Public Private Partnerships in California

Final Report #2 and #3

Preliminary Analysis of:
1) Analytical tools
2) The California Political Environment and Challenges to P3
3) Structuring P3 Projects
4) Criteria for evaluating potential P3 projects
6) Market potential for private capital in California

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Abstract

In this report we will discuss five of the six topics from the Phase I Research Road Map: 1) Analytical tools, 2) The California Political Environment and Challenges to P3, 3) Structuring P3 Projects, 4) Criteria for evaluating potential P3 projects, and 6) Market potential for private capital in California. The remaining topic in the road map was covered in an earlier report. Per our project proposal, the following is based solely on available literature. Research on these topics will be conducted in Phase II of the project. This final, combined version of reports #2 and #3 completes our deliverables for Phase I.

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Introduction

This report is broken into six sections. In the first we talk about the analytical tools used to look at P3s. In the second section we look at the political environment for P3s in California. We cover the structure of P3s in the third section. In the fourth section we talk about the criteria for evaluating potential P3 projects. In the fifth section we discuss the potential for private capital investment in California's transportation project. The final section contains a brief conclusion.

1) Analytical tools

Well-defined, widely-applicable analytical tools are required to assess the appropriateness of a given P3 project proposal and to effectively compare the merits of various procurement methods. These analytical tools range from the forecasts used to identify the need for a given project to the many fiscal analysis tools necessary to fully understand the comparative costs and benefits of alternative procurement and provision methods. In this first section of the report, we highlight the following analytical tools integral to the evaluation of P3s:

- Demand Analysis and Modeling,
- Life Cycle Cost Calculation and Forecasting,
- Construction Cost Variability and Uncertainty, and
- Fiscal Analysis and Modeling.

a) Demand Analysis and Modeling

Projects considered for P3s emerge from a lengthy transportation planning process (see e) The capital planning and funding process on page 18). Very briefly, regional forecasts of population and employment form the base of a complex modeling process that generates estimates of future travel demand. These estimates are used to identify transportation system capacity problems, and a list of projects to address these capacity problems is generated. In California's metropolitan areas, any project to be considered as a potential P3 would be part of this regional planning process.

Despite the complexity and extensive data requirements of current state-of-practice demand forecasting, the models have a number of problems. Because demand forecasting is critical for P3 analysis, we provide a short discussion of modeling problems. First, long-term forecasting (transportation forecasting typically uses a 20-year time horizon) is inherently difficult, because the future is inherently uncertain. At the regional level, population and employment forecasts depend on expectations of in and out migration, economic growth rates, etc. In order to predict capacity problems on the transportation system, however, we need highly localized estimates of population and employment. The greater the geographic detail, the more uncertain these estimates become, because the distribution of activities within a metropolitan area depends on many factors, e.g., decisions of individual employers, developers, residents, and cities. Thus, while facility demand estimates are typically provided as point estimates, there is a great deal of uncertainty associated with them.

A second and related problem is that state-of-practice models do not have an adequate behavioral base. That is, forecasts are generated based on generally-observed relationships (for example, the relationship between the number of trips taken per day and household size), but not on the causal factors that generate these relationships. When these simple relationships are extrapolated to future conditions, they are often applied to conditions that are quite different from those used to generate the relationship in the first place.

Third, forecasting models are "calibrated" by adjusting model parameters to force the model to replicate the base data as closely as possible. That is, the trip demand generated from employment and household characteristics is matched to observed traffic volumes on the transportation network. This calibration process introduces idiosyncratic factors (e.g. unknown differences in the specified model parameters across space and time) into the future forecast, further reducing the reliability of the estimates.

Fourth, the intent of these models is to show where capacity problems are anticipated, *given an assumed level and distribution of population and employment growth, and given many simplifying assumptions on how travel demand is generated.* A particular problem for potential P3 projects is that these forecasts do not consider tolls or other changes in travel costs. That is, future forecasts are based on today's fuel prices, parking policies, etc. In the case of P3 projects, demand is critical, either to establish appropriate estimates of facility use to set shadow tolls or other payments, or to estimate toll revenue potential. If fuel prices, household travel patterns, or any other factor that affects travel behavior were to change significantly, forecast accuracy would be affected. For example, reductions in household size (resulting from an increased divorce rate and higher per capita income) is one explanation for more rapid than anticipated growth of travel over the past two decades.

Fifth, state of practice models differ in the extent to which "feedback effects" are considered, meaning how travel would change when transportation system conditions change. For example, forecasting models typically predict increased congestion as a result of population and employment growth outstripping transport supply. However, we observe that travelers respond to congestion by avoiding it when possible, e.g., choosing different routes, travel schedules, or destinations. In the long run, congestion may affect the distribution of population and employment, as some households and firms relocate to less-congested places. These land use effects are almost never considered in state of practice models, the Sacramento region's model being the exception in California (SACOG 2002, p. 1).

Many models do not consider changes in traveler behavior. Travelers may respond to tolls in several ways. They may choose a different travel time, route, mode, or destination – or they may forego the trip entirely. A conventional travel demand forecasting model does not consider tolls, and therefore cannot capture these behavioral responses. Failure to consider tolling effects will cause demand to be over-estimated. Another feedback effect of interest in the case of P3 consideration is travel schedule shifts – from the peak hour to earlier or later departure, for example.

Forecast models generate a "peak period" result by assuming a given fraction of total demand will take place during the peak period. This does not allow for time schedule shifting. The lack of consideration of feedback effects also affects public transit investments. Demand is typically overestimated, because other possible responses to congestion (e.g. change in destination choice or travel schedule) are not considered.

Transportation forecasting models are the subject of extensive research, and with constantly increasing efficiency in large-scale computation, increasingly complex and detailed models are being developed (TRB 2006, p. v; Johnston 2004, p. 118). Several state-of-the-art models address many of the problems described above. However, these models are very data intensive and costly to develop, and the larger the metro area, the more difficult it is to apply such models.

Given the problems with existing regional forecasting models, it is clear that potential P3 projects merit additional analysis. Available tools differ for tolled vs. un-tolled projects. In the case of projects without user fees, a corridor level demand analysis that considers multiple time frames (say five-year intervals through the anticipated life of the project), allows for feedback effects, and uses alternate assumptions on key parameters may be sufficient. The case of projects with user fees is more difficult, as the model must explicitly incorporate trip pricing and its impacts. Better analytical methods for P3 demand analysis will be addressed in Phase II of this research.

b) Life Cycle Cost and Forecasting

In this section, we discuss the process of aggregating and estimating project Life Cycle Costs (LCC). While our literature review provided information on the prevalence and state of practice of life cycle costing for individual building construction projects, it did not yield any reports that provided a detailed description of LCC for P3s. Caltrans indicated that life cycle cost estimation is incorporated into the larger cost / benefit analysis for prospective California highway and transit improvement projects (2007). But, we do not know whether life cycle costing is an uncommon practice in P3 projects, or whether such costing details are not published, or whether our search was not sufficiently extensive to find such reports.

LCC consist of all inputs required to design, build, and maintain a new infrastructure asset over its expected lifetime. For an already-existing infrastructure asset, LCC include predominantly O&M-related costs. Life cycle cost calculation for a given project (or set of projects) also facilitates comparison between project alternatives, as it "is the most straightforward and easy-to-interpret measure of economic evaluation" of long-term project costs (Fuller 2010). P3s increase the transparency of LCC forecasts as request for proposals, bids, contracts, annual reports, etc. are all (or should be) public documents (Yescombe 2007, p. 28; USGAO 2008a, pp. 22-23; also see Table 2: Vining and Boardman's Eight Rules for Governments Entering in to P3s on page 39).

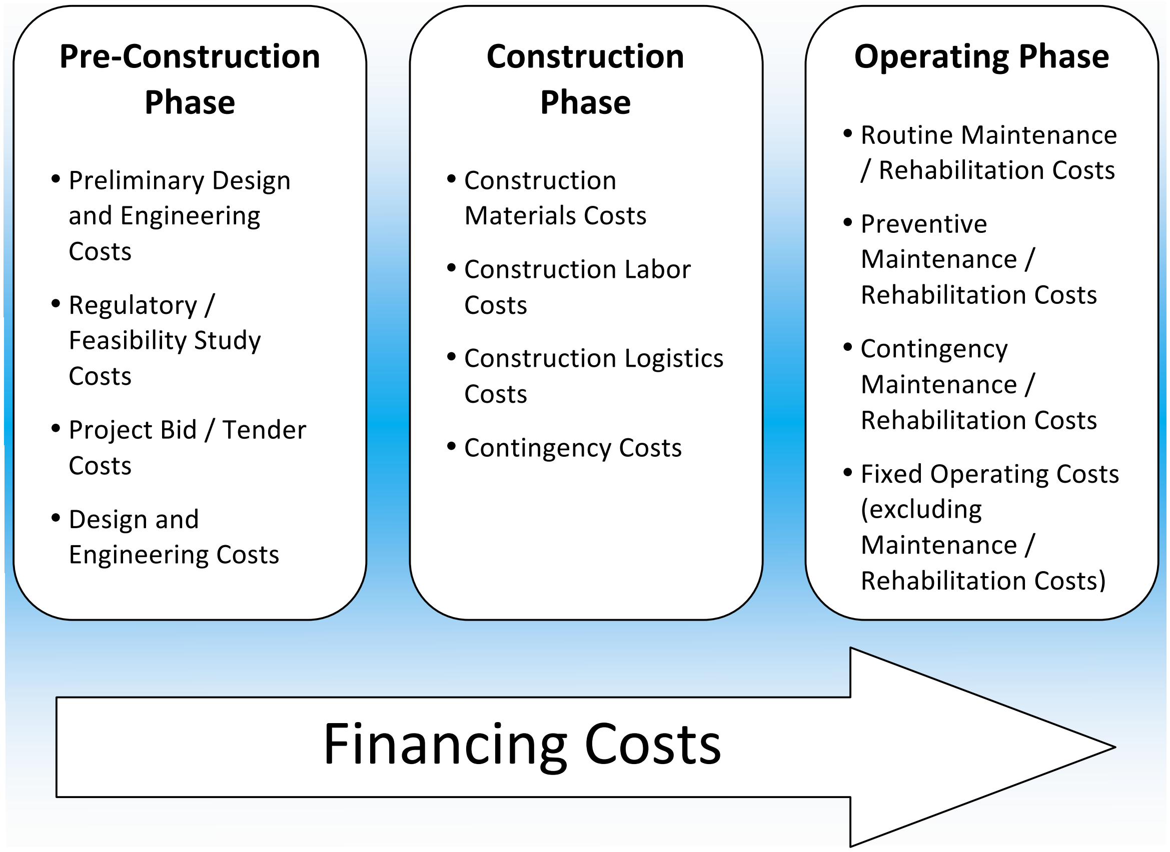
Calculating the many individual costs that comprise total LCC is a complex process that requires thorough project review. Those costs consist of the following,

- planning / development costs,
- initial / construction costs,
- fuel costs,
- operation, maintenance, and repair costs,
- replacement costs,
- residual costs,
- finance costs, and
- non-monetary costs.

Furthermore, a "consideration for the time value of money" must be factored into LCC assessments as well (Barringer 2003, p. 2). The private sector annualizes project LCC in NPV to account for not only the time value of money, but also for depreciation, taxes, and missed opportunities for the incorporation of various financing mechanisms like tax-increment financing, for example (USGAO 2008a, p. 24). The public sector, however, does not require inclusion of depreciation or taxes in LCC calculations – though it is obligated to consider the time value of money (Barringer 2003, p. 2).

Barringer (2003) uses a framework of acquisition costs and sustaining costs to identify LCC. Figure 1 on page 7 shows our adaptation of Barringer's LCC diagram – along with similar partial frameworks employed by both the Minnesota Department of Transportation and the Federal Highway Administration, both of which have P3 experience – to identify LCC specifically for transportation capital projects. Individual cost components are organized chronologically, with the earliest costs incurred occurring on the left-hand portion of the diagram, and later costs occurring towards the right. Figure 1 is not intended to be an exhaustive list of all possible LCC elements so much as merely the major cost elements generally included in calculating LCC, as per the LCC estimation frameworks of the aforementioned sources. Additionally, it is important to note the separation and distinction of financing costs from the remainder of other project costs. Project financing costs are an ongoing, long-term expense that will be initiated at the outset of the project and continue throughout its lifespan, oftentimes fluctuating with macroeconomic conditions. While the exact nature of the costs incurred by a project are generally bound by the life-cycle stage of the project, financing costs are an omnipresent cost center for transportation capital projects. The exact nature and extent of financing costs vary immensely from project to project and are inherently contingent upon the financing vehicle chosen.

Figure 1: LCC Cost Estimation Tree for Transportation Capital Projects



Adapted from: Barringer 2003, p.5; FHWA 2011; MNDOT 2011.

Quantifying some LCC components is an easier process than quantifying others; project construction and O&M costs are two of the more complex cost sets to estimate. Theoretically, construction and O&M costs should be estimated by referencing historical data from similar projects, but in the case of new, complex P3s, such a comparison may not be adequate. For example, there may not be enough examples of specific types of projects constructed using the DB method to provide good estimates. In addition, transportation facility costs are highly sensitive to local geology, soil conditions, and topology. Construction cost can be derived from both government and private sector cost estimating databases, as well as a number of digital construction cost estimating software platforms such as the Tri-Services Parametric Estimating System (TPES). TPES, conceived originally for buildings, "can be adapted to facilities beyond those included in the base modeling system" in conjunction with highly-calibrated software packages from specialized firms like US Cost (Fuller 2010). Other construction cost estimation options include consulting an "old-fashioned" database like a commercial-grade unit price book or the newer RS Means Building Construction Cost Database[1] software, as well as contacting testing and / or trade organizations for materials cost reference data.

In order to best estimate O&M's share of LCC, resources include supplier quotes, published estimating guides, and data estimating guides that are based on statistical relationships of historical data (Fuller 2010). Data exists on O&M cost, and asset management more generally, for various traditional types of infrastructure assets, allowing for the estimation of an O&M figure. Further options for O&M LCC estimation include consulting Whitestone Research's Building Maintenance and Repair Cost Reference (2010) which, despite its focus on buildings, also gives "service life estimates for specific building components" (Fuller 2010). Additionally, the US Army Corps of Engineers allows public access to its own O&M databases[2] on its previous infrastructure projects.

Uncertainty arises, however, for P3s that seek to construct new types of infrastructure assets, e.g., a new type of highway with "reversible" lanes currently being constructed in Florida, or California's proposed high-speed rail line. Developing O&M figures for new types of facilities requires increased guesswork and less certainty than it might for a traditional facility. While inferences from historical data can be reached for new, complex facilities, they remain just that – inferences and guesswork more than history-based cost estimation. To base cost estimation for construction and O&M costs for new types of facilities on previous historical cases, one can use the aforementioned examples and cross-consult. By combining and averaging estimates of various building components – taking the cost of higher-strength rails from one rail project, concrete rail ties from another, and denser ballast from yet another to get a sense of cost for key components in a new high-speed rail line, for example – one can gain a rough estimate for construction and O&M costs for new / uncommon facility types.

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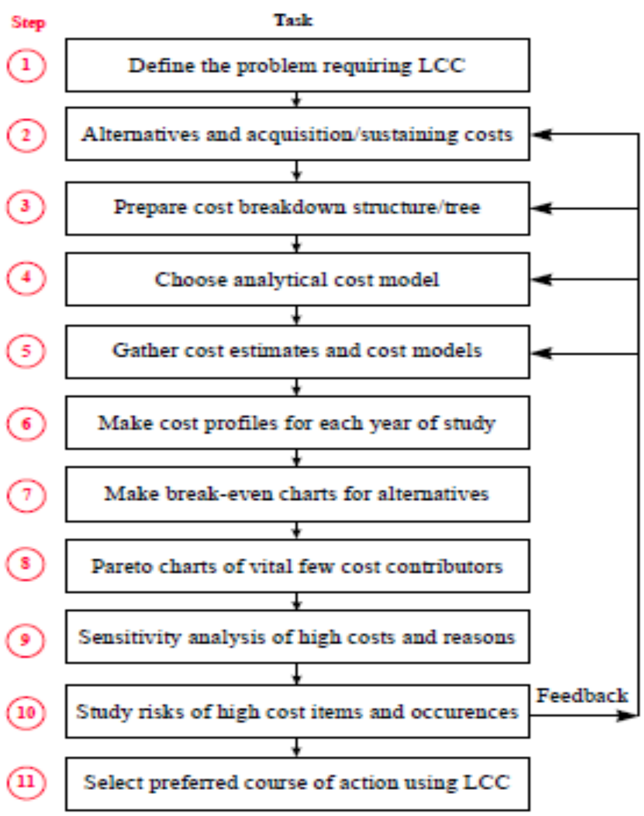
[1]Available at: http://rsmeans.reedconstructiondata.com/MeansCostWorks.aspx.
[2] US Army Corps of Engineers' Tri-Service Automated Cost Engineering Systems (TRACES). Available at: http://www.hnd.usace.army.mil/traces/.

Figure 2 on page 9 provides a step-by-step listing of the LCC estimating process for a given P3. Given that a P3 evolves from a basic design / engineering concept into a more complex and detailed entity over the course of several development stages, LCC estimation must occur once design and engineering proceedings have been completed. The full scope of detail and complexity for a given P3 is not known until final design and engineering preparations have been completed, as one cannot accurately estimate cost for a project if one does not completely know the given project's level of complexity.

Figure 2: LCC Estimation Process



Source, Barringer 2003, p. 4.

Since LCC can only be reliably estimated at the end of the project planning process, it is not a convenient tool for evaluating P3 project alternatives. Fuller (2010) notes that accurate LCC estimates are available so late in the design process that opportunities for cost-reducing design changes are likely to have already been missed. Ultimately, the inclusion of LCC review in the P3 development process must occur – by the very definition of LCC – once project design / engineering plans have been finalized. But, in the case of design-build (DB) P3 contracts, the individual contractors bid on the price of the project and have, presumably, conducted their own LCC analysis of the given project. It is up to the public sponsor, then, to either verify those estimates or to judge them against the sponsor's own LCC estimate for the project and choose the project's contractor accordingly. This cost-comparison process is covered in more detail in the section titled d) Fiscal Analysis and Modeling on page 13.

If LCC is used to review project alternatives, the LCC estimate can only be approximate. That is, the potential errors in the LCC estimate should be explicitly considered. LCC review of project alternatives implies that alternatives will in fact be considered – even once final design / engineering has been completed. The costing process in Figure 2 assumes that, as part of the LCC estimation process, a review of various alternatives is built into LCC estimation for a given project. However, these alternatives are limited; they reflect ways of adjusting the project to reduce costs within the confines of the structure and function of the project. Defining a process for estimating and then reviewing that estimation of project LCC could help to ensure long term P3 financial and operational viability. If LCC are dramatically overestimated then project risk is not optimally allocated and private investors may potentially enjoy major profits at the expense of the public sector, or such overstatement of risk may very well scare off potential investors. If LCC estimates are too low, project viability could be threatened as costs increase dramatically without a corresponding increase in revenue.

c) Construction Cost Variability and Uncertainty

In this section, we discuss the propensity of infrastructure projects to consistently incur significant construction cost overruns, strategies for how best to avoid them, and the relationship between the P3 model and construction cost variability. The P3 arrangement has "earned a strong reputation for the ability to deliver projects on-time" globally (PWC 2010, p. 8; Iacobacci 2010, pp. 23 and 59). The great strength of the P3 model lies in expediting project construction while minimizing construction and maintenance costs. But construction cost variability remains a risk even for P3s. Construction cost can rise for a variety of reasons. The following are a few factors that could cause a rise in construction costs,

- global materials price fluctuations (caused by any number of factors from rising oil prices to large consumption of a given input),
- international economic conditions,
- rising property values in or along project right-of-way, or
- new political / environmental regulations.

Perhaps the single greatest rise in construction cost for a given transportation project, however, stems not from inputs or labor, but rather, from opportunity cost. A publication by AECOM Consult Team on recent US P3s cites the ability, or lack thereof, of the public sector to "keep the project moving" as a critical determinant of construction cost overruns and uncertainty (2007b, c. 3 p. 72).

When a project "is delayed by disagreements among its partners or inaction, costs can increase significantly" to the point where "stakeholder support can dissipate, enabling opponents to gain momentum and kill the project" (ACT 2007b, c. 3 p. 72). Such delays can occur at both the pre-construction / design / planning stage as well as at the project's construction / implementation stage. Project delays at either stage are critically important for a P3 to minimize cost overruns; but ultimately "cost escalation is highly dependent on the length of the project-implementation phase, and at a very high level of statistical significance" (Flyvbjerg et al. 2004, p. 16). "For every passing year from the decision to build until operations begin, the average increase in cost escalation is 4.64 [percent]" excluding financing costs which, for a large-scale project, would make annualized delay costs "considerably higher" (Flyvbjerg et al. 2004, p. 16). In short, the need to minimize project delays during the implementation / construction period is critical in concurrently minimizing construction cost overruns.

Public sponsors must also pay attention to the preliminary, pre-design / engineering phase of the planning process for a major project – before implementation / construction can begin. Given that public opposition to the project can, and most likely will, occur within that pre-design / engineering part of the initial planning phase, the length of the debate and ensuing legal challenges can lead to cost fluctuations as well – a "political risk" component to construction cost variability (Bruzelius et al. 2002, p. 145). Additional costs are generated from lawsuits and mitigation payments to opposition groups. While minimizing delays at the implementation / construction phase is critical to reduce project cost overruns, anticipating the source of overruns at the very earliest stages of the P3 process is important as well. In order to minimize potential delays both before and during project construction, every effort should be taken early on to resolve potential problems and avoid costly delays further down the line.

Studies of the costs of transportation infrastructure projects show that "cost escalation is a pervasive phenomenon" across different project types, geographic areas, and historical periods (Flyvbjerg et al. 2004, p. 3). Of 258 global transportation infrastructure projects surveyed, 90 percent experience cost overruns with average cost escalation for rail projects at 45 percent, 34 percent for fixed links like bridges and tunnels, and 20 percent on average for roads (Flyvbjerg et al. 2004, p. 4). Furthermore, over the last 70 years, cost escalation has not decreased, suggesting that little institutional learning seems to have occurred as a result of the overruns.

While larger projects have larger percentage cost escalations than smaller projects, generally there is no correlation to project size and increased risk of overrun; rather, all projects experience an equally very high percentage of incurring a major overrun (Flyvbjerg et al. 2004, p. 16). Bialik (2010) argues that the average historical overrun percentages for similar facilities be incorporated into a project's construction cost.

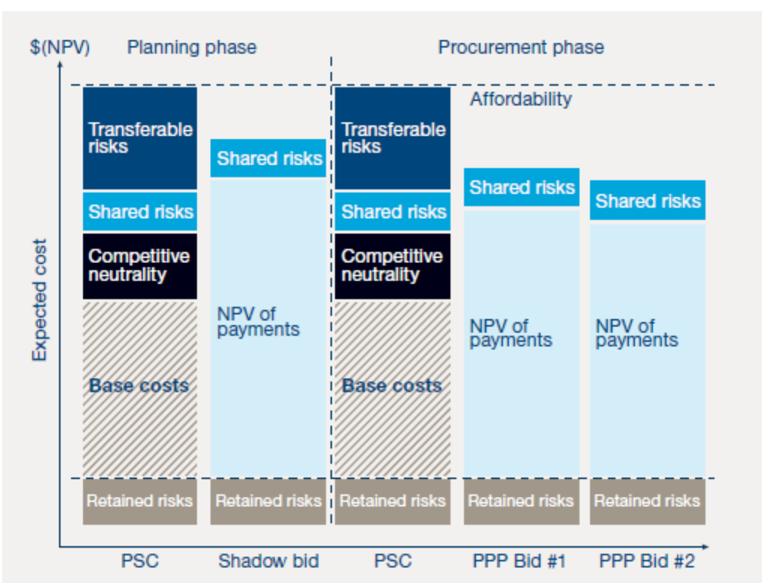
Though cost overruns are a predictable occurrence with major infrastructure projects, the P3 arrangement seems very capable of mitigating the magnitude of those overruns. A study at the University of Melbourne indicated that P3s had an average cost escalation of slightly over four percent compared to an average 18 percent overrun for publically-procured projects (Duffield et al. 2008, p. 25).

For $4.5 billion of contracted P3 projects in Australia, the aggregated overrun was $53 million; for $4.1 billion of traditionally-procured projects in Australia over the same time frame, the aggregated overrun was $618 million. As such, the P3 "cost advantage" and enhanced project cost certainty are both "economically and statistically significant" (PWC 2010, p. 8). We surmise that P3 projects may incur less cost escalation because the associated financial risk is placed on the contractor rather than on the public sector.

d) Fiscal Analysis and Modeling

Tied into both LCC analysis and the revenue potential of a given P3 is the fiscal analysis of the project. Such an analysis includes a review of project funding, financing, valuation, and an estimation of the opportunity cost for undertaking each of the previously listed in the way each was. Even at the earliest stage, fiscal scrutiny is key to ensure that the most appropriate candidates are chosen for P3s, and that a given project does, in fact, create a positive economic outcome for stakeholders. This process is best undertaken by employing a Value for Money (VfM) analysis, as described in Figure 3 on page 13.

Figure 3: VfM Analysis



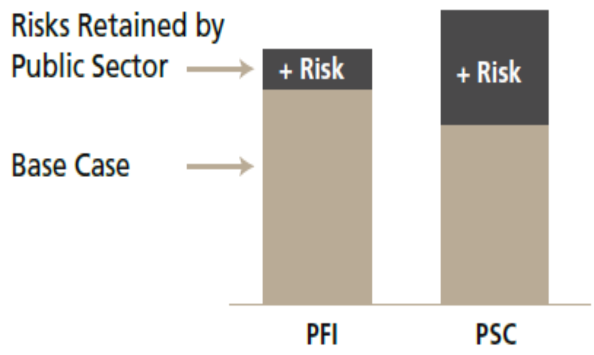
Source, PriceWaterhouseCoopers 2010, p. 9.

VfM "evaluates future cash flows to determine whether a capital project is best suited to a traditional public procurement option or a P3" (PWC 2010, p. 9; see also, USGAO 2008a p. 35). Figure 3 shows the various components that comprise the expected cost (in net present value - NPV) of a given P3 at two stages – the planning stage and the procurement stage. An initial VfM is run when a project is first conceived. It determines whether or not a P3 would make sense, given the expected future revenue and the required capital outlay. For the public sector side of a VfM, base costs represent actual costs of the project before risk to the public sector including: design, construction, and O&M. Competitive neutrality represents the core cost differences between public and alternative procurement related to the different risk profile of the public sector. For example, the public sector does not have to purchase insurance to cover asset operating risk nor pay taxes on any profits.

For the private sector bids, NPV of payments represents payments from the public sector to cover the private partner's cost of design, construction, and O&M of the asset – assuming the P3 contract does not actually involve any private financing (i.e., design-build). Retained risks are defined as risks retained by the public sector (including some estimation or calculation of residual risk), shared risks are shared by both the public and private sectors, and transferable risks are transferred to the private sector in the P3 contract.

VfM measures relative financial benefit of traditional procurement versus a P3 by using a public sector comparator (PSC) to determine cost savings. The PSC, graphically represented in Figure 4 on page 15, represents "a hypothetical, risk-adjusted cost estimate for a project, were the project to be financed, owned, and implemented by the public sector" (PWC 2010, p. 9). The PSC enables a two-stage VfM analysis for a more complete understanding of the relative benefits of pursuing a project (or not) as a P3. Furthermore, given the level of detail in that two stage analysis, a general understanding can be reached of where significant cost-saving would occur should the project ultimately be pursued as a P3.

Figure 4: PSC v. Private Procurement



Source, FHWA 2009, p. 23.

The first VfM stage, in the planning phase, looks to compare public procurement (the PSC) with a "shadow bid," a theoretical private bid composed of comparable private sector costs for the same project. Should a project's shadow bid cost less than the proposed PSC total, alternative procurement is encouraged, as cost savings can be attained. The literature has not conclusively determined how much cost savings through different procurement methods are enough to justify alternative procurement. Phrased differently, there is no universally-accepted "tipping point" at which the cost savings attained through alternative procurement become economically significant for the public sector and mandate the pursuit of a P3.

Ultimately, VfM allows for "well-informed, accurate, full-cost pricing early in a project" while also encouraging competition from various private sector bidders "who are aware that a genuine benchmark exists that they will have to beat" (PWC 2010, p. 9; see also, USGAO 2008a, p. 35). The VfM / PSC paradigm is particularly useful because it is also adaptable to reflect the costs of a project funded with public bonds, juxtaposed to one funded with private equity and debt, by substituting the appropriate numbers. Furthermore, the VfM / PSC analysis can objectively and clearly demonstrate the extent of the risk transfer that has occurred in the P3, and whether the project is of requisite complexity and scale, as mandated in FHWA (2009), to proceed with alternative procurement. In short, if pursuing alternative procurement for a given project will not yield any real financial benefit to the public sector, it will quickly become apparent in the VfM / PSC analysis.

In terms of project financing, many options exist for financing a P3. The exact makeup of the financing package is highly variable and is itself contingent on the type of project being financed, and the extent of private sector involvement in the project. Public sector resources include funds from state infrastructure bonds, state gas tax revenues, Federal government loans (TIFIA, and TIGERs I and II), Federal grants, Federal gas tax revenues and – increasingly more common in the face of leaner state resources – local sources like shares of property or sales tax revenues (e.g., Measure R, in Los Angeles).[3] Private financing can come from private bank loans, private bond issues – standard bonds as well as tax-exempt private activity / non-profit bonds, as has been done in several Virginia P3s – and private equity shares as well.[4]

While the exact composition of a project's financing package is highly variable and contingent on the contract type chosen, P3 financing packages are, by their natures, very complex and intricate arrangements. There is not a singularly optimal financial arrangement for all P3 project; the financial instruments chosen are very much case-specific and tied to the larger macro-economic status of the region and the nation. Perhaps the most critical element of any financing arrangement for a P3 with large capital costs is the financing package's debt-to-equity ratio, as it correlates directly to financial risks borne by various parties involved, along with potential financial gains to be realized. An excessively high debt-to-equity ratio would create a situation in which private equity stakeholders do not have the incentives – as a result of having little equity stake at risk – to ensure optimal P3 asset performance. Again, the exact amounts of debt and equity involved in a given P3, and as such the financing arrangement's debt-to-equity ratio, are largely contingent on the nature and scope of the particular P3.

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[3] See section i) Local self help and role of local governments on page 28 for more on local sales taxes.
[4] See v) Status of capital market and sources of capital on page 78 for more on private financing.

Financing arrangements are dictated, ultimately, by those larger economic trends and – given the current prevailing economic conditions – a financing arrangement structured in years past would likely be infeasible today. Bond spreads remain high even in the public sector, and the cost of private sector debt issue remains even more expensive than public debt issue. In fact, average spreads "reached their 2001 level in 2008 and continued to increase through 2009 to reach an average of 300 bps, the highest in 15 years" (Infrastructure Economics 2010). Crossing the 2001 basis point threshold is significant, given that the 2001 spread represents the cumulative effects of the recession that occurred in the wake of not only the dot com bust but also the stock market shock following the September 11 terrorist attacks.

In short, before a state enters into a P3, prevailing macroeconomic trends should be considered alongside the equally-important VfM / PSC metrics. But, given the complexity of P3 financing arrangements, the public sector must be very explicit as to what its assumptions are in generating VfMs at multiple stages. The increased cost of debt, the tightening of global credit markets, and other major impacts of the global downturn on project financing should be accounted for and included in the assumptions that are part of a VfM analysis.

By conducting fiscal analysis and modeling before construction on a P3 project begins and before contracts are finalized, a public sponsor can clarify financial and funding risks well before cost discrepancies arise. Even if discrepancies or extenuating financial circumstances do arise, both public and private parties can – with adequate contractual risk structuring – consider refinance. Refinancing can help to protect the public interest. Some projects have built specific clauses mandating a sharing of "refinancing gains" between public and private stakeholders into contracts, enabling the P3 to "take advantage of better financial terms" while still protecting the public interest (USGAO 2008a, p. 34).

Finally, by modeling what potential outcomes may arise, the public sector can better determine what sort of contract would be most appropriate for the project, or whether public procurement is the most viable option. To protect the public interest, the public sector must either offer projects with a guaranteed revenue stream like tolls or user fees, or it must be very sure that availability-payment-based P3s actually reduce public sector risk, both outright and residual. If the project does not reduce risk or is otherwise infeasible based on VfM / PSC analysis, public procurement may make the most sense. Ultimately, part of deeming a P3 "shovel-ready" is to deem it "wallet-ready" as well.

2) The California political environment and challenges to P3s

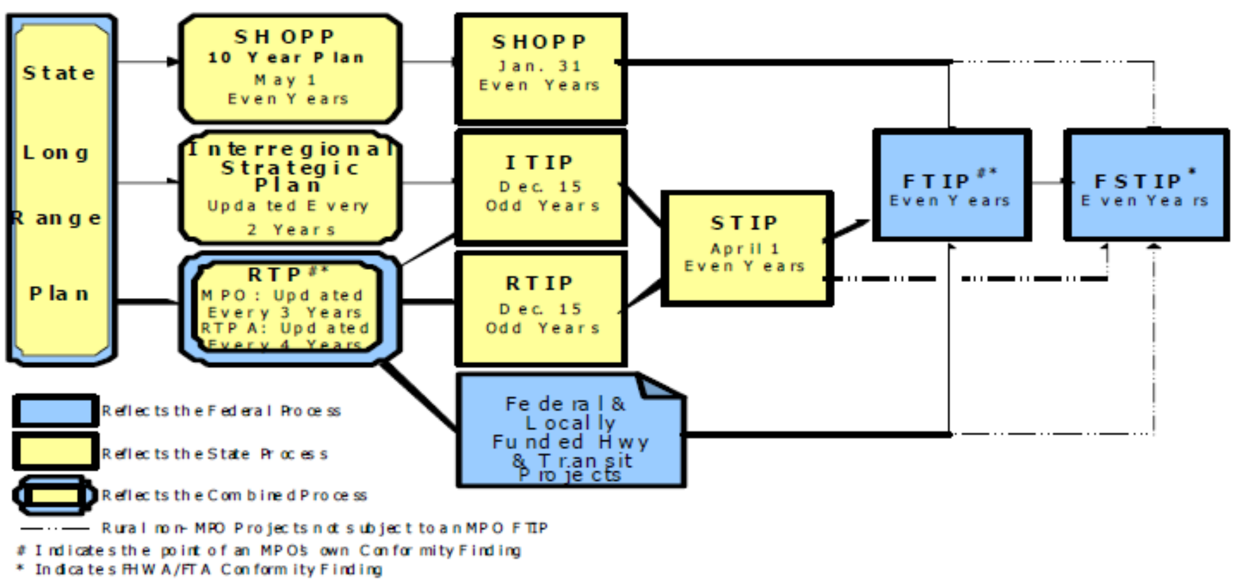
e) The capital planning and funding process

In the following section we consider the capital planning and approval processes for transportation projects in California and how consideration of P3 delivery might be considered or encouraged. To construct a transportation facility in California, the project must go through a lengthy, multi-step, multi-agency, bottom-up process. Transportation projects, planned and proposed at the local level, are then reviewed at the regional (MPO) level, followed by a review at the state level. The planning process is federally mandated. The increased role of MPOs was one of the big changes to federal transportation funding requirements made by the ISTEA (Lewis and Sprague 1997, vii). Localities, MPOs and the state are required "to represent and incorporate the views and needs of citizens" at each stage of the TIP process (Wachs 2004, p. 150; March 2000, pp. 161, 179). See Figure 5 on page 19 for a graphical representation of the State Transportation Improvement Program (TIP). In California, planning is even more decentralized than other parts of the US. Californian MPOs have jurisdiction over state highway planning only.

Projects must go through several plans and approvals before they can be approved for construction. See Figure 5 on page 19. At the local level, projects must be part of approved regional transportation plan and included in the Transportation Improvement Plan (TIP). Once approved, the local TIP becomes part of the Regional Transportation Improvement Plan (RTIP) governed by the applicable MPO. The RTIP is then incorporated in the statewide plan known as the Federal Statewide Transportation Improvement Program (FSTIP). From there the US Department of Transportation incorporates state plans into a Federal Transportation Improvement Plan (Metro 2010).

Given that each MPO is required to incorporate into its TIP "realistic estimates of the projects' total costs and revenues from various sources during the investment period"; at or before the RTIP stage is the logical point at which an agency should decide whether or not to pursue a P3 (Wachs 2004, p. 149). In other words, by the time a facility makes it in to the RTIP, the budget and funding sources for the construction (though not the operation or maintenance costs) must be identified. Those sources do not have to be pre-appropriated and may not actually fund the project. However, the MPO must have the "reasonable" expectation that the identified sources will contribute to the project.

Figure 5: The TIP Process



Source, Caltrans 2010b, p. 2.

Currently, local agencies have no requirement to consider using P3s to deliver their projects. However, the planning process as it stands, provides an incentive for P3s. Political gamesmanship and negotiations are a virtually inevitable part of the TIP project review process (Wachs 2004, p. 149). The boards (typically made up of elected representatives) at the county and regional level have to approve the projects. If some, or all, of the funding for a given project comes from private investors, fellow board members (be it at the county or regional levels) may be more willing to include that project as it would require less (or no) public capital. To the extent that public sponsors are able to use P3s to supply capital for proposed projects, the political negotiations during the approval process could be minimized. Yet, the only transportation P3 currently under contract in California is the Presidio Parkway project (ARUP 2010; California Construction 2010).

We suspect that local agencies are not considering P3s because, among other reasons, a) they lack the skills to successfully pursue a P3; b) institutional inertia, historically, projects did not utilize P3 delivery; and c) the prevalence of local sales taxes already provides them with a funding source for local contribution to desired projects (ACT 2007a, pp. 48-49; Crabbe et al. 2005). Since local sponsors propose new facilities, it will be up to them to consider P3s as they feed projects into the TIP process. As part of Phase II of the research project, we anticipate conducting interviews with local officials to learn what they consider to be the barriers to, and how they may be encouraged to pursue P3s. We will also find out if CTCs or MPOs currently have any P3 programs.

Given the limited and shrinking supply of public capital for transportation projects, potential projects that are ripe for private investment should be identified early on in the TIP process. However, only those projects appropriate as P3s should be considered as such. The AECOM Consult Team notes in their report on P3s that successful projects require, "[1)] a project of relative urgency, [2) a] lack of adequate public resources to complete the project in a reasonable timeframe, and [3) a] public sponsor ability to develop and administer a flexible PPP contract agreement which represents a win-win situation for both public and private partners" (2007a, p. 17). Local sponsors should be given the tools and knowledge to identify (and perhaps design) projects that meet AECOM's criteria. Once public sponsor identifies a potential P3 project, it should carefully consider P3 delivery. As local sponsors move projects up through the TIP process, each higher level should evaluate whether or not local sponsor adequately considered a P3.

Power is shifting from the state to municipalities a) as they rely more on local self help sales taxes[5] and b) as legislation shifts responsibility for urban highway planning from the state to regions. Despite this shift in power, we see three ways the state could influence the decision to consider P3s.

1) Require MPOs and in turn, public sponsors to consider P3s as projects work their way up the TIP process. If a MPO submitted a RTIP that did not demonstrate bona fide consideration of P3 delivery of the projects contained therein, the State Transportation Commission could reject it from the STIP. Any such requirement may require a legislative change. While MPOs in California continue to have control over the Regional Transportation Improvement Plan, not all MPOs are created equal. For example, the MTC plays a powerful role in allocating transportation dollars especially when compared to SCAG (Lewis and Sprague 1997, 117-118). To the extent that the state can influence MPOs, the formation of the RTIP may be an opportunity to review the potential for P3 funding. However, given the varying degrees of power and control that California MPOs muster, requiring a local government to consider P3 possibilities at the RTIP stage of the process may be challenging.
2) Offer additional funding to local governments for planning new transportation projects provided that funds are used solely to plan P3s. Suppose that a public sponsor wants to enter into a P3 handing off as much to the firm as possible, e.g., a concession in which the firm designs, finances, builds, operates, and maintains all aspects of a facility. That public sponsor will need seed money to pay staff time and hire consultants to prepare requests for proposals and negotiate the contract. A new program at the state level could facilitate such endeavors.

[5] See section i) Local self help and role of local governments on page 28.

3) Establish a P3 best practices office that could act as clearing house and support team for local agencies (Little Hoover Commission 2010, p. 79). For example, the office could research contracts used in P3s in other jurisdictions and develop template contracts for California. The office also might assist local agencies in identifying projects ripe for P3s and avoid projects where there might be regulatory hurdles, e.g., the FTA's New Starts Funding process is not conducive to P3s (USGAO 2009, pp. 24-25). The United Kingdom has such an office[6] at the national level; states in Australia[7] and provinces in Canada[8] have similar offices as well (USGAO 2009, p. 37; Little Hoover Commission 2010, pp. 21-22).

The first suggestion is more of a stick where as the later two are more carrot-like. Ultimately, the local sponsor managing the project will be the one best-suited to decide whether or not it has the skill set and the institutional capacity to undertake a P3; suggestions two and three above could improve that skill set or provide technical assistance to a public sponsor considering a P3. Suggestion one would not necessarily be welcome at the local level; it may simply be seen as yet another hoop to jump through. However, when coupled with technical advice and experience that would come from suggestion three and the dollars from suggestion two, P3s could be increasingly considered at the local level in California.

f) CEQA and the environmental process

In the following section we discuss how CEQA and the environmental review process relate to transportation P3s. A key question is the role of the private sector (e.g. the private contractor) in the review process. The literature is unanimous: the private sector is ill-equipped to take on environmental risk and the challenge of steering a project through the environmental review process (USGAO 2008a, p. 37; ACT 2007a, pp. 5, 18, 23, 57, and 77; Iacobacci 2010, pp. 10 and 33; Wang 2010, pp. 126-127; Yescombe 2007, pp. 249-251; Gómez-Ibáñez and Meyer 1993, p. 105; Czerwinski and Geddes 2010, p.

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[6] UK: http://www.partnershipsuk.org.uk/
[7] For example, Victoria, AU: http://www.partnerships.vic.gov.au/
[8] For example, British Columbia, CN: http://www.partnershipsbc.ca/

29). Public sponsors apparently have heeded this advice, as we could only find one case study in which the public sponsor turned over responsibility of the entire environmental review process to a private partner: The South Bay Expressway in San Diego. While only a single data point, the South Bay Expressway provides a cautionary tale to government sponsors and private investors alike; in that case, the private firm took nine years to navigate the CEQA process (ACT 2007b, c. 3 p. 77).

Private investors view the environmental review process as a potential for delays in a construction start date. Investors may also fret that any potential mitigation arising from the process could either, a) increase costs or time to construct, e.g., the addition of an underground segment where an at-grade segment was originally proposed, or b) create a change in the relative attractiveness to users, e.g., the elimination of an exit on a freeway. Given a choice, any private investor would prefer to commit to a project once the CEQA review process is complete to avoid risk of outright cancelation, delay, or changes in design (ACT 2007b, c. 3 p. 85).

To cope with environmental risk, private investors increase the costs of the bid to include, for example, debt service reserves (necessary to cover delays), potential mitigations, etc. Of course, if none of these risks come to pass, the rewards will go to the private firm, not the taxpayer. As Vining et al. note, "there are no free lunches;" if the private sector takes on a risk (environmental or otherwise) it will pass the expected cost of said risk back to the public sector (2005, pp. 199 and 215).

In addition to environmental approval process and the capital process described in section e), there are many local, state, and federal organizations that can influence, review, or approve transportation projects within the state of California. At the federal level there are two departments and several sub-department-level bodies that are involved with transportation projects. The following is non-exhaustive list of those organizations,

- Department of Transportation,
- Federal Highway Administration,
- Federal Transit Administration,
- Federal Rail road administration,

- National Highway Traffic Safety Administration, and
- US Environmental Protection Agency.

Source, March 2000, pp. 1-21.

There are also numerous organizations at the state and local levels. The following is non-exhaustive list of those agencies, commissions and other organizations,

- Business, Transportation, and Housing Agency,
- California Coastal Commission,
- California Department of Fish and Game,
- California Department of Transportation (aka Caltrans),
- California Environmental Protection Agency,
- California Public Utilities Commission,
- California Transportation Commission,
- City Transportation Departments (e.g., SFMTA, LADOT),
- County Transportation Commissions (e.g., SFCTA, Metro),
- Governor's Office of Planning and Research,
- local Metropolitan Planning Organizations (e.g., SCAG, MTC),
- Native American Tribal Governments,
- Southern California Regional Rail Authority, and
- Tahoe Regional Planning Agency.

Sources, March 2000, pp. 21-56, CDFG 2011, GOPR 2007.

The cast of characters involved with any project in California can be very large and not even necessarily the same for similar project in the same county. In addition to the aforementioned list of organizations, politicians at every level of government could necessarily have influence over any project especially as part of the TIP process. Each of the above organizations is tasked with its own responsibilities and has its own agenda. Some agencies administer programs and dole out funds that are not conducive to P3s. For example, if a potential P3 facility is relying on any New Starts funding from the Federal Transit Administration, even a simple design-build P3 would be difficult as the approval process is unfriendly to P3s (USGAO 2009, pp. 24-25).

Project sponsors in California, e.g., Metro, Caltrans, or SFMTA, have the local knowledge (including the alphabet soup of departments, administrations, agencies, commissions, etc.) and experience to get projects done in their respective service areas. That local knowledge would be difficult for a private investor to build across many municipalities, especially if the investor was based abroad. In addition to the CEQA process and the aforementioned capital planning process, other formal approval may be required. For example, in addition to the capital process (see section e on page 18) a light rail project will need the approval of the California Public Utilities Commission. The Expo light rail line, currently under construction in Los Angeles, had to make modifications and changes to the design of the facility at the request of the California Public Utilities Commission after neighbors complained about the safety of the project near a high school (Weikel 2010). As another example, the California Coastal Commission blocked the extension of the 241 toll road in Orange County (Coker 2009). The Public Utilities Commission and the Coastal Commission are just two of the secondary agencies that might need to review a project. Current P3 best practice advice states that public sponsors may be the most expert on obtaining such approvals (ACT 2007a, pp. 5, 18, 23, and 77; USGAO 2008a pp. 36-37). Therefore, private investors may lack the skills and institutional knowledge to successfully navigate the other approvals required. We found no empirical evidence that a private firm could navigate the approval process any better than a public sponsor.

g) Influence of public and private sector labor

In the following section we consider the influence of public and private sector labor in the decision to pursue P3s. While unionized labor is not explicitly required by federal or state law, contractors on public works are required to pay the prevailing wage. If the P3 project involves any federal funding, the Davis-Bacon act requires any contractor to pay construction workers the prevailing wage. The prevailing wage is equal to the mode (the most frequently occurring) wage provided that the mode represents over half the wages for any given craft; if the mode wage represents less than half of the wages for any given craft, the prevailing wage is equal to the mean (the weighted average) wage (Philips 2005, p. 7). The calculation for projects in California usually results in the mode dictating the prevailing wage, which is in turn the wage typically paid to unionized constriction employees (Philips

2005, p. 7). If the project were to eschew federal funding of any kind, the Davis-Bacon act would not apply. However, even if no federal money were involved, state labor laws would require employers to pay the prevailing wage (see California Labor Code, sections 1720, 1772, and 1773, for example).

As noted earlier, prevailing wage laws do not necessarily require unionized labor. A non-union construction company could win a contract, provided that it pays the prevailing wage; such a firm would not be subject to union rules that, for example, prevent a low-skilled (i.e., less expensive) technician to pull a wire through a conduit whereas union might require a full-blown electrician to perform that menial task (Northup 2000, pp. 11, 14-15). Of course, this raises the specter of project quality; are non-union projects of the same quality as union-made facilities? A topic for Phase II is to find out whether union labor is used in existing P3 projects.

Private investors may siphon off skilled government employees to work on P3s (Yescombe 2007, p. 23). Who better to assist in the approval process, or project management of a P3 than a person with local institutional knowledge and on-the-ground connections? Suppose a senior government employee leaves to work for a private firm. A state project sponsor may or may not wind up paying more for that former employee's labor. While the firm may "markup" the cost of the former employee, the government may save money on benefits and other costs associated by no longer employing the person directly. A high profile example of employee movement from the public sector to the private sector is Bob Carr. Mr. Carr, a former Premier from New South Wales, Australia, joined Macquarie (a prominent Australian investment back with a global portfolio of infrastructure and P3 investments) in 2005. At the time, Macquarie entered into several P3s with the Australian government and compensated its employees handsomely, earning the reputation of Australia's "Millionaires' Factory" (Macquarie 2005; Guardian 2005).

The Professional Engineers in California Government certainly does not feel there are any savings from using outside firms for engineering work. It claims that Caltrans actually pays more per position than it does for state employee engineer (PECG 2010, p. 1). Local governments could be encouraged to enact ordinances preventing civil servants from leaving for private firms to work on contracts with the same jurisdiction. The City and County of San Francisco has such a law in place. However, that ordinance would not prevent a San Francisco employee from jumping ship and working on a P3 project for Alameda County. California state law, under the Milton Marks Postgovernmental Employment Restriction Act (section 87406 of the Political Reform Act 2011) forbids designated employees of public agencies from leaving to work on a project as an employee of a private firm (CFPPC 2011, p.99). The Act's restrictions are not permanent, however – it mandates a year pass between an employee's last day for the State and their first day as an employee for the private firm. Jurisdictions in California could consider legislation to amend The Act's restrictions – lengthening them a period of several years, or making them permanent.

Public sector unions representing state engineers and other Caltrans employees already object to design-build P3s (Rau 2006, p. B1; Liu 2006, p. B3). Design-build-maintain-operate would likely be unpopular with other unions representing maintenance workers for Caltrans. Anytime work previously done by unionized labor is transferred to the private sector government unions will object. That said, unions are not necessarily always opposed to P3s. For example, the union representing Caltrans' engineers was not opposed to the design-build 405 Carpool Lane project in the Sepulveda Pass because the enabling legislation required Caltrans engineers to conduct the inspections (Liu 2006, p. B3).

Public sector unions may be highly suspicious of the introduction of a profit motive, especially if the private investor is able to lower wages and / or utilize less favorable work rules (de Bettignies 2004, p. 136). The efficiency of the private sector could simply be attributed to hiring fewer employees at lower wages, which may affect the project quality (Yescombe 2007, pp. 22-23). While de Bettignies and Yescombe hypothesize that P3 firms might use cheaper, less qualified labor and deliver a substandard product, resulting in higher operations and maintenance costs, we could find no evidence to refute or support that thesis. Given the dearth of literature on this issue we will need to continue our research in Phase II. As public sponsors move forward with P3s, they will need to carefully consider the positions of the relevant labor unions.

h) Project approval process

See section f) CEQA and the environmental process on page 22.

i) Local self help and role of local governments

In this section we consider the role of local governments and the impact of local self help sales taxes on the usage of P3s. Power is shifting in the transportation sector, as evidenced by two major shifts. One, there is a general trend of devolution in the United States (Giuliano 2007, pp. 3-4). Two, California counties are increasingly relying on local countywide sales taxes to pay for transportation facilities (Crabbe et al. 2005, p. 110). County Transportation Commissions control the revenue from these sales taxes. Nineteen counties in California currently have a transportation sales tax measure, ranging in size from 0.25¢ to a total of 1.5¢ per dollar of taxable spending[9] (Crabbe et al. 2005, p. 98-99). As California counties rely more and more on local dollars for transportation projects, the state will have less and less influence over how that money is spent (Giuliano 2007, p. 12; see also, Crabbe et al. 2005, pp. 110-111). Local governments propose and build transportation facilities; as they gain power, it will be at the local level the state must work to encourage P3s.

Countywide transportation sales tax measures typically contain an expenditure plan, i.e., a list of projects that are designed primary to appeal to a broad range of voters in order to ensure the necessary super majority affirmative vote for the measure (Crabbe et al. 2005, p. 113). The expenditure plans include not necessarily those projects most needed, nor the projects that are necessarily the most cost effective; rather, the lists are usually designed to be geographically diverse and politically appealing (Crabbe et al. 2005, pp. 112-113, 115; Giuliano 2007, p. 11). Once these local self help sales taxes pass,

[9] Only one county, San Benito, has ever failed to renew a self help transportation sales tax (Crabbe et al. 2005, p. 98).

the expenditure plans are set in law and no adjustments can be made even if a particular project no longer make sense[10] (Crabbe et al. 2005, pp. 112-113). As the local self help sales tax levies proliferate in California and expenditure plans are etched into law, there is nothing that state or regional agencies can do to change the lists. Nor can anyone necessarily change the project to make it more conducive to a P3. These tax measures and their expenditure plans can last decades, and hence affect possibilities for P3s.

On the other hand, P3s are a potential way for county transportation commissions to supplement local dollars (be it from self help sales taxes or other funds) when public funding is in short supply. Orange County provides an excellent example. The county wanted to build more freeways, planning for several new roads "to serve Orange County's booming population" during the 1970s (The Toll Roads). The funding for these freeways was, however, "nowhere in sight," even after local officials had "dug in their own backyard for seed money that would demonstrate their commitment to building these roads" (The Toll Roads). Ultimately, as funding for the roads was scarce, "it became apparent that the new roadways had to be tollways or they wouldn't be built at all" (The Toll Roads). After years of political wrangling over the addition of tolls to the proposed freeways – with measures enabling the creation of toll roads reaching as high as the state senate on several occasions only to be denied each time – a bill was eventually passed in 1987 (Weintraub 1987). The bill enabled the construction of the 73, 241, 261, and 133 Toll Roads. Ultimately, Orange County got the freeways it wanted – and badly needed – without (or with less) assistance from the State of California.

Self help sales taxes have empowered local agencies, but the lists associated with said measures limit their flexibility. If projects currently on the list are unattractive to private investors there is little

[10] One example is the San Gabriel Valley extension of the little-used Gold light rail line included in Measure R. While, the extension helped to gather support from San Gabriel Valley voters, once it opens it will require heavy subsidies to operate (Giuliano 2007, p. 11).

anyone can do to change the list. To the extent that counties want to pursue projects outside those lists, P3s might be the answer.

j) Public perception re P3s and user fees, private investment in public infrastructure

In this section we look at the public and its impression of P3s. We found many claims about the public's perception of P3s but little conclusive evidence that the public embraces or rejects P3s in general. The USGAO notes that there is public "opposition" and "outcry" regarding new P3s in such varied places as Texas; Ontario, Canada; and New South Wales, Australia (2008a, p. 37). But the USGAO also notes that P3s can free up capital for other projects, speed delivery of facilities, and reduce the burden on the state's balance sheet all of which should be popular with the public (2008a, p. 20).

One of the perceived advantages of P3s is to the extent that private finance is used, the project does not need to be accounted for on the government sponsor's balance sheet (Wang 2010, pp. 51- 53; Vining et all. 2005, p. 202). Shifting debt from the government's balance sheet to that of private firm's may be appealing to politicians and the public alike, however it may come at price. Private finance is thought by some to be more expensive than financing available to the public sector (USGAO 2009, pp. 19, 21-22; Wang 2010, p. 5; Little Hoover Commission 2010, p. 16). While more expensive in nominal terms, de Bettignies et al. note that comparing a government's interest rate to that of a P3 is like comparing "apples and oranges" (2004, p. 147). The authors' point is that the government is essentially borrowing at a risk-free rate. (Given that a public sector bankruptcy is exceedingly rare, the state will repay any and all loans.) In contrast, a private company is borrowing at the risk-free rate plus a premium to cover the lenders' loss in the event of the bankruptcy (de Bettignies 2004, p. 147). In other words, the private firm is paying for the cost of borrowing plus an option to possibly declare bankruptcy. Since the government essentially cannot declare bankruptcy, it could not buy that option even if it wanted to. Therefore, the public sector interest rate is not directly comparable to the private sector interest rate. Despite many citations to the contrary, de Bettignies et al. conclude, "…it is not at all clear that the government will be able to borrow at a lower cost than the private sector" (2004, p. 147).

The other common assumption that the government's borrowing costs are lower hinges on the fact that its tax-free bonds trade at a lower interest rate than that of the private sector's taxable bonds. However, private firms may have access to tax-free private activity bonds from the federal government as authorized by SAFETEA-LU (USGAO 2008a, p. 27; Vining et al. 2005, p. 203). To the extent that P3 firms have access to tax-free bonds this advantage of government financing is also negated. Even though the common assumption is that direct government borrowing is cheaper, this is not always the case. All that said, communication to the public of the finer points of debt pricing may be challenging.

Assuming that P3s can deliver needed projects faster than traditional public financing, the public may see the P3 as an innovative way to get projects done. On a popular project, the profit involved with a P3 may be perceived by the public as a necessary evil – a trade off for the timeliness of the delivery. For example, few objected to the large bonus payment paid to the contractor for early completion of the Interstate 10 repairs in west Los Angeles after the 1994 Northridge Earthquake. Unfortunately we did not find any empirical evidence (e.g., a poll of a public in a geographic area proximate to a P3) in the case studies to confirm this common supposition regarding P3s.

Most of the literature conveys the common supposition that the public may be more willing to accept user fees if a private firm delivers a project (Wang 2010 p. 53; Vining et al. 2005, p. 202). We found no basis for this supposition in our research. Conversely, given that Wall Street investment banks and foreign firms are the likely conduits for raising the capital for P3 projects and given their low reputation with the public, their profits would be an easy and high profile target for the public's ire. Moreover, in one case in Texas – State Highway 121 (SH-121) – the fact that a private (also, foreign) entity would be collecting the tolls led to a dissolution of the contract with the P3 and resulted in a public provision of the facility. The fact that a Spanish company won the original contract for SH-121 caused so much outrage from the public that the Texas Legislature intervened; the P3 agreement with the Spanish firm was scrapped and a local public tolling agency was subsequently given the contract resulting in a Public-Public Partnership (Battaglio and Khankarli 2008, p. 145). In that case study the public's objection seemed to be more related to the fact that a *foreign* company would be collecting the tolls rather than an objection to tolling in general or toll collection by private *domestic* firms. However, the public was not appeased until a public agency was responsible for collecting the tolls.

To the extent that a P3 facility has user fees, there will always be political pressure to keep tolls and fares as low as possible and to avoid variability, lest the public think of the facility simply as a "Lexus Lanes" project (USGAO 2008a, p. 29). This pressure would potentially put the public sector sponsor in conflict with a private investor whose primary objective would be to maximize return on investment. However, P3 contracts can, and often do, limit the return on investment a private investor in a P3 earns (ACT 2007b, p. 81; USGAO 2008a, pp. 7, 31). Such constraints, however, may make a P3 less attractive to potential bidders. Moreover, careful oversight on the part of the public sponsor will be required in order to insure such constraints are met (Yescombe 2007, p. 234). Should the public be concerned about high profits, public sponsors can highlight contract provisions that limit a private firm's return on investment, as has been done with the Presidio Parkway Project. The internal rate of return (IRR) for the project has been capped at 14.46% in the executed P3 agreement – the IRR of the actual project bid is slightly lower (Caltrans 2010a, p. 40).

The USGAO notes that tolls and user fees will likely increase faster on a P3 project than on a publicly sponsored facility (2008b, p. 6). If the public holds that same assumption, P3s may be unpopular as the public sees the private firm for what it is, a profit maximizer. In the privatizations of the Chicago Skyway and the Indiana Turnpike, tolls are higher under the private ownership and future hikes are likely to be larger and more regular (USGAO 2008a, pp. 31-32). In both those examples there was a large upfront payment into the public coffers; only time will tell what the public will think of those two deals once the initial payment is spent and tolls continue to rise.

A positive public perception is key to advancing P3s in California. There has been high profile coverage of P3s in California that has been less than positive, such as the SR-91 Express lanes and the subsequent public buyout, as well as the South Bay Expressway and its ensuing bankruptcy. However, the clear lesson of SR-91 about the careful negotiation of any non-compete clauses is common in the best practices literature (USGAO 2008a, p. 71). And, the South Bay Expressway bankruptcy has so far not cost the taxpayers any money, nor has the facility closed.

Until someone conducts empirical research on the public's true thoughts on P3s (e.g., a poll or focus group testing) we cannot definitively say how the public perceives P3s. The public may see the P3 aspect as secondary to the project itself. In other words, if a project is otherwise popular with a group, the P3 aspect may be yet another positive attribute; P3s might be seen as "innovative" and "cost effective." However, if a project is unpopular with a group, using P3 delivery may give opponents an easy target for criticism; P3s might be seen as "costly" and a "give away" to rich (possibly foreign) corporations.

3) Structuring P3 projects

k) Risk assessment and risk sharing

In this section we discuss how risks may be transferred in a P3. There is a great deal of discussion in the P3 literature about risk allocation and the benefits of transferring risk from the public sector to private investors. Table 1 on page 33 shows the typical breakdown of how the existing research suggests that risk should be allocated.

Table 1: Key Risk Sharing Split by Sector

Party Best Equipped To Manage	Risk Factors

Party Best Equipped To Manage	Risk Factors
Public Sponsor	environmental right-of-way acquisition statutory / regulatory public acceptance
Private Investor	construction cost project delivery timeframe maintenance cost latent defects project quality risk factors

Adapted from ACT 2007a, p. 57.

No matter what the contract provisions are, transferring risk to private investors has proven extremely difficult both in theory and practice (Vining and Boardman 2008, p. 152). Ultimately a P3 is supposed to deliver a facility deemed vital to the transportation system. The government sponsor will always retain the risk of either, a) renegotiating a troubled deal in order to complete a facility, or b) not delivering the facility at all (Yescombe 2007, p. 20). The more complex and more expensive a facility is, the less likely option b) would ever come to pass as the political cost of failure would be too high (Vining and Boardman 2008, p. 154). In terms of option a), re-negotiating the contract with the current private investor will always be cheaper than bringing a new partner when a P3 project runs into trouble; given that the private investor knows he or she has the upper hand in the negotiation, the temptation to take opportunistic advantage of the government sponsor is strong (Wang 2010, pp. 57-58).

While many are quick to praise the potential for risk transfer from the government sponsor to the private sector, it is not clear that the sponsor realizes a net benefit, even if risk is successfully transferred. For example, two state governments in Australia successfully transferred risk – the firm in one case declared bankruptcy but the state paid nothing to investors (USGAO 2008a, pp. 22-23) – however, private firms are expert “at ensuring that they are fully compensated for [any] risk…” at the outset of the deal (Vining et al. 2005, p. 215). Consider a person who buys term life insurance. The risk of that buyer dying is not eliminated. Rather, the risk is pooled with fellow policy holders who's premiums will compensate the buyer's beneficiary should he or she die during the term of the policy. In the case of P3s, when risk is transferred to a private investor, the government essentially buys an insurance policy; the private investor calculates the "premium" for said policy based on the total cost of the risk involved and the probability it will occur plus (likely) a markup (Iacobacci 2010, pp. 9, 12, and 26). In the end, even if a government sponsor is successful in transferring a risk to a private investor, said investor will seek compensation equal to risk assumption. In other words, government sponsors can pass off all the risk they want in a P3, however it will come at a price.

Budgetary Risk

Private investors have a fiduciary responsibility to their shareholders and bondholders to a) protect their principal investment and b) to deliver the promised return. Therefore, they must weigh all risks and plan for all contingencies. This is substantially different from public financing, especially for a project funded by general obligation bonds and with no user fees. In public financing, no one is held directly accountable if usage is less than predicted or costs are higher than expected. There is widespread evidence of cost overruns in public works projects (Flyvbjerg et al. 2004, p. 3). However, "[p]rivate equity requires a revenue stream that will cover project debt and generate an acceptable return on investment (ROI) for the equity partners" (Giuliano et al. 2010, p. 6). Thus, private investors, unlike government sponsors, have a financial incentive to control costs. Private investors should bring discipline to budget estimates. As part of Phase II we will look at the reliability of budget estimates on P3 projects.

Payment Risk

There are two main types of P3s: tolled and toll-free. P3 projects the generate user fees e.g., tolled highways, may be more attractive to private investors because they necessarily generate a new revenue stream from which the investors can get repaid (Gómez-Ibáñez and Meyer 1993, p. 9; ACT

2007b, c. 3 pp. 85-86). Moreover, if the P3 firm operates the facility, i.e., it sets and collects the tolls, the firm can feel confident that its revenue is secure. However, there is a risk the projected usage will fall short of forecasts. Flyvbjerg et al. found that ridership projects in rail projects were consistently half of projections, and that roadway usage was over ±20 percent off for half the surveyed projects (2005, p. 144); clearly transportation forecasting is an inexact science. Conversely, a P3 facility which is toll-free (e.g., the Presidio Parkway) is paid for by shadow toll or availability payments. These payments are sourced typically from tax revenues and the state would be contractually bound to pay them. Seemingly, predictable reoccurring availability payments would be more attractive to private firms than tolls. However, any payments could potentially be subject to delays. During past budget negotiations, the State of California has occasionally delayed payments to vendors (Little Hoover Commission 2010, p. 16). Any P3 firm would be well aware of these potential delays and would need to build in a debt service reserve[11] to cover the possibility of a delay of any future payments owed by the state. The cost of this debt service reserve will be built in to the contract. Some transportation projects are more suited to P3 funding than others; in California those projects with user fees may be more attractive to P3 firms.

User fees create a link between the cost of a facility and its use in a way that general revenue bonds never could. Even in a case where a user-fee project is not funded directly by a private investor, but rather by toll / revenue bonds issued by the government, there will be a private sector third-party underwriter who will rate the bonds (USGAO 2008a, p. 25; see also, Iacobacci 2010, pp. 28, 36, and 37). Whether it is a private investor, third party lenders, or a rating agency, a non-state actor will need to conduct an independent analysis of the projected revenue and usage forecasts. This second (or third) set of eyes, ought to create an incentive for the state's revenue and usage forecasts to be more conservative than they otherwise would be if the project was funded by general obligation bonds. As noted in the best practices document,

[11] A debt service reserve is simply an account of money that is set aside to cover payments to lenders in the event that a firm does not receive timely payments from the public sponsor or toll collections are less than predicted.

> … 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

(Giuliano et al. 2010, p. 35; see also, ACT 2007a, pp. 17, 23, and 39). Thus, the involvement of the private sector (even if only a bond rating agency) should help to create more realistic usage forecasts and control costs.

Bankruptcy Risk

Private investors minimize their risks by creating special purpose entities to take on the responsibility of a P3 (Vining and Boardman 2008, p. 153; Wang 2010, p. 57; Yescombe 2007 p. 109). Once a larger private firm has formed this entity it can limit its total risk exposure, at a maximum, to the equity invested in the new entity. The equity is supplemented with debt from the market. For example, if the project had a total cost of $100 million, a private firm might seek $80 million of debt and fund the remaining $20 million of equity (Iacobacci 2010, pp. 26 and 37). This equity can, and is often, funded by the market as well (Vining and Boardman 2008, p. 153). Potentially, the private firm may have very little capital exposed. In other words, the private firm is unlikely to, and usually does not, have much "skin in the game." If the project goes horribly wrong, the private firm can simply put the new entity into bankruptcy and walk way (Vining and Boardman 2008, p. 153; Vining et al. 2005, p. 215; USGAO 2008a, p. 23). Moreover, the presence of third party debt and equity holders in a deal may hinder the promised innovation and efficiency promised by P3s; bankers are a conservative lot and they may put pressure on the P3 firm to use "tried and true" methods, materials, or practices rather than try something new (Yescombe 2007, p. 23). Government sponsors must be aware of who will be held responsible for unplanned costs, for example. Will it be the large, well-capitalized, P3 firm or a small subsidiary that is easily put in the bankruptcy if something goes horribly wrong?

Political Risk

P3 contracts along with detailed budgets and forecasts are public documents. In some cases the extra visibility that necessarily comes with P3 delivery of a project can possibly add political risk that would otherwise be absent from a traditionally funded project (Yescombe 2007, p. 28; USGAO 2008a, pp. 22-23). Political risk can never be transferred to a private investor. To the extent that a P3 becomes an issue in a political campaign, the outcome of the election could determine the success or failure of a P3 (ACT 2007a, pp. 53-54; Iacobacci 2010, pp. 30-31, and 42).

l) Responsibility and accountability

In the following section we discuss responsibility, accountability, and ensuring that the public gets a fair deal when the state enters into P3s. As we have seen in San Diego County, the involvement of private investment does not necessarily mean the avoidance of over forecasting usage. In the case of the South Bay Expressway, rosy user forecasts turned out to be optimistic and the company that both built the road and collects the tolls went into bankruptcy protection in March of 2010 (Schmidt 2010). In this case, the deal was structured as a concession and the state is not obligated to bailout the investors. In other words, the accountability for the lower revenues falls on the private investor. However, there is little chance the facility would ever close or be abandoned (Giuliano 2007, p. 13). Most likely the government will extend the concession allowing the owners to refinance the debt as happened after other P3 bankruptcies, e.g., the Dulles Greenway (Wang 2010, p. 140). Of course by extending the concession, the government sponsor is foregoing revenue in the future (assuming that the facility would continue to be tolled at the end of the concession) or a delaying the facility becoming free for users; again as Vining et al. note, “there are no free lunches” (2005, p. 199).

The USGAO notes in testimony to Congress while the US Department of Transportation had done much to promote the idea of P3s, it has done too little in helping states and local governments evaluate them (USGAO 2008b, pp. 3, 12). Adrian Vining and Anthony Boardman outline eight rules for government on entering P3s. The rules serve to insure successful P3s that benefit the taxpayers. Those rules are outlined in Table 2 on page 39. Before formulating those rules Vining and Boardman state some of the pertinent conclusions from P3 research. One, the authors aptly point out, "…[P3] firms wish to *maximize profits* not pass on their superior production efficiency to government in the form of lower prices" emphasis added (Vining and Boardman 2008, p. 152). Two, they cite evidence that the competitive pressures of the bidding process could reduce costs (see also, de Bettignies et al. 2004, p. 139). However, those cost savings maybe outweighed by the higher transaction costs both in a) the request for proposals / bidding process / contract negotiation, and b) on-going contract monitoring (Vining and Boardman 2008, p. 150; USGAO 2008a, p. 34; USGAO 2008b, p. 6, Iacobacci 2010, pp. 9-10 and 26). As one example of transaction costs, the AECOM Consult Team guide recommends that public sponsors hire "firms or individuals with comparable expertise" to P3 firms (ACT 2007a, p. 37). The USGAO notes in its report that these experts can be very costly; for example, on a rail project in Denver the public sponsor anticipated spending $15 million on advisory fees when negotiating the P3 contract (USGAO 2009, p. 21; see also, USGAO 2008a, p. 34). Vining and Boardman conclude that even if a private investor can be made to pass along cost efficiencies to a public sponsor, taxpayers will only benefit from said savings if transactional costs (i.e., the *ex ante* negotiating, and *ex post* monitoring of the P3 contract) are less than the private-sector efficiency benefits (Vining and Boardman 2008, p. 159). To avoid these pitfalls, the authors developed the following eight rules. See Table 2 below.

Table 2: Vining and Boardman's Eight Rules for Governments Entering in to P3s

	Rule	Summary Explanation
1.	Establish A Jurisdictional P3 Constitution	Adopt, "as closely as possible, quasi-constitutional provisions to ensure transparency for all P3s," most importantly in P3 budget reporting and public availability of all contracts (Vining and Boardman 2008, p. 156).
2.	Separate the Analysis, Evaluation, Contracting / Administrating, and Oversight Agencies	Separate agencies that: analyze project desirability; decide on mode of alternative procurement; administer P3 process; evaluate overall P3 success. Without separation, the "otherwise monolithic P3 agency" will "turn into an agency that sees its main job as boosting P3s" (Vining and Boardman 2008, p. 157).

	Rule	Summary Explanation
3.	Ensure That the Bidding Process Is Reasonably Competitive	Public sector should be "permitted, even encouraged" to bid on P3s, though it may not be optimal for major, complex projects (Vining and Boardman 2008, p. 157). Government P3 promoter should actively seek bidders if at least optimal number (three to five) is not already present. Also, de Bettignies et al. note that competition is the key to reducing the bid prices (2004, p. 139).
4.	Be Wary of Projects That Exhibit High Asset-Specificity, Are Complex or Involve High Uncertainty, and Where In-House Contract Management Effectiveness Is Low	Because changes in plans and / or implementation are "inevitable" once a complex project has begun, "the ability to renegotiate at a reasonably low cost can be thought of as a (valuable) option" for governments and private investors alike (Vining and Boardman 2008, p. 158). Such an option must be explicitly built into the P3 contract in order to be assured, especially since "complex and uncertain projects are exactly the ones where government would like to reduce risk" (Vining and Boardman 2008, p. 158).
5.	Include Standardized, Fast, Low-Cost Arbitration Procedures in All P3 Contracts	Two arbitration procedures should be included in any P3 contract: first, for disputes "that the parties agree are minor," and second for disputes "that at least one party considers to be a major breach of contract" (Vining and Boardman 2008, p. 158).
6.	Avoid Stand-Alone Private Sector Shells With Limited Equity From the Real Private Sector Principals	This rule is perhaps the most critical rule in ensuring P3 financial success for all parties. The public sector must ensure that "the private sector partner or partners have sufficient equity at risk to give them the proper incentives for optimal performance" (Vining and Boardman 2008, p. 158). Balance is needed in the private sector's equity to debt ratio to avoid a potentially catastrophic distortion of financial incentives in a P3.
7.	Prohibit the Private-Sector Contractor From Selling the Contract too Early	If something negative occurs during the project's operating phase and there is uncertainty as to "who to pin the blame on," government transaction costs can increase astronomically (Vining and Boardman 2008, p. 158). Also, if contractor thinks it can sell contract "before all of the bugs are known" in the P3, it will have an incentive to under invest in the P3 (Vining and Boardman 2008, p. 158).
8.	Have a Direct Conduit to Debt Holders	"If the private sector equity participant declares bankruptcy, there should be a clear conduit to the debt holders;" but, "if the other rules are adopted," this rule "is probably unnecessary" and certainly "should be avoided if possible" (Vining and Boardman 2008, p. 158).

Source, Vining and Boardman 2008, pp. 156-159.

To ensure maximum transparency and accountability for all parties, we recommend that the state adopt these eight rules.

m) Contingency planning

See k) Risk assessment and risk sharing on page 33.

n) How P3s fit into the capital planning process

See e) The capital planning and funding process on page 18.

4) Criteria for evaluating potential P3 projects

In this section we will a) define a successful P3, b) develop a list of attributes that theoretically will predict the success or failure of the project, and c) collect a data sample of P3s that both meet and fail our definition while comparing the attributes of successful projects to the unsuccessful ones. Our aim is to provide decision makers with a set of pre-implementation project attributes which can help identify candidate projects for successful P3 implementation. By identifying these attributes, and verifying their presence or lack thereof, decision makers can more effectively evaluate a P3's potential for success.

Definition of Successful P3s

Since each individual P3 is tailored specifically to that project's institutional context and environment, we experienced some difficulty in forming a general definition of a "successful" P3. While one project may be considered a success in one context, that same project, if undertaken in a different environment, may very well be considered a failure. Furthermore, given that the scope and complexities of projects vary even within the same institutional context – successful brokering of a highway maintenance contract in California is not of the same complexity as negotiating a concession agreement for California's proposed high-speed rail line, for example – finding a consistent pattern that demarcates success is often difficult. In short, so much surrounding the definition of a successful P3 is contingent on the project's larger environment and the expectations of what the project should accomplish. As such, we have sought to define what constitutes a successful P3 by identifying five key characteristics of P3s that transcend differences of project contexts / environments and that are hallmarks of successful P3s, as observed by existing P3 literature.

A P3 can be considered successful if it meets all five of the following criteria:

1) the project is completed on time and within budget at a minimum;

2) the project has never entered bankruptcy or sought bankruptcy protection;

3) there is a measurable financial benefit / cost savings realized by the public sponsor;

4) the project's operations and maintenance (O&M) service components are of at least the same quality as would be possible through traditional procurement;

5) the P3 has contributed positively to the overall efficiency of the transportation system.

Again, our definition of a successful P3 is a project that meets or exceeds all five of the above criteria. We discuss each of these individual characteristics in the five subsections that follow.

1. The project is completed on time and within budget at a minimum.

A successful P3 must be completed at least on-time and within the project's allotted budget. On-time and on-budget project delivery eliminates cost overruns and politically-volatile delays in the project entering service. A set of reports released by AECOM Consult Team stressed the importance of "keeping the project moving" for both political and financial reasons (ACT 2007b, c. 3 p. 72).

Successful P3 arrangements will have demonstrated an ability to maintain consistent progression of project construction and to achieve on-time and on-budget delivery. Regardless of the project's larger context (e.g., the expectations of risk allocation, how much financial gain is to come from the project, or what sort of operational benefits are anticipated) if a project's delivery is delayed or it runs over budget (or both), the P3 simply cannot be considered successful by any standard. While "changes in plans and / or implementation are inevitable after the project has begun," the public sponsor and private investor must work together to mitigate the impacts of those changes on both the project's bottom line and its delivery schedule further down the line (Vining and Boardman 2008, p. 157). Flyvbjerg et al. cite a significant annual percentage increase in overall project cost for each year of project construction delay; on-time delivery and on-budget delivery are very much tied together in P3s, as a delayed project will cost more and threaten project viability (2004, p. 16).

In a P3, the public sponsor and the private investor enter into a contract to guarantee the delivery of a facility by a certain date and within certain budgetary constraints. If those conditions are not met then the core tenets of the contract have not been met and the P3 is simply not a success.

2. The project has never entered bankruptcy or sought bankruptcy protection.

A successful P3 will have never entered bankruptcy or sought bankruptcy protection. First and foremost, such a P3 would not satisfy item number three in the list of successful P3 characteristics. An asset that enters into bankruptcy or seeks bankruptcy protection is by no means minimizing the public sponsor's financial risk exposure, nor financially benefitting the public sponsor in any way. Secondly, for those projects funded by user fees, if a facility enters bankruptcy it presumably suffered from less-than-anticipated demand. Such an occurrence raises questions about the effectiveness of many components of the public sponsor's and the private investor's due diligence and planning elements, e.g., demand forecasting, risk analysis, and contingency planning (Giuliano, et al. 2010a, p. 37). Finally, an asset that goes bankrupt is a public relations and political problem on a multitude of levels, damaging the acceptance of the P3 model. A P3 that has been forced to seek bankruptcy protection in any capacity cannot be considered a successful arrangement.

3. There is a measurable financial benefit / cost savