EXAMINATION OF RECENT DEVELOPMENTS IN DBFO PUBLIC PRIVATE PARTNERSHIP TRANSPORTATION PROJECTS IN NORTH AMERICA

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Abstract

With continuous demand for transportation infrastructure and chronic funding shortfalls faced by governments, public-private partnerships (PPPs) for infrastructure provision—including those in which private partners play a role in designing, building, financing, and operating infrastructure—have garnered increasing attention in recent years in both the United States and abroad. High profile PPP concession deals, like the leases of the Chicago Skyway and Indian Toll Road, have raised concerns in the U.S. about the protection of public interests in PPP projects, and ignited heated debates about the desirability of PPPs, which are partly driven by ideology and by vested interests, but also by questionable decisions in previous PPPs. While public agencies at the local, regional, state/province, and federal levels are interested in identifying successful PPP arrangements in the best public interest, the considerable variety and complexity of PPP deals, combined with numerous local factors unique to each project, have made the development of a successful PPP evaluation framework especially challenging.

In order to fill this gap in the knowledge of appropriate PPP approaches for transportation infrastructure projects, we examine two recently closed Design-Build-Finance-Operate (DBFO) PPP deals in Canada and the U.S.: 1) British Columbia's Golden Ears Bridge, and 2) Texas State Highway, Segments 5 and 6. The main objective of this paper is to gauge the adjustments that public agencies have been making to improve the performance of DBFO projects based on past experiences in the field. Specifically, we discuss the following as critical factors to be treated with particular consideration in DBFO cases: 1) responsibility for pre-construction and construction risks, 2) asset valuation, traffic demand risk, and revenue risk, 3) non-compete provisions, 4) facility performance standards, 5) terms for early termination, and 6) preserving public and political acceptance.

The two case studies examined in this paper provide evidence of improved balance in risks, responsibilities, cost, benefits and rewards between the public and private sectors, incorporating the knowledge from past experiences to properly evaluate merits and shortcomings of PPPs. These two cases indicate good directions toward what we call a middle-ground approach to address various critical issues and implement PPPs successfully. As technical issues will be resolved with continuous accumulation of experience and knowledge, it is likely that the issues of public and political acceptance of PPPs will be more critical for their successful implementation.

Track: E4 - Transportation Finance
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Key Words*: public private partnerships, highway financing, design-build-operate-finance, North America*

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1. Introduction

In light of chronic funding shortfalls and waxing highway construction and maintenance demands, public-private partnerships (PPPs)—including those in which private partners play a role in designing, building, financing, and operating infrastructure—have been garnering increasing attention from government officials in U.S. and abroad. PPPs for public transportation infrastructure projects involve partnerships with the private sector involvement in designing, building, financing, maintaining, and/or operating road or transit infrastructure, or some combination of these roles. PPPs have a large spectrum of types based on the degree of shared responsibility in these functions, ranging from traditional procurement to design and build a new facility, to long-term concession of a new or existing asset that amounts to virtual private ownership (Apogee Research 1995; Fayard 2005).

While some government officials have great expectation of DBFO and concession PPPs to draw on private funds to provide transportation infrastructure and service, and to reduce financial burden on government, past PPP cases in the US have not always found contract designs that maintain a good balance between public interests and private sector profits. Because of lack of experience and knowledge, earlier PPP projects in the US undermined their own success. Provisions that resulted in substantially greater interests for one party at the expense of the other swung the pendulum of uncertainties and risks unevenly, to reach extremes. For example, in the case of California's SR-91 Express Lanes, a non-compete clause prevented the state transportation agency from building additional lanes to improve safety at entrances and exits, and ultimately led the Orange County Transportation Authority to buy back the concession, costing the public $207.5 million in 2003 (Persad, Walton, and Wilke 2005) On the other hand, the contract for Virginia's Dulles Greenway did not contain any non-compete provisions, and allowed the state to improve a competing free road without any compensation to the Greenway's operators for reduced toll revenue.[1] High profile PPP concession deals, like the leases of the Chicago Skyway and Indiana Toll Road, have raised concerns in the U.S. about the

[1] The road opened in 1995 to lower-than-expected traffic demand. VDOT began making improvements to the parallel, competing road, State Road 7 within a year of the Greenway's opening. By 1996, the company was working on plans to restructure loan contracts and defer debt payments, and by 1998 the TRIP II consortium was filing with the Virginia State Corporation Commission to refinance its debt. Although the road eventually operated with a positive cash flow as of 2005, it was not making a profit for its private investors. In 2005, Macquarie Infrastructure Group bought the rights to the Greenway (Garvin and Bosso 2008; Persad, Walton, and Wilke 2005)

protection of public interests in PPP projects, and have ignited heated debates about the desirability of PPPs. Such debates are partly driven by ideology and by vested interests, but also by questionable decisions in previous PPPs. These long-term concession deals in Chicago (99 years) and Indiana (75 years) have been criticized for foregoing substantial future financial revenue in exchange for upfront concession fees, and these two cases may have created more difficult conditions in terms of public and political acceptance for other PPP projects in future.

While public agencies at the local, regional, state/province, and federal levels are interested in identifying successful PPP arrangements in the best public interest, the considerable variety and complexity of PPP deals,[2] combined with numerous local factors unique to each project, have made the development of a successful PPP evaluation framework especially challenging. We have chosen to examine DBFO PPPs in particular because the DBFO strategy has the most substantial implication for long-term financing of transportation infrastructure projects, and has garnered significant attention from public officials and transportation planners. DBFO is also a strategy that involves partnership between the public and private sector over the entire lifetime of the project. In order to improve our knowledge of more successful arrangements in DBFOs, we examine two DBFO cases in North America—British Columbia's Golden Ears Bridge, and Texas's SH-130 Segments 5 and 6 to gauge the adjustments that public agencies have been making to improve the performance of DBFO projects based on past experience in the field. Specifically, we will discuss: 1) how contractual terms in these two cases are designed to move away from rather simplistic arrangements that tend to lead to unbalanced, extreme allocation of risk, uncertainty, and benefits, and 2) how they form a sort of "middle ground" that is conducive to both public and private interests. We found the following six factors are particularly important to differentiate the two case studies from past projects and require careful examination: 1) responsibility for delays and associated cost overruns during construction, 2) traffic demand and revenue risk, 3) non-compete provisions, 4) facility

[2] There are many types of PPP arrangements ranging from traditional public procurement to full privatization, depending on how the responsibilities are divided between the public and private sectors. These include service contracts, design-build (DB) / turnkey, build-operate-transfer (BOT) / design-build-operate (DBO) / management contracts, lease agreements, design-build-finance-operate (DBFO) / concession. This categorization of PPPs is driven by three main factors: 1) governmental decisions about which responsibility for designing, constructing, financing, and operating highways is outsourced, 2) methods by which the public sector compensates the private sector and provides opportunities for profit, and 3) highway facility ownership arrangements (Iseki, Uchida, and Taylor 2009).

performance standards, 5) terms for early termination, and 6) preserving public and political acceptance of the project.

As DBFO PPPs are a financial arrangement between the public and private sectors dealing with unavoidable uncertainty and associated risks on various issues, it is not realistic to find a single or even a small number of successful models that are universally applicable to all cases. This paper discusses the right direction of development of new DBFO PPP deals identified in the two case studies.

2. Review of the Literature

While the United States and Canada have examples from around the world to learn from, every PPP case is unique for a variety of reasons, including the type of facility, local politics, local terrain, and local transportation needs. The large scale of the facilities, the complexity of the deals, and unique local circumstances in politics, geology, environment, and type of use make it difficult to establish a single set of best practices for state, provincial, or local governments to follow. For instance, the requirements of different types of transportation infrastructure, such as intercity connectors, economic development roads, or special constructions like bridges and tunnels, each pose their own sets of criteria to consider (Fishbein and Babbar 1996).

The potential value of a PPP is not simply a financing alternative for public agencies facing funding shortfalls or debt ceilings, but should also be found in socio-economic benefits gained by the public, and financial benefits accrued by the private partners in transportation public work projects. Drivers and taxpayers should obtain a high-quality facility that meets a well-defined transportation need, and private firms and their investors should earn a profit in return for their investment and associated risks they undertake. PPPs have the potential to make this possible by allocating the risks associated with infrastructure projects to the partner best able to bear them (Iseki, Uchida, and Taylor 2009). Ideally, neither partner should assume the bulk of the risks without sufficient reward, nor should either party pay or receive too high a risk premium.

Although private sector involvement in the provision of transportation infrastructure is not new in North America, PPPs represent a new level of involvement and active partnership.[3] Due to the two recent high-profile PPP cases in Chicago and Indiana, the term "PPP" has become associated particularly with long-term concession agreements with equity participation from the private sector, whether that entails the lease and operation of an existing facility (a "brownfield" project) or the creation of a new facility (a "greenfield" project), in return for payments from the public agency or the right to collect tolls from road users over the term of the contract (Ortiz and Buxbaum 2008). As governments have contended with shortfalls of funding from traditional sources, they invite greater participation by the private sector through PPPs than is typical in a traditional design-only or construction-only contract. And, importantly, the private partner assumes a greater proportion of a project's risks along with the expectation of larger potential returns.

Transportation infrastructure projects are inherently risk-prone in several ways: they have large initial costs, high irreversibility, long-term durability of assets, and a high degree of complexity (Checherita and Gifford 2007). One of the primary benefits of a PPP, as opposed to traditional public provision, is the ability to diversify risks, allotting them to the party best able to bear them (Ortiz and Buxbaum 2009). Given the variety of transportation projects, local conditions, and types of infrastructure, no single model of an optimal allocation of risks maximizing the benefits of all involved is available. Nevertheless, it is possible for a public agency contemplating a PPP to examine types of risks and at what stages in the PPP process those risks occur, and how the agencies may apply best practices guides or past experience to the particular case at hand.

According to Garvin and Bosso (2008), there have been two generations of PPPs in the U.S. The first generation of PPP includes projects such as California's SR-91 Express Lanes and Virginia's Dulles Greenway; both roadways opened to the public in 1995 with a long planning period starting in the late 1980s. The second generation includes projects more recent projects such as the Chicago Skyway and Indiana Toll Road (ITR) concessions, which were leased in

[3] The US Federal Highway Administration's definition of a PPP is expansive: "[p]ublic-private partnerships (PPPs) are contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects" (Federal Highway Administration n/d). Garvin and Bosso (2008) propose a working definition of an infrastructure PPP as a "long-term contractual agreement between the public and private sectors where mutual benefits are sought and where ultimately (a) the private sector provides management and operating services and/or (b) puts private finance at risk."

2004 and 2006, respectively. The public, elected officials, practitioners, and academics have raised concerns in both generations that are shaping debates and discussion about the desirability of PPP projects and about how to craft better PPP terms when public agencies choose PPPs as the best means to deliver and operate transportation infrastructure. In the following sections, we discuss the importance of the following five main issues that are repeatedly found in the literature on PPPs: 1) pre-construction and construction risks, 2) asset valuation and demand risk, 3) non-compete clauses, 4) opportunistic behavior, especially pertaining to facility maintenance and early termination terms, and 5) public acceptance. These five issues also lead us to the six factors that are particularly important to differentiate the two case studies from the past projects and are carefully examined in this paper.

2.1 Pre-construction and Construction Risks

Public agencies considering PPPs for the first time have no simple task ahead of them. Personnel or contractors with a wide variety of skills including value engineering, business modeling, risk transfer assessment, capital budgeting, auditing, financial problem solving, and more will become increasingly necessary as PPPs become more common (Ortiz and Buxbaum 2009). According to several researchers, it is public agencies that usually find themselves bearing the risks associated with environmental approval processes and the delays they may entail (AECOM Consult 2007; Checherita and Gifford 2007; Fishbein and Babbar 1996). Costs pertaining to difficult terrain, cultural and archeological sites, mitigation of environmental impacts, disposal of pre-existing hazardous materials, and relocation of utilities known ahead of time are also responsibilities usually taken by the public sector, but costs and delays arising from surprises during construction—after the public agency has supplied its data on site conditions and the private partner has accepted them—are typically the private partner's burden (AECOM Consult 2007; Checherita and Gifford 2007; Fishbein and Babbar 1996; Page et al. 2008).

2.2 Asset Valuation, Demand Risk, and Revenue Risk

Accurate asset valuation has become a significant concern in the wake of the recent Skyway and Indiana Toll Road (ITR) leases. Their unusual lengths—99 years and 75 years, respectively—and very large one-time upfront payments have singled them out for special criticism. There are strong disagreements about whether the Skyway and ITR concessionaires paid too much or too little for them. Some argue that the $3.85 billion paid was less than the ITR

was worth although the winning bid for the ITR was almost twice the prebid valuation (Ortiz and Buxbaum 2007). Whether payments are upfront or spread out over the length of the lease, public and private parties both face risk calculating the value of infrastructure assets, and either party may bear the cost of miscalculation (AECOM Consult 2007; Checherita and Gifford 2007).

Estimating the asset's value based on the expected cash flow with forecasted future traffic demand as well as the facility's future operating and maintenance costs are challenging even to experienced firms and public agencies (Vassallo 2006). In the case of toll roads, the public's willingness to pay rather than take alternative routes is another factor that may determine the future level of traffic demand (Fishbein and Babbar 1996). Price-setting for infrastructure poses special difficulties, particularly because it lacks a market-like price signal indicating demand levels (Pagano 2008).

Another risk of asset valuation is associated with bidding, and is referred to as the "Winner's Curse." Winner's Curse refers to the possibility that the bidder with the best offer is the most likely to have miscalculated the asset's value or projects prospects (Bel and Foote 2009; Checherita and Gifford 2007). There is also the possibility that in markets that are in the early stages of privatization, firms may make abnormally good bids, hoping to take a leading position in PPP deals (Bel and Foote 2009). Winner's Curse is generally a risk borne by the bidder, but it is difficult in practice to distinguish between an overly optimistic bid and deliberately opportunistic behavior (Checherita and Gifford 2007).

We can find inconsistencies in bidding prices by the same firm on similar projects in different markets that have different bidding/auction structures and government requirements. Some firms bidding on the Skyway and ITR concession deals also bid on three major French brownfield concessions in the same time period. While the concessionaires in all five cases paid a one-time, up-front fee for the right to operate the roads for the length of the lease, bidding prices were considerably more conservative in the French concessions. Investors paid 60 times the current cash flow for the Skway and ITR, but only 12 times the current cash flow for the French toll road networks (Bel and Foote 2009). Bel and Foote (2009) account for the difference based on the fundamental differences in PPP bidding approaches: the French utilize, what Bel and Foote (2009) call, a *best bid* method as opposed to Chicago's and Indiana's *high bid* method. While the sole criterion for awarding the contract was the size of the bid in the U.S. cases, the French cases required detailed business and "industrial" plans demonstrating the many of the

assumptions on which bidders have based their calculations.[4] In the U.S. cases, the use of the *high bid* method in an upfront concession deal focuses on short-term financial benefits without a careful assessment of either long-term financial costs or economic benefits and costs to the public.[5]

When the private sector is expected to recoup its initial investment and make profits from future toll revenue, the bulk of demand-related risk is borne by the private sector, making the accuracy of cash flow projections and construction and maintenance costs crucial to the bidders (AECOM Consult 2007; Checherita and Gifford 2007; Fishbein and Babbar 1996; Ortiz and Buxbaum 2009; Vassallo 2006). Since travel demand is derived from the demand for other activities at different locations and is influenced by factors such as the regional economy and changes in activity locations over time, either the public or the private sector has less than sufficient control over demand (Vassallo 2006; Vining and Boardman 2008).[6] To insulate themselves and their investors, private firms may establish stand-alone corporations or Special Purpose Vehicles (SPVs) that can potentially declare bankruptcy in a worst-case scenario with no recourse to their parent companies (Shaoul, Stafford, and Stapleton 2006; Vining and Boardman 2008).

Although assumption of some risk is the basis for receiving the potential reward, it is becoming common for a certain amount of demand risk to be shared with public entities through minimum revenue guarantees, contract extensions, revision of toll rates, and other mechanisms (Ortiz and Buxbaum 2009; Vassallo 2006). For example, the use of shadow tolls transfers *a portion* of the demand risk to the government; when traffic is higher than projected because no actual toll revenue is being collected to pay the contractor, while the concessionaire retains the risk of lower than expected traffic, resulting in lower compensation from the government (Ortiz and Buxbaum 2009; Shaoul, Stafford, and Stapleton 2006). Availability payments, which may

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[4] The business plan includes assumptions regarding "traffic, revenues, maintenance and capital expenditures, [and] financing structure and expenditures." The industrial plan details "the strategic, management and operational initiatives to be implemented by the concessionaires and commitments regarding labor issues and the relationship with both regional and local authorities and community interest groups" (Bel and Foote 2009). Reviewing the assumptions underlying bidders' business and industrial plans is an integral part of the French government's evaluation of proposals.

