists during peak hours, and free to all users in off-peak times (Wang, 2010). The HOV lanes had, prior to the conversion, been underused despite growing congestion. The I-394 MnPass project was made possible as a result of the state's 2003 High Occupancy Toll Lane legislation, as well as by its inclusion in the FHWA Value Pricing Pilot program.

Contract, Funding, Financing

MNDOT chose Wilbur Smith Associates' (WSA) project proposal in 2003, and a BTO contract was signed in early 2004. MNDOT assumed project ownership in addition to providing the bulk of the project's funding while the private team –WSA, SRF Consulting Group, Cofiroute, and Raytheon – were responsible for design, construction, finance, and operation of the project (Wang, 2010). As per the requirements of the FHWA's Value Pricing Pilot program, toll revenue from the project was to be split 50-50 between capital improvements in the toll corridor and public transit improvements – all after paying the base costs of operation. The project was financed jointly by WSA and the state, with payment from WSA to set up the tolling system. Funding was expected to come directly from the HOT lanes' toll revenues.

Outcome

In sum, the I-394 MnPass project has been a "big success in terms of traffic management over both HOV/HOT lanes and other free lanes, but its financial performance has been a big disappointment" (Wang, 2010, p.155). HOT lanes appear to be losing revenues largely because of their own efficacy in decreasing congestion on the parallel free lanes. According to project evaluation, "congestion is just not bad enough in the free lanes to generate major revenues in the

toll lanes alongside" (Wang, 2010, p.155). Some MNDOT officials have noted that what is hoped for, in order to increase the financial viability of the project, is "some California style real congestion" to create an incentive for drivers to use the HOT lanes in greater numbers (Wang, 2010, p.155).

Case Study 12: SH-130 Segments 5 and 6 – Central Texas

Background

These two segments of State Highway 130 link through Travis, Caldwell, and Guadalupe counties southeast of Austin to I-10 near Seguin, TX. With completion of Segments 5 and 6, the SH 130 project will amount to a 91-mile toll highway running through Central Texas, intended to alleviate traffic in the highly-congested I-35 Corridor. Private sector involvement with this project was possible after Texas Department of Transportation (TxDOT) planners identified a major transportation funding gap and pressed the state legislature to create P3-enabling legislation. In 2003, Texas legislature passed legislation allowing for the increased use of P3 in toll roads, and strengthened it further with amendments in 2005.

Contract, Funding, Financing

TxDOT used a Pre-Development Agreement process to seek a private partner. This process has not been used extensively. The process involves a two-phase agreement, including a pre-feasibility stage where negotiations and information gathering can inform the second, implementation phase. TxDOT selected Cintra-Zachry (CZ) and both signed a comprehensive development agreement (CDA) shortly thereafter; after the conceptual, preliminary, and final planning took place over the course of five months, the parties then signed a Facility Implementation Plan Preparation Agreement (FIPPA). The concession was approved in June 2006, granting CZ a 50-year concession from the date the project opens to traffic.

In terms of the project's delegated responsibilities, TxDOT owns the facility and provides back office services to support transponder (TxTag) toll collection. The private consortium is charged with design, construction, finance, O&M, and toll collection. CZ paid TxDOT a $25.8 million upfront concession fee and will share toll revenue with TxDOT proportional to increases in toll revenues to the point where increases will allow the state to reach a 50-50 split. Finally, the contract has "limited non-compete protection" which is "not expected to cause a substantial restriction on improvements to or building of new competing roads" (Wang, 2010, p.158).

The project was financed with a mix of private equity and private bank and TIFIA loans, an approach chosen to minimize the financial impact on and risk to the state given the major infrastructure funding gap it was facing. Toll proceeds are expected to fund the project, with the state of Texas forecasting $1.6 billion over 50 years for its share alone.

Outcome

Expected to open to traffic in 2012, the SH-130 Segments 5 and 6 project looks to complete a major piece of the puzzle in terms of providing traffic congestion relief in central Texas. The project is innovative in several ways, particularly in the CDA's arrangement for higher concession payments and revenue sharing percentages should higher posted speeds than currently allowed on SH-130 be approved by the legislature, as demand increases when speeds on the facility go up relative to parallel routes. TxDOT's innovative use of the rarely-used two-phased process for executing a P3 project seems to have ensured a fairly comprehensive, flexible, and risk-averse plan for both parties involved, as well. Ultimately, only time will tell how both of these segments – and how the larger, newly-completed tolled SH-130, for that matter – will fare in head to head competition with the free, neighboring I-35.

APPENDIX B

Project Details and Public-Private Partnership Arrangements of the 27 Toll Road Projects Involving Private Finance

State	No.	Name	Size: Lane-miles	Initiation Year (1)	Open Date	Facility Type	Project Type	Term	Public partner(s)	Private partner	Cost: Current dollars in millions	Financing structure
AL	4	Emerald Parkway - Montgomery County	9.0	Early90s	Dec. 1994	Greenfield	Developer toll road	Privately owned	No	United Toll Systems	4m (100% private)	4m UTS equity
		Alabama River Parkway - Montgomery County	40.0	Late 90s	Apr. 1998	Greenfield	Developer toll road	Privately owned	No	United Toll Systems	12m (60% private)	12m UTS equity &loans, 8m local, state
		Black Warrior Parkway Bridge - Tuscaloosa County	30.0	Late 90s	Dec.1998	Greenfield	Developer toll road	Privately owned	No	United Toll Systems	25m (68% private)	17m UTS equity; 8m local, federal
		Foley Beach Express Lanes- Foley	54.0	1996	Jun. 2000	Greenfield	Developer toll road	Privately owned	City of Foley, FHWA	Baldwin County Bridge Company	44m (82% private)	7.5m FHWA, city; 36m private bonds
CA	3	SR 91 Express Lanes - Orange County	40.0	1989	Dec. 1995	HOT related	Concession	35yrs, terminated by OCTA	Caltrans, OCTA	California Private Transportation Company	130m (100% private)	20m equity; 100m bank loans; 9m subordinated debt to OCTA.

		South Bay Expressway (SR 125) - San Diego	82.6	1989	Nov. 2007	Greenfield	Concession	35yrs	Caltrans, SANDAG, the City of Chula, FHWA	California Transportation Ventures (MIG)	722m (67% private)	160m MIG equity; 321m bank loans; 140m TIFIA; 81m federal fund; 20m SANDAG.
		E-220 High Desert Corridor - San Bernardino	200.0	2003	(TBD)	Greenfield	(TBD)	(TBD)	High Desert Corridor Joint Powers Authority (JPA)	(TBD)	900m (TBD)	7.5m fed. funds; no future funds secured.
CO	1	Prairie Falcon Parkway Express - Pueblo to Larimer	840.0	2006	(TBD)	Greenfield	(concession expected)	(TBD)	CDOT	PFPE Company	2500m (TBD)	(TBD)
FL	4	Daniel Webster Western Beltway Part C (SH429) - Orlando	96.0	Early 90s	Dec.2002, Dec.2005, Apr. 2006	Greenfield	Public road	no	FTE, OOCEA	Disney	731.50m (1% private)	Disney donated 7.5m& some land; Main funds from FTE, OOCEA
		Poinciana Parkway - Orlando	40.0	2005	In design / finance stage (expected Dec.2011)	Greenfield	Developer toll road	Privately owned	Osceola County, Florida	Avatar Properties	60m (TBD)	(under financing)
		I-595 Express - Broward County	31.5	2007	Under const. (expected 2014)	HOT related	availability payment concession	35yrs	FDOT	I-595Express LLC (ACS Dragados)	1600m (62% private)	210m equity; 781m bank loans; 608m TIFIA

		Florida First Coast Outer Beltway - Jacksonville	186.0	2007	Under NEPA review (TBD)	Greenfield	concession expected	35-75 yrs expected	FDOT	(TBD)	2230m (TBD)	(TBD)
MN	1	I-394 MNPASS - Minneapolis	22.0	2003	May 2005	HOT related	Public road	no	MNDOT	A team led by WSA (2)	12.5m (20% private)	2.5m WSA equity; 10m state fund
MS	1	Mississippi Airport Parkway Project - Jackson	48.0	1999/ 2008 **(2)**	Suspended Sep. 2009	Greenfield			MDOT		400m (2007 estimate)	
TX	5	Camino Columbia - Laredo	43.6	1997	Oct. 2000	Greenfield	Privately owned	Privately owned	TXDOT	Camino Columbia LLC, landowners	90m (100% private)	15m landowners; 75m bank loans.
		SH 130 segments 5 and 6 - Austin	160.0	2005	Under const. (expected in 2012)	Greenfield	Concession	50yrs after opening	TXDOT, FHWA	SH 130 Concession Company (Cintra/ Zachry)	1309m (67% private)	196.4m equity; 682.6m bank loans; 430m TIFIA
		IH 635 LBJ Managed lanes - Dallas	80	2005	Under const. (expected by 2015)	HOT related	Concession	52yrs, for construction and operation.	TXDOT, NTTA NCTCOG, RTC City of Dallas, Dallas County, FHWA,	LBJ Infrastructure Group (Cintra/ Meridiam)	2678m (54% private)	598m equity; 400m bank loans; 400m private activity bonds; 800m TIFIA; 445m Public funds

		IH 35W Managed Lanes - Fort Worth	40.0	2006	Planning stage (expected by 2015)	HOT related	Concession	52yrs	TXDOT's Fort Worth District	NTE Mobility Partners (Cintra/ Meridiam)	667m (67% private)	(TBD)
		I-820/SH183 Managed Lanes - Dallas-Fort Worth	54.0	2006	In design / finance stage (expected by 2015)	HOT related	Concession	52yrs	TXDOT	NTE Mobility Partners	1000m (67% private)	(TBD)
UT	1	Adams Avenue Parkway - Ogden	4.0	2000	2001	Greenfield	Concession	50yrs	UTDOT	Adams Avenue Turnpike LLC (Bruce, Doug Stephens)	8.9m (78% private)	2m state; 6.9m property owners
VA	7	Dulles Greenway - Loudoun County	66	1988	Sep. 1995	Greenfield	Privately owned, concession	42.5yrs, extended 20yrs in 2001	VDOT, local county.	Toll Road Investors Partnership II (TRIP II)	350m (100% private)	40m equity; 310m private loans & other private debt
		Pocahontas Parkway VA 895 - Richmond	35.2	1995	May & Sep. 2002	Greenfield	Concession	30yrs	VDOT, FHWA	Pocahontas Pkwy Association, FD/MK	381m (94% private)	no equity; 5m FD/MK fund; 354m 63-20bonds; 18m SIB loans; 9m federal funds.
		Dulles Greenway Widening - Loudoun County	29.4	1999	2000, 2001	Brownfield	Concession	42.5yrs, extended 20yrs in 2001	VDOT	TRIP II	40.6m (100% private)	40.6m private bonds
		Pocahontas Parkway Extension - Richmond	6.4	2001	Under const. (expected early 2011)	Greenfield	Concession	part of a 99yr lease	VDOT	Transurban	48m (0% private)	48m TIFIA loans
		I-95/I-395 HOT Lanes - Northern Virginia	84.0	2005	Under NEPA review (TBD)	HOT related	concession expected	TBD	VDOT	FluorDaniel/ Transurban	882m (TBD)	(TBD)

		I-495 Capital Beltway HOT Lanes - Northern Virginia	56.0	2004	Under const. (expected 2013)	HOT related	Concession	85yrs (5yrs build, 80yrs operate)	VDOT	FluorDaniel/ Transurban	1929m (48% private)	349m equity; 409m state grant; 585m TIFIA; 586m private activity bonds.
		Dulles Toll Road Rail Link - Loudoun County	112.0	2006	Under const. (expected in 2015)	Brownfield	Permit for MWAA for operation & improvement (public concession)	50yrs	MWAA	Fairfax Commercial landowners (financing)	5250m: Phase I 2600m (15% private) Phase II TBD	Phase I : 900m FTA funds; 252m Congress; 400m tax on landowners; 75m VDOT; 973m DTR

1. Initiation Year is defined as the time when a project's feasibility study gets endorsed or approved, or the final Environmental Impact Study (EIS) approved and Record of Decision received.
2. The project's initial EIS was approved in 1999 but the project was suspended later and resumed in 2008 by sending out RFPs to private developers.

Abbreviations
Caltrans= California Department of Transportation
DTR= Dulles Toll Road
FD/MK: Fluor Daniel and Morrison Knudsen
FHWA= Federal Highway Administration
FTA= Federal Transit Administration
FTE= Florida's Turnpike Enterprise
JPA = High Desert Corridor Joint Powers Authority
NCTCOG= the North Central Texas Council of Governments
NTTA= the North Texas Tollway Authority
MIG= Macquarie Infrastructure Group
MWAA= Metropolitan Washington Airport Authority
OCTA= Orange County Transportation Authority
OOCEA= the Orlando Orange County Expressway Authority
PFPE= Prairie Falcon Parkway Express
RTC= Regional Transportation Council
SANDAG= San Diego Association of Governments
TIFIA= the Transportation Infrastructure Finance and Innovation Act
TRIP II= Toll Road Investors Partnership II
UTS= United Toll Systems
WSA= Wilbur Smith Associates