[5] In the U.S., much more liberal conditions related to the length of the concession, limits on allowable toll increases, required ratios of equity to debt, and projections of traffic growth—compared to the French terms—significantly influenced the cash flow that bidders could expect in an upward direction.

[6] The private operator may gain some control over demand through the tasks of maintaining the road quality, safety, toll levels, and congestion (Checherita and Gifford 2007), while the public agencies certainly influences traffic by its control over the transportation networks, including providing alternative routes.

be becoming more common in the near future (Ortiz and Buxbaum 2009), also shift demand risk to the public. Whether the public sector generates revenue by collecting tolls itself, or through some other source, availability payments to the concessionaire are fixed, but may be reduced if a portion of the facility is out of service, based on the amount of time it was unavailable. Rather than exclusively sharing the downside risks of PPPs, public entities can also establish revenue sharing provisions. If the private operator should benefit from higher than anticipated demand or from advantageous refinancing, a portion of the profits may be paid to the government (Ortiz and Buxbaum 2009).

What risk the private sector does assume comes at the cost of a risk premium. One of the sponsoring public agency's most important duties is to evaluate the difference between public and private delivery of the desired project as accurately as possible. In this regard, value for Money (VfM) is probably the best-known valuation technique for financial and risk-transfer costs and benefits.[7] An important quality of VfM is that it is not simply based on the lowest bid, but considers the life-cycle costs and quality of the facility. The VfM process entails creating a Public Sector Comparator (PSC). The PSC is a hypothetical project designed to estimate all the costs of construction and maintenance, and performance of any other services throughout the duration of the proposed contract, were they to be provided using traditional public procurement methods.[8] The value of risks to be transferred is also assessed, and assigned to the party most likely to bear those risks (Morallos and Amekudzi 2008; Ortiz and Buxbaum 2009).

Some of the key criticisms of VfM are faulty discount rates, inability to quantify sensitivity to contract term changes, and difficulty defining the optimal risk allocation scenario (Ortiz and Buxbaum 2009). Two early PPP projects under British Columbia's Liberal government raised public questions about whether a PPP model produces really a better value than public provision in each case. Skepticism arose regarding: 1) whether appropriate discount rates were used to compare the PSC and private bids and 2) how PSC costs were estimated. In one case, significant differences in the design and plan between the PSC and the winning bid

[7] The U.K. was the first to establish a set of formal VfM procedures, and agencies in some other countries, such as Australia and Canada, have established their own procedures along the lines of the U.K.'s (GVTA 2005; Morallos and Amekudzi 2008; Ortiz and Buxbaum 2009). Several U.S. states, including Florida and Alaska, have also used VfM in their PPP valuation processes (Ortiz and Buxbaum 2009). Other techniques such as shadow bids and market valuation have been used as well. Shadow bids and market valuation are two methods that have been employed in Texas to set a minimum value for proposed projects (Ortiz and Buxbaum 2009).

[8] Qualitative factors are also considered in the creation of a PSC and in the ultimate consideration of bids, but are usually not assessed in the VfM procedure.

also provoked concern about the usefulness of the VfM process (Cohn 2008). It has also been recommended that VfM be monitored and reevaluated over the course of the project to ensure that the project continues to live up to expectations, although this requires the devotion of sufficient public resources to conduct that monitoring (Morallos and Amekudzi 2008). Shaoul, Stafford, and Stapleton (2006) found that in the U.K.'s Private Finance Initiative (PFI), high transaction costs combined with the costs of private finance made the PPP proposals more costly than their PSCs. The economic justification for the PPPs, despite the high cost of private finance, apparently rested on the value expected from risk transfer, innovation, and efficiency gains.

Since asset valuation has substantial impacts on a public agency's overall evaluation of private firms' incentives to participate in, and the public's level of acceptance of, PPP deals, it is important to streamline a valuation process. At the same time, because unavoidable uncertainties and associated risks make it impossible to accurately estimate asset values, PPP arrangements need to have some flexibility to manage the effects of uncertainties on asset valuation and resulting financial benefits on both parties,

2.3 Non-compete Clauses

One of the key concerns that arose from the first generation PPPs was how to plan for the prospect of future competition from new or improved facilities that provide an alternative route. California's SR-91 Express Lanes were subject to a rigid non-compete clause that led to a $12 million settlement to the concessionaire, and later the purchase of the concession at a cost to the public of $207.5 million, in order to make highway system improvements nearby (Garvin and Bosso 2008; Persad, Walton, and Wilke 2005). The contract did not assume the potential for early termination by either party. This lack of exit provisions complicated matters first when two of the three partners who made up the concessionaire—SPV and the California Private Transportation Company—wished to leave the tolling industry and proposed selling the concession, and second, when public outcry over the settlement required of California Department of Transportation (Caltrans) to violate the non-compete agreement prompted the public sector (via the Orange County Transportation Authority) to buy the franchise itself (Persad, Walton, and Wilke 2005). Conversely, Virginia's Dulles Greenway had no non-compete provisions, and the already under-performing road suffered even more when the

Virginia Department of Transportation began improving Route 7, a free alternative route (Garvin and Bosso 2008).

The conflict in the SR-91 case attracted national attention, and has significantly influenced the nature of non-compete clauses in subsequent toll road projects (Persad, Walton, and Wilke 2005). More recent PPPs have found ways to specify allowable future improvements in the region, under what circumstances the private partner is entitled to compensation for lost revenue, and how that compensation is to be determined, more carefully than the SR-91 contract did (Ortiz and Buxbaum 2009).[9] Although non-compete agreements in recent PPP deals have been more balanced than SR-91, public concern persists that non-compete clauses create a monopoly for the concessionaire (Ortiz and Buxbaum 2007).

2.4 Opportunistic Behavior in Contract Implementation/Termination

Theoretically, the complexity of PPP deals, uncertainties extending well into the future, and asymmetric information between parties raise the opportunity for either party of a PPP agreement to engage in opportunistic behavior, but it is more often found to be triggered by the private partner, and borne by the public, than the reverse (Checherita and Gifford 2007). In some cases of opportunistic behavior, the winning bidder underbids and requests renegotiation after the contract to change its terms, citing new risks or circumstances not accounted for in the contract and arguing it is not feasible to fulfill the project as originally planned at the price specified (Checherita and Gifford 2007).[10]

Beyond the proposal and bidding phase, there are public concerns about the possibility of private operators taking opportunistic advantage of monopoly power, particularly where inflexible non-compete terms exist (DeCorla-Souza 2008; Ortiz and Buxbaum 2008; Szeto and Lo 2008). There are fears that the private operator's interest in profit maximization may lead to underinvestment in maintenance on the one hand, leaving the facility in poor condition and possibly unsafe, or raising tolls excessively on the other hand (Ortiz and Buxbaum 2008). In addition, without careful design of contracts, either a public agency or a private contractor may

[9] For example, ITR's 10-mile "limited-compete" zone, which requires compensation if a new four-lane limited access highway is built, but permits anything else; Denver's Northwest Parkway, which requires compensation for any project not already planned at the time of the agreement that results in a revenue loss to the concessionaire; and a similar compensation arrangement in Melbourne, Australia for new facilities that compete with CityLink (Ortiz and Buxbaum 2009).

[10] Engels et al (2009) found in their prediction model that 73 percent of PPP renegotiations in Chile through 2007 occurred shortly after the concession was auctioned, when the projects were still in the construction phase.

take advantage of unexpected events or *force majeure*, such as natural disaster, to exit from a contract, leaving the other party in financially disadvantaged position and/or with assets with little value.

2.5 Public and Political Acceptance

One of the critical challenges that new approaches to transportation policy or provision of infrastructure, such as PPPs and road pricing, often face is gaining public acceptance. For PPPs to succeed as a general strategy for financing and managing infrastructure, they not only have to meet public agencies' needs and the private sector's profit expectations, they also need to maintain the trust and confidence of the public and their elected representatives (Garvin and Bosso 2008). In their PPP equilibrium framework, Garvin and Bosso (2008) point out that it is important that PPP projects "nurture the development of this market and sustain its existence." In this sense, public trust is essential not only for individual projects, but also for PPPs as an infrastructure provision model. Some of the concerns that are raised among the public about long-term concessions may not have solid grounds, but are based on misperceptions, such as the fear that American assets are being sold to foreign interests and the belief that all PPPs entail rigid non-compete clauses (Ortiz and Buxbaum 2007). Other public concerns that have potential to prevent or delay a project include: lingering hostility over previous failed PPPs, suspicion that decisions are being made without adequate public involvement, and concerns about private opportunistic behavior raising tolls or sacrificing quality.

Potential critics still need to be made aware of contract terms that safeguard public interest in order for PPPs to gain acceptance by taxpayers, road users, and legislators. As previously discussed, public agencies have been crafting non-compete clauses more carefully than before (Ortiz and Buxbaum 2007). Legislators in more than 20 states in the U.S. have created and passed enabling legislation required to enter into PPP agreements, and each PPP project needs to be individually approved by the legislature in some states (Iseki et al. 2009).

The degree of public support built up beforehand may have impacts on the risk of project development failure, or default after construction completion (AECOM Consult 2007). For example, citizens' and legislators' distrust of Texas Department of Transportation (TxDOT) and the Regional Transportation Council for Dallas contributed to the withdrawal of acceptance of a private bid for the operation of the SH 121, and the ultimate rebidding and awarding of the contract to a public agency (Battaglio and Khankarli 2008). Similarly, in Malaysia, extremely

low transparency and lack of any public participation requirements have led to citizens' protests and suspicion of corruption—the management of political risk is viewed as one of the Malaysian PPP program's chief weaknesses, which can make potential investors skeptical (Ward 2005).

Most public concerns arise when public agencies provide insufficient information to the public in a timely manner. Ortiz and Buxbaum (2008) prescribe that greater transparency through public forums and easy access to information about the deal help a potential deal advance in the face of this skepticism A position paper by the Regional Plan Association of New York, New Jersey, and Connecticut and the U.S. Public Interest Group recommends full disclosure of the current and proposed contract standards, and adequate opportunities for public input and legislative review (Ortiz and Buxbaum 2009).

Complicating the need for transparency and public involvement is the bidder's need for a certain level of confidentiality. The private sector's potential to bring cost-saving and service improvement through innovations is one of the frequently cited benefits of PPPs (Cohn 2008; Iseki, Uchida, and Taylor 2009; Ortiz and Buxbaum 2009). However, since innovative approaches can be valuable intellectual property to the bidders, the high risk of exposure of intellectual property may limit involvement of private firms with more innovative approaches.

Proposals to mitigate the transparency-confidentiality dilemma include: 1) permitting temporary confidentiality during the bidding process while fully disclosing selection criteria, 2) appointing independent auditors to determine what should be made public and what should not, 3) appointing auditors to assure the public and politicians that all legal, accounting, business plan, and policy issues are addressed through the procurement process; and 4) creating review panels of stakeholder representatives (Ortiz and Buxbaum 2009). The FHWA's "User Guidebook on Implementing Public-Private Partnerships for Transportation Infrastructure in the United States" recommends that one or more "public champions" be drawn from elected officials to maintain support for PPPs throughout the project development (AECOM Consult 2007). The report considers a public champion a prerequisite to even pursue a PPP deal.

Delays due to public or legislative outcry can be costly once a project is underway, as modifications may be required to satisfy public or political concerns after the contract design is completed (Iseki, Uchida, and Taylor 2009). Public and legislative involvement can also extend the process of proposal evaluation longer than some firms are willing to endure (Fishbein and Babbar 1996; Morallos and Amekudzi 2008; Ortiz and Buxbaum 2009; Page et al. 2008). Thus,

it is certainly recommended to proactively address public concerns as well as political concerns before these concerns become problematic for smooth implementation of PPP projects.

3. Case Studies

In order to use PPPs as a viable transportation financing option, contracts for PPP deals have to be carefully designed to balance the allocation of risks, uncertainties, responsibilities, benefits, and costs between the public and private sectors. In this section, we examine two DBFO cases in North America—British Columbia's Golden Ears Bridge and Texas's SH-130 Segments 5 and 6—in regard to the following factors that are directly related to the five issues identified and discussed as critical in the literature review: 1) responsibility for delays and associated cost overruns during construction, 2) traffic demand and revenue risk, 3) non-compete provisions, 4) facility performance standards, 5) terms for early termination, and 6) preserving public and political acceptance of the project. By doing so, we will show how contractual terms in these cases are designed to improve upon rather simplistic arrangements in the previous PPP concession deals in North America, and form a sort of "middle ground" that is somewhere between traditional public procurement approached and the earlier PPP with contractual terms that proved to be too extreme or simplistic to cause various problems. Although we cannot determine, solely based on the contracts alone, whether or not the drafters of PPP agreements chose the terms as a result of learning from other PPPs' experiences, we can still examine various issues, including risk allocations to what is recommended in the literature. While we cannot specify a single or a few PPP approaches that can be applicable to all future projects, we can still learn some lessons from these two cases to show the right direction of development of new PPP arrangements.

We selected Golden Ears Bridge in Vancouver, British Columbia and SH 130, Segments 5 and 6, in Central Texas because these are two of the most recent PPPs implemented by transportation agencies with a fair amount of experience giving them the ability to make adjustments to improve the performance of their DBFO projects, and because contract information was readily available.[11] Provincial governments in Canada, and state governments

[11] This availability of information is evidence of good public communication in these two cases as we discuss later.

in the U.S. are facing similar gaps between infrastructure needs and funds available and seeking alternative ways to finance large transportation infrastructure projects without raising taxes (Watson 2007). The significant differences are that Canadian agencies do not have access to tax-exempt financing, and that Canada's gas tax revenue goes into the general fund, not a dedicated highway or transportation fund. Table A provides a brief overview of each project, and overall allocation of risk and responsibility for the several issues to be examined in more detail below.

Table A: An Overview of the Two Studied Project with Overall Allocation of risk and Responsibility

	Texas State Highway 130 (SH 130), Segments 5 and 6	**Golden Ears Bridge (Fraser River Crossing)**
Purpose	Intercity connector, bypass, congestion relief	Bridge (replacing ferry)
Location	Central Texas	Greater Vancouver, B.C.
Public Partner	TxDot: Texas Department of Transportation	TransLink: South Coast British Columbia Transportation Authority
Private Partner	SH 130 Concession Company, LLC	Golden Crossing General Partnership
Primary Parent Firms	Cintra (Spain), Zachry American Infrastructure (San Antonio)	Bilfinger Berger BOT Inc. (Germany)
Type of PPP	DBFO	DBFO
Length of Agreement	50 years after Service Commencement Date	32.5 years after Substantial Completion Date
Type of Payment to Private Partner	Toll revenue	Availability (from tolls collected, and ferry subsidy)
Upfront Payment to Public Partner	$25.8 million concession fee ($25 million plus interest accrued between Agreement and NEPA Finality Date)	$50 million license fee
Investors' Target IRR	12%	6%

	Risk Factors and Responsible Party			
	PUBLIC	**PRIVATE**	**PUBLIC**	**PRIVATE**
Environmental approval	✓	✓✓✓	✓	✓✓✓
Construction Cost (and Time) Overrun		✓✓✓✓		✓✓✓✓
Traffic/Revenue		✓✓✓✓	✓✓✓✓	
Competition/Non-Compete Clause	✓	✓✓✓	N/A	N/A
Maintenance/Handback Condition	✓	✓✓✓	✓	✓✓✓
Default	✓✓	✓✓	✓✓	✓✓
Public Acceptance	✓✓✓	✓	✓✓✓	✓

3.1 Golden Ears Bridge, British Columbia

British Columbia's Capital Asset Management Framework, established by the province's Liberal government in 2002 (Cohn 2008), encourages local government entities to consider creative approaches to construction and management of capital assets, including PPPs (Ministry of Finance). Assessment for PPP feasibility by the sponsoring agency is required for all capital projects expected to cost more than CAD 20 million (Watson 2007). One of British Columbia's major transportation infrastructure projects to be financed and operated under a DBFO PPP agreement is the Golden Ears Bridge, crossing the Fraser River approximately 45 kilometers east of the city of Vancouver.

The "Fraser River Crossing," as it was known before being named the Golden Ears Bridge, was a major component in the Three Year Plan and Ten Year Outlook Plan prepared by TransLink, the public agency responsible for regional transportation planning and management in the Greater Vancouver region. It was also consistent with the Greater Vancouver Regional District's Livable Region Strategic Plan (GVTA 2005). High population growth in Greater Vancouver's northeast sector called for better connectivity between communities on the south and north sides of the river, as the north side of the river had much poorer connectivity to the rest of the region than the south side. The new bridge was expected to provide a better access from the north side to major employment centers in Surrey and Langley on the opposite shore than the existing options[12] and eventually lead to development of the north side as an attractive residential location for people working in the south (Steer Davies Gleave 2004). Initially, TransLink considered a Design-Built-Operate business model for the bridge, using non-recourse debt to finance the project. On a further review of that model, however, TransLink concluded that paying the higher cost of non-recourse debt would not be worthwhile in those circumstances because TransLink would be highly unlikely to permit a project to fail and allow the asset to be transferred to another party in the event of default.

On February 24, 2006, TransLink (as Greater Vancouver Transportation Authority, or GVTA) and Golden Crossing General Partnership (GCGP)[13] signed two separate agreements—

[12] Albion Ferry between the Port Mann Bridge 12 km to the west and Mission Bridge 25 km to the east.

[13] GCGP is a Special Purpose Vehicle (SPV) created by several parties with the Canadian division of the German firm Bilfinger Berger as the primary partner (Bilfinger Berger (Canada) Inc 2009).

one on design-build and the other on operating, maintenance and rehabilitation (GVTA and GCGP 2006a, 2006b). The term of the agreement is 32 years following the completion of construction, which is based on TransLink's estimate of the time to recoup the full cost (GVTA 2005). Cost recovery risk is allocated to TransLink, as it opted for an availability payment method rather than permitting the concessionaire to collect tolls. In fact, TransLink entered into a separate DBO contract with a different contractor to design and build tolling facilities and collect toll revenue.

TransLink had numerous objectives for the Golden Ear Bridge that influenced its allocation of risks and responsibilities (GVTA 2005). Several of the most important objectives are: (1) retention of full ability to implement public policies to address issues that may arise in the future, (2) stable toll structures, (3) no public funding except for the transfer of the Albion Ferry subsidy to the project, (4) no opportunity for private "windfall profits," (5) minimal financial exposure to TransLink, and (6) a premium on public safety.

Table B shows how TransLink and GCGP allocated risks and responsibilities related to site conditions (B-1), revenue risk (B-2), non-compete provisions (B-3), maintenance and handback conditions (B-4), and early termination (B-5). Table B also shows the type of risk/ concern, brief descriptions of contract terms associated with the risk/concern, and how risk or concern is allocated between the public and private sectors to be addressed in the literature and in the Golden Ear Bridge contract.

Table B: Allocation of Risks and Responsibilities between TransLink and GCGP in Golden Ears Bridge Case

KEY:
■: private
●: public
□: mostly private
○: mostly public
✖: either/both

Golden Ears Bridge (Fraser River Crossing)

		RISK/CONCERN	RESPONSIBILITY ACCORDING TO LITERATURE	CONTRACT TERMS	RESPONSIBILITY IN CONTRACT
B-1	**Environmental approval, site conditions**	environmental regulation compliance	○	Contractor must establish and implement Environmental Management System	■
		archaeological finds	○	TransLink assumes responsibility for undisclosed archeological finds, Heritage Objects; Contractor is entitled to change event	●
		approvals	○	Contractor obtains all Government Authorizations except Environmental Assessment Certificate	□
		sufficiency of data	✖	TransLink makes no warranties or representations regarding data provided about site conditions, except for geotechnical data	□
				TransLink is responsible for faulty geotechnical data, also assumes responsibility for undisclosed archeological finds	●
	Construction Cost (and Time) Overrun	late opening	■	Contractor pays $20,000 for each day late up to 2 years, Substantial Completion, or termination. If bridge opens more than 5 months late, TransLink makes deductions from its 6th year of capital payments (after ramp-up period): $100,000 for first day late,	■
		materials and labor inflation (2010 Olympics)	■	Contractor takes all risk	■
B-2	**Traffic/Revenue**	misuse of upfront payment*	●	license fee goes toward property acquisition, planning and development, third party commitments	●
		windfall profits &/or exorbitant toll increase*	●	availability payments are fixed (safety bonus is also available, but has an upper limit)	●
				goal of tolls is to pay off bridge (through availability payments, etc.) - no profit expected by TransLink	●
		insufficient demand	■	TransLink assumes risk over lifetime of contract, but makes no payments until facility is open, and makes smaller ramp-up payments over first 5 years of operation	○
B-3	**Competition/Non-Compete Clause**	N/A	■	TransLink takes on all competition risk	●
B-4	**Maintenance/ Handback Condition (condition at end of lease)**	maintenance below TransLink standards	●	availability payments are contingent on bridge/lanes being open; noncompliance points for failure to met maintenance specifications	■
		performance below TransLink standards	●	congestion is not penalized, but closure is; different penalties for closures of different segments at different times of day; up to $250,000 annual bonus for safety initiatives that reduce collisions	□
		facility turned over in poor condition at end of lease	●	facility must be in a condition whereby TransLink would not have to undertake rehab work for a minimum of 5 years; BC provincial standards used for pavement quality, etc.; remaining life required at handback (5+ years) specified for each individual element	■
B-5	**Default, early termination**	change in law	□	either party may notify the other, either party may terminate if no solution can be reached	✖
		Contractor default	○	Contractor may submit a remedy plan, TransLink has option to terminate; TransLink may terminate for risks becoming uninsurable; TransLink pays Contractor Adjusted Highest Qualifiying Bid Price or Adjusted Estimated Fair Value according to Rebidding Process	□
		TransLink default	□	Contractor may terminate if owed a sum over an agreed-upon amount; Contractor may suspend work; TransLink must reimburse any costs incurred as a result of a default; TransLink must pay Base Senior Debt Termination Amount plus demobilization costs; termination amount must put Contractor in same after-tax position as it would have been without taxes	○
		non-default termination	✖	if a court determines that any part of the agreement is illegal, unenforceable, or invalid, and the basic intentions of the parties are "entirely frustrated," either party may terminate	✖
		Force Majeure (natural disaster, war, riots, etc.)	✖	before Substantial Completion Date: either party may give notice to the other, if no solution can be reached eather party may terminate	✖
				after Substantial Completion Date: TransLink may give notice, and may terminate if no solution can be reached	□

* concern of general public, e.g. taxpayers, drivers, residents, etc. - as opposed to concern of public agency

Construction Cost, Time, and Site Condition Risks (B-1)

Vancouver's hosting of the 2010 Winter Olympics made construction costs volatile, introducing a higher risk of construction cost overrun than would normally be the case (GVTA 2005). In this situation, nearly all of the construction cost overrun and delay risks are allocated to GCGP. The value of a contract with a fixed amount of cost on the public side was substantial as stated in the VfM (TransLink 2006). TransLink also insured itself against construction delay risks by including clauses that would require GCGP to pay $20,000 each day if the construction was not complete after the agreed-upon date, and allow TransLink to make deductions from its availability payments to GCGP beginning after a five year ramp-up period (GVTA and GCGP 2006d). GCGP also assumes the risk of making a CAD 50 million up-front license payment to TransLink, while receiving no payments during the construction period and reduced payments over the first five years of service (TransLink 2006).

TransLink also takes relatively little risk regarding environmental approvals and site conditions. While the PPP literature frequently places environmental approval responsibilities with the public sector, in the case of the Golden Ear Bridge, GCGP is responsible for obtaining all governmental authorizations except the Environmental Assessment Certificate, and for developing a system to ensure compliance with all environmental laws during the course of construction (GVTA and GCGP 2006a). TransLink makes no warranty as to the completeness or accuracy of most of its data regarding site condition factors, and places most of the risk of previously unknown utilities, contamination, and other environmental conditions on GCGP (GVTA and GCGP 2006d).[14]

Traffic Demand and Revenue Risk (B-2)

By choosing availability payments,[15] TransLink assumes all the revenue risk itself. In exchange, TransLink maintains full control over public policy and toll structures, avoids any possibility of private windfall profits, and eliminates the need for non-compete provisions.

[14] The two primary exceptions to this are that TransLink is responsible for inaccuracies in its geotechnical data, and also for any undisclosed Heritage Objects (cultural and archeological finds) (GVTA and GCGP 2006d). Responsibility for Heritage Objects was put to the test when a major archeological find pertaining to Katzie First Nation's history was discovered in the course of construction, requiring ten months of excavation before that portion of the facility could continue (The Vancouver Province 2008).

[15] The availability payment of CAD $316,198 (indexed to inflation, with a base date in October 2005) was made monthly after the fifth year of construction (GVTA and GCGP 2006c); Payments were lower over the first five years to allow for use of the bridge to build up (TransLink 2006).

Although taking full responsibility for revenue risk jeopardizes one important priority for TransLink—minimizing its risk of financial exposure—some innovative features of the financing structure mitigate the risks to both TransLink and investors. The Golden Ears Bridge (GEB) is the first PPP in North America to have all of its senior debt insured, which has given the project AAA rating (it would have had BBB rating otherwise). While the insurance protects lenders, the AAA rating also lowered interest rates and substantially reduced the costs to TransLink (TransLink 2006).

A revenue-related risk that the general public (e.g. taxpayers and facility users) may have to bear is the misuse of up-front payments. In the case of the GEB, because TransLink retains responsibility for acquiring right-of-way for the facility and paying for several third-party commitments, there is little likelihood that that TransLink would misuse the upfront payment of CAD 50 million made by GCGP. This upfront payment was simply applied to the total cost of CAD 216 million that TransLink estimated as its own financial obligations for the project (TransLink 2006). It is clear that the goal of tolling is to pay off the project, not to make a profit, so there is little risk that toll revenue will be applied to non-transportation or non-local projects either.

Maintenance and Handback Conditions (B-4)

Fixed availability payments to GCGP could raise the possibility of opportunistic behavior where maintenance and safety are concerned. In the GEB case, GCGP is required to keep lanes open and maintain a certain level of conditions of the roadways in order to receive availability payments. Payment deduction formulae for numerous non-availability and non-conforming scenarios[16] are specified (GVTA and GCGP 2006c). As an incentive to make improvements for safety, GCGP is allowed to collect up to CAD 250,000 a year from TransLink, in addition to its availability payments, for safety initiatives that reduce the likelihood of collisions, as certified by an independent safety specialist (GVTA and GCGP 2006c).

In addition to the requirement to maintain the good condition of the facility, specific provisions for "handback" (i.e., restoring the facility to public responsibility) prevent GCGP from leaving TransLink with a facility in a condition that has deteriorated over the final years of the concession. The Handback Standards technical document requires that the facility be in such

[16] Different deduction rates for closures on different days of the week and different times are specified to reflect expected usage.

a condition that TransLink will not need to perform any rehabilitation work for at least five years. Moreover, in order to ensure that TransLink is not overburdened after five years, each specific element of the facility is given an expected remaining lifespan of between five and ten years (GVTA and Group 2005).

Early Termination (B-5)

Conditions for early termination specified in the contract are: (1) change in law, (2) contractor default, (3) TransLink default, (4) non-default termination, and (5) *force majeure*. Control of the facility, or as much of it as has been built, reverts to TransLink under any termination conditions (GVTA and GCGP 2006d).

Although the risk of future changes in law undermining a PPP is usually ascribed to the private partner in the literature, either party may notify the other if a change in law has jeopardized the project in their view, in the case of the GEB. If no agreement can be reached, either party may elect to terminate (GVTA and GCGP 2006d).

Should GCGP be in default for any reason, including the event of risks becoming uninsurable, it may submit a remedy plan, but TransLink retains the option to terminate the agreement (GVTA and GCGP 2006d). TransLink is under no obligation to repay the equity invested in the case of contractor default, as senior lenders are protected by insurance (TransLink 2006). GCGP is at least compensated for part of its initial investment[17] If a rebidding process is chosen, GCGP may be obligated to pay TransLink an additional amount, depending on the amount of the bid accepted by TransLink (GVTA and GCGP 2006d).

In the event of a default by TransLink, GCGP may terminate after TransLink's past-due-amount exceeds an agreed-upon level. TransLink must reimburse any additional costs incurred as a result of the default, pay the Base Senior Debt Termination Amount,[18] and ensure that payments to GCGP are sufficient to put it in the same after-tax position as it would have been without taxes (GVTA and GCGP 2006d).

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[17] This compensation includes an Adjusted Highest Qualifying Bid Price after conducting a rebidding process, and Adjusted Estimated Fair Value. The highest qualifying bid is adjusted by amounts payments made by TransLink to the contractor, losses to TransLink, and other money outstanding to TransLink, and by insurance proceeds and credit balances owed to the contractor. "Estimated Fair Value" is the amount a third party would pay TransLink for the asset, according to agreed-upon valuation processes. That amount is adjusted similarly to Adjusted Highest Qualifying Bid.

[18] All senior debt owed at the termination date, with qualifications delineated in the agreement's schedule of definitions.

Conditions for non-default terminations require that a court determine that some part of the agreement is illegal, unenforceable, or invalid, or that the basic intentions of the parties are frustrated. Under those circumstances, either party may elect to terminate (GVTA and GCGP 2006d).

Similarly to changes in law, either party may initiate termination if a force majeure event occurs prior to the specified completion date and no solution can be agreed upon. After the specified completion date, however, only TransLink can give notice that it requires a solution or termination (GVTA and GCGP 2006d).

Public and Political Acceptance

The GEB is such a high-profile PPP that TransLink was well aware that positive public perception was important both for the success of the GEB and the future of PPPs in British Columbia (Cummings 2004; TransLink 2006). It was the most private financing ever raised for a greenfield PPP in Canada's history (TransLink 2006), and occurred after two earlier British Columbian PPPs, including one in Vancouver, had already raised controversy over lack of transparency and possibly misleading project valuations in support of PPP models over other alternatives (Cohn 2008). British Columbia worked to overcome skepticism of PPPs by creating a framework to make capital procurement procedures clearer and more transparent.[19] British Columbia also established Partnerships BC, a public agency that performs three primary roles: 1) advocating for PPPs, 2) collecting data from current and existing PPPs, and 3) advising public agencies in the course of developing PPPs. The goals of the last role include forming stronger agreements between the public and private sectors, and reducing the transaction costs of developing PPP agreements as British Columbia's PPP experience builds (Cohn 2008).

As a result of careful planning and public outreach, 40,000 people showed up and clogged the bridge on its pedestrian-only opening day in June 2009—10,000 more than TransLink expected—and this suggest that the project has been reasonably well-received locally (Tebrake 2009). As the first toll bridge in British Columbia since elimination of tolls in the 1960s, the first to use electronic tolling, and the first major bridge PPP, the Golden Ear Bridge continues to be closely watched for further evaluation (Golden Ears Bridge opens an era that bears watching 2009).

[19] The Capital Asset Management Framework, introduced in Spring 2002 (Cohn 2008).

3.2 Texas State Highway 130, Segments 5 and 6

Texas SH 130 is a four lane tollway roughly paralleling Interstate 35, anticipated to be 89 miles long, bypassing the heavily congested Austin area, that has been a part of the area's long-range transportation plans before the advent of PPPs in Texas (TxDOT 2008). The first four segments are 49 miles long, and were constructed as a design-build project. Texas's Exclusive Development Agreement (EDA) legislation first enabled PPPs and other new procurement strategies; the legislation was subsequently amended to rename EDAs Comprehensive Development Agreements (CDA) (Persad, Walton, and Wilke 2005). Segments 5 and 6 are being developed under a DBFO contract to extend the tollway for another 40 miles southward to connect with Interstate 10 (SH 130 Concession Company 2009).

While SH 130 has been in transportation plans for some time, it was also a candidate until recently to be part of Trans-Texas Corridor 35 (TTC-35). Proposed by Governor Rick Perry and TxDOT in 2002, the original TTC plan envisioned an eventual 4,000 lane miles of multi-modal corridors, with 1,200 feet of right-of-way to accommodate six lanes for passenger vehicles, four lanes for freight trucking, freight rail, heavy passenger rail, and light passenger rail, as well as a central corridor for utilities (TxDOT 2009a). Through a competitive bidding process, the CDA to conduct planning for TTC-35 was awarded to a partnership comprised of the Spanish company Cintra, and San Antonio firm Zachry (Cintra-Zachry). Part of the CDA gave Cintra-Zachry the option to select a number of near-term projects that could become part of TTC-35 to "self perform" (TxDOT 2005, 2006). Cintra-Zachry selected SH 130 as the first project, created a special purpose vehicle named SH 130 Concession Company, and signed a project contract after conducting a "Price Reasonableness" procedure with TxDOT in lieu of a competitive bid (TxDOT 2009c; TxDOT and Cintra Zachry LP 2005).[20] SH 130 Concession Company paid TxDOT a one-time concession fee of USD 25 million (plus interest accrued between signing the agreement and actually paying the fee on NEPA finality), and will collect tolls for 50 years following the facility opening, sharing toll revenue with TxDOT (TxDOT and SH 130 Concession Company 2007a).

Table C shows how TxDOT and SH 130 Concession Company allocated risks and responsibilities related to site conditions (C-1), revenue risk (C-2), non-compete provisions (C-

[20] The Price Reasonableness procedure is required for self-performed CDA projects. It entails TxDOT and the developer estimating project costs independently of each other, and then reviewing each other's estimates and the assumptions on which they are based until all differences between the estimates and assumptions are settled.

3), maintenance and handback conditions (C-4), and early termination (C-5). Table C shows the same contents for the Texas SH 130 segments 5 and 6 as in Table B.

Construction Cost, Time, and Site Condition Risks (C-1)

SH 130 Concession Company bears the brunt of construction cost and delay risk. Not only does the company fail to earn any toll revenue until the facility is operating, it can be penalized USD 25,000 a day for each day past the designated Service Commencement Date (TxDOT and SH 130 Concession Company 2007d). Similar to the Golden Ear Bridge case, TxDOT does not guarantee the completeness of its data regarding site conditions. Under this condition, SH 130 Concession Company bears most responsibility for environmental mitigation, including all measures necessary to obtain National Environmental Policy Act (NEPA) approval, although TxDOT must make the actual NEPA application (TxDOT and SH 130 Concession Company 2007d).

Hazardous material removal is handled in a unique manner in the contract provisions. The developer agrees to pay for up to USD 6.6 million for hazardous waste removal found along the facility right-of-way. Costs above USD 6.6 million and below USD 11.5 million are shared equally between both partners, and TxDOT is entirely responsible for any costs exceeding USD 11.5 million. Should the costs of removal be less than USD 6.6 million in the end, however, TxDOT is entitled to 50 percent of the difference between the actual costs and 6.6 million, making hazardous waste removal a potential source of revenue sharing (TxDOT and SH 130 Concession Company 2007b, 2007g).

Traffic Demand and Revenue Risk (C-2)

Toll revenue risk is borne entirely by SH 130 Concession Company, in return for which, the company justifies seeking an aggressive 12 percent internal rate of return (TxDOT and SH 130 Concession Company 2007e). Their lease term of 50 years is also somewhat longer than the typical PPP term of 30-35 years, allowing more time to reach the desired rate of return (Ortiz and Buxbaum 2007).

Table C: Allocation of Risks and Responsibilities between TxDOT and SH 130 Concession Company

KEY:
■: private
●: public
□: mostly private
○: mostly public
✖: either/both

Texas State Highway 130 (SH 130), Segments 5 and 6

		RISK/CONCERN	RESPONSIBILITY ACCORDING TO LITERATURE	CONTRACT TERMS	RESPONSIBILITY IN CONTRACT
C-1	**Environmental approval, site conditions**	environmental regulation compliance	○	Developer is responsible for performing all mitigation requirements, including NEPA and Section 404	■
		wetlands impact	○	TxDOT acquires required mitigation property up to 15.5 acres, Developer is responsible for additional requirements	○
		approvals	○	TxDOT responsible for NEPA, Section 404, and Section 401; Developer responsible for all other Government Approvals	□
		sufficiency of data	✖	TxDOT makes no warranties or representations regarding data provided about site conditions, Developer assumes risk for unexpected conditions	□
				TxDOT shares Hazardous Materials costs greater than $6.6 million and pays 100% for costs above $11.5 million	✖
	Construction Cost (and Time) Overrun	late opening	■	$25,000/day penalty for each day past Service Commencement Deadline	■
C-2	**Traffic/Revenue**	misuse of upfront payment*	●	used for projects in the Austin-San Antonio region	●
		misuse of revenue sharing payments*	●	used for other regional mobility improvements	●
		windfall profits &/or exorbitant toll increase*	●	toll revenue sharing, refinancing gain sharing	■
				maximum toll increases indexed to Gross State Product per capita	■
				facility expansions required if average speed falls	■
		insufficient demand	■	assumed by concessionaire, seeking higher IRR in return for higher risk	■
				50 year lease from end of construction period: longer time to achieve IRR	□
C-3	**Competition/Non-Compete Clause**	inability of TxDOT to expand or improve in surrounding area	●	all projects already specified in transportation plans are excluded from "competing facilities;" all improvements to I-35 excluded from "competing facilities"	■
				no improvements are prohibited anywhere, but some may require compensation for lost toll revenue	●
		loss of toll revenue for concessionaire	■	entitled to compensation for lost revenue for non-exempt competing facilities; terms for arriving at amount of lost revenue	✖
C-4	**Maintenance/ Handback Condition (condition at end of lease)**	maintenance below TxDOT standards	●	Facility Management Plan required of concessionaire from beginning; Quality Assurance Plan developed by Independent Engineer; oversight by Independent Engineer; fees for non-compliance points	■
		performance beneath TxDOT standards	●	capacity improvements required if through-put and average speeds decline	■
		facility turned over in poor condition at end of lease	●	Developer begins contributing to Handback Reserve Fund 6 years before end of lease; Residual Life standards specified in advance	■
C-5	**Default, early termination**	failure to satisfy financing obligations	■	$100,000,000 liquidated damages ($100,000,000 if Developer elects to extend deadline), minus value of ROW parcels paid for by Developer	■
		uncured noncompliance points	■	fees set for noncompliance points; accumulated points trigger Remedial Plan; failure to submit or comply with Remedial Plan may trigger Termination Event	■
		TxDOT default	●	Developer right to terminate, or Compensation Event	○
		TxDOT termination for convenience	■	TxDOT pays Fair Market Value (determined by 3rd party appraiser, procedure specified in Exhibit 22) or Senior Debt Termination Amount, plus costs to demobilize	○
		Force Majeure (natural disaster, war, riots, etc.)	✖	either party can give notice of election to terminate, but other party can elect whether or not to accept termination; if Developer does not accept notice to terminate, TxDOT has no obligation to pay for restoration, repairs, lost revenues, etc.	□
				if TxDOT does not accept notice to terminate, TxDOT must reimburse Developer for increase in costs for repair, restoration, delay, lost revenues, etc.	○

***** concern of general public, e.g. taxpayers, drivers, residents, etc. - as opposed to concern of public agency

Risks related to the contractor's windfall profits and exorbitant toll increases are mitigated by revenue sharing and maximum toll increase standards. The maximum allowable toll increases are indexed to Texas's Gross State Product per capita, and is recalculated annually (TxDOT and SH 130 Concession Company 2007i). Revenue sharing for TxDOT begins with the first dollar SH 130 Concession Company earns: three "bands" of annual revenue are established, and TxDOT earns 4.65 percent of all revenue within the first band, 9.30 percent of revenue within the second band, and 50 percent of revenue in the third band.[21] TxDOT also claims the right to share in any windfalls resulting from refinancing (TxDOT and SH 130 Concession Company 2007b). According to TxDOT's website, its share of the SH 130 revenue will go toward regional mobility improvements, not to non-transportations-related, or non-local uses (TxDOT 2009b).

Non-Compete Clauses (C-3)

Since avoiding restrictive non-compete clauses was a primary concern of TxDOT, it commissioned the University of Texas at Austin's Center for Transportation Research to conduct a study on potential alternatives, as well as successes and failures of other PPPs (Persad, Walton, and Wilke 2005). TxDOT could not avoid a non-compete agreement altogether, but its commissioned study and past experience guided the development of the final agreement with SH 130 Concession Company.

TxDOT representative Phillip Russell testified before the state's *Legislative Study Committee on Private Participation in Toll Projects* that California's experience on SR-91 had been one significant influence on its non-compete decisions. He also testified that a Competing Facilities Clause in a bond indenture for the Central Texas Turnpike Project taught them valuable lessons that led to several improvements in the SH 130 5 and 6 contract. Namely, the contract is an improvement in that there are no restrictions on TxDOT's right to build competing facilities. In order to be compensated, SH 130 Concession Company bears the burden to prove that they have sustained a loss of revenue (2008). Another improvement is that TxDOT is not, in the CDA for SH 130, compelled to raise tolls in order to meet its obligations, as it typically would be under a bond indenture, as the developer bears the revenue risk (Russell 2008).

[21] The floor of the first band is set at zero, and there is no ceiling on the third band. Furthermore, if TxDOT should choose to permit SH 130 to have a higher speed limit than neighboring I-35, TxDOT has the choice of either higher concession payments, or higher revenue sharing percentages for the first two bands (TxDOT and SH 130 Concession Company 2007b).

The provisions regarding competing facilities that require compensation exclude all improvements to the existing parallel free road, I-35, as well as all projects already specified in the state's and region's transportation and mobility plans. Any other improvements or new facilities that cause toll revenue loss on SH 130 are subject to compensation in the amount of the loss, as agreed to by both parties (TxDOT and SH 130 Concession Company 2007c).

Maintenance and Handback Conditions (C-4)

To ensure that the developer and TxDOT agree upon maintenance and performance expectations, the developer is required to create a Facility Management Plan to be reviewed by both TxDOT and an independent engineer hired by both parties. The independent engineer selected is an active party in decision-making and oversight throughout the lifetime of the CDA (TxDOT and SH 130 Concession Company 2007d), and also develops a quality assurance plan of its own, as a standard to evaluate the project's quality. Various fees are assessed for different sorts of non-compliance with TxDOT's standards.

As one of TxDOT's performance standards, SH 130 Concession Company is responsible for monitoring traffic throughput, and is required to increase roadway capacity to maintain specified minimum average speeds if the level of service falls below the specified standards due to traffic congestion. If more than 5 percent of hourly vehicle flows exceed 1,200 passenger cars per lane per hour for three months in a row, the company is required to begin monitoring speed in addition to traffic throughput. Three months with 5 percent of hourly speeds falling below 65 miles per hour trigger the requirement that the company develop a capacity improvement plan, which must be implemented if speeds further decline such that 10 percent of hourly average speeds are below 60 miles per hour for three consecutive months.

Like the Golden Ears Bridge case, to ensure the return of the facility to public control in good condition, SH 130 Concession Company is required to meet Residual Life standards, and also to create a "Handback Reserve Fund" in which the company deposits the amount of funds sufficient to meet residual life standards, plus a 10 percent contingency fee (TxDOT and SH 130 Concession Company 2007f).

Early Termination (C-5)

Texas law required that TxDOT have the right to terminate a contract for convenience while the SH 130 CDA was being negotiated. Buyback formulas in the Transportation Code are

based on the lesser of the base case financial model revenue forecast, or current market value of the project (Russell 2008); a third-party appraiser determines the fair market value amount (TxDOT and SH 130 Concession Company 2007h).

Should SH 130 Concession Company fail to meet its financing obligations, it is required to pay USD 100 million liquidated damages, less the amount of right-of-way parcels it has already paid for (since the developer is responsible for paying for right-of way acquisition) (TxDOT and SH 130 Concession Company 2007h). It the event of a *force majeure* occurrence, either party may notify the other if its intention to terminate the agreement, but it is the right of the other party to accept or reject termination. If it is the developer's choice not to accept termination, TxDOT has no obligation to pay for any restoration or repairs required of the company, or reimburse for any lost revenue. Conversely, if TxDOT does not accept the developer's notice of termination, TxDOT must reimburse the developer for all those costs (TxDOT and SH 130 Concession Company 2007h).

Public and Public Acceptance

In Texas, public perceptions of PPPs in general and of the TTC-35 in particular are both poor at present. The Texas legislature had become skeptical enough of CDAs to pass a moratorium on them, and public and legislative protest had already resulted in the revocation of an accepted bid to develop SH 121 and the re-awarding of the contract to a public agency.

TTC-35 was controversial due to its significant social and environmental impacts on the land adjacent to the proposed corridor, and the level of citizen protest of the plan eventually led to TxDOT's recommendation of the "No Action Alternative" in the NEPA environmental study of TTC-35 on October 7, 2009. Amadeo Saenz, TxDOT's executive director, announced, "Citizens all along the I-35 corridor did their civic duty by participating in public meetings and hearings, and by voicing their concerns. Now it's our duty to respond to those concerns – by recommending the No Action Alternative for TTC-35" (TxDOT 2009d).

SH 130 Segments 5 and 6 are unaffected by this decision, because SH 130 is independent from TTC-35 and its contract was awarded to Cintra Zachry's SH 130 Concession Company as one of their "self performance" options under the CDA. Despite the public championing of Governor Perry, it remains to be seen whether perceptions of PPPs and toll roads remains grim in Texas, or improves in the future.

4. Conclusions

Finding a successful model for public private partnerships is not an easy task because PPPs can entail many different levels of private sector involvement in various stages and functions in transportation infrastructure and service provision. Even looking exclusively at DBFO-type PPPs, their planning, implementation, and outcomes are affected by many factors, including environmental conditions, financial market, future regional economy and traffic demand, and public and political acceptance. However, the literature and case studies examined in this paper showed that there are certain directions toward better applications of PPPs, while there may not be one converging point.

In the two case studies, we found that both DBFO PPP contracts reflected a level of accumulated experience and knowledge on PPPs, and accordingly elaborated contractual terms to deal with various uncertainties, and better allocated risks and responsibilities between the public and private sectors.[22] While neither model can be one that every other agency can follow, these two cases combined showed right directions toward what we call a middle-ground approach to address various critical issues and carry out PPPs in a successful manner.

One note for caution is that what constitutes the middle ground depends to some extent on a transportation agency's pre-established priorities and needs from the facility, and that this was certainly the cases examined in this paper. Because a policy to maintain complete control over the bridge was paramount for TransLink in British Columbia, opting for the public sector to assume the bulk of demand risk was an appropriate exchange, and was also supported by cautious financing arrangements. Although limiting its own financial exposure was a concern of TransLink's, the agency found that the risk of a failed project or losing control of the asset was of even greater concern, and that assuming a greater financial risk by using the DBFO model was preferable to a DBO financed by non-recourse debt. Texas, on the other hand, opted for a graduated revenue sharing arrangement with its concessionaire, which retained all the revenue risk. In exchange for that risk, the concessionaire based its revenue sharing levels on its expected rate of return of 12 percent. This rate of return needs is determined within the context

[22] British Columbia's establishment of Partnerships BC as its PPP-data clearinghouse has the potential to identify successful strategies that are applicable to other similar PPPs (Farrugia, Reynolds, and Orr 2008). Such successful strategies not only improve the service of public interest and private value in the contracts, but benefit both sectors by reducing the transaction costs of creating good requests for proposals, creating proposals, conducting bidding, and negotiating final contract terms.

of the entire projects and the partners' interests in them, balancing risks with rewards overall.[23] In this sense, one takeaway for public agencies is that they should have a comprehensive list of priorities pertinent to the project facility, and carefully examine and determine the mechanism to handle associated responsibilities and risks.

As California's SR-91 case became a very good lesson to learn about non-compete clause in PPP concession contract, public agencies have become more careful to prepare contract terms for this factor. By assuming demand risk, TransLink obviated the need for a non-compete clause, while Texas self-consciously designed its non-compete terms based on lessons from other projects, reflecting in particular a lesson learned from a previous project in Texas. In both cases, risks asscociated with environmental approval and construction risks were handled more by the contractors than by the public agencies. As the level of uncertainty related to future traffic demand is always substantial, it is recommended that public agencies include considerations of availablity payments and toll revenue sharing, instead of transferring a right to collect tolls solely to the private sector. It is also important for public agencies to make a clear judgement which party has more ability to deal with each of risks associated with environmental approval and construction.

Opportunistic behaviors predicted in theories on both public and private sides need to be carefully prevented through contracts, detailed business and implementation plans reviewed by public agency and/or by an independent their party. Maintenance standards, penalties for not meeting standards, actions to be taken, and handback funds can be incorporated to minimize the negative effects of opportunistic behaviors in defaults as well as unexpected incidents, such as *force majeur*. The PPP deals in Vancouver, British Columbia, and Texas showed ample procedures in place for addressing these issues.

PPP financing approaches remain controversial in the eyes of the public and elected officials due to the high visibility of private firms in large public works projects. While governments and transportation agencies around the globe continue to use PPPs for various aspects of transportation projects with the fundamental principle of PPPs—distributing risks, responsibilities, costs, benefits, and rewards between the public and private sectors—there will always be a certain level of skepticism, objection, and protests regarding the idea that private

[23] This rate of return is similar to that of the Indiana Toll Road in in the base case scenario (Johnson, Luby, and Kurbanov 2007), but the windfall profits are less due to the revenue sharing.

firms make profits *at the expense of public benefits*. While the large social impacts expected from TxDOT's ambitious Trans-Texas Corridor project, combined with lack of good public relations, caused the termination of the Trans-Texas Corridor,[24] TransLink's careful public outreach certainly provides a good example to increase the level of understanding of PPPs among the public. Although British Columbia's Liberal Government provoked criticism with two of its earliest PPPs, it appears to have moderated its program by introducing more transparency and issuing best practices, standards, and guidelines for local governments to follow. Public agencies considering PPPs should address issues of public and political acceptance from the earliest stages of planning, as they could potentially overturn and kill the project in any time with a long project period. The issue of public and political acceptance will remain critical for successful implementation of PPPs even as other more technical issues begin to be resolved, and public agencies as well as transportation scholars continue to gain experience and knowledge on PPPs.

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[24] Even though the Trans-Texas Corridor concept ended badly, before it died altogether, TxDOT was beginning to respond to public criticisms and reformulate the multi-modal vision to be more flexible and sensitive to local wants and needs (TxDOT 2009a).

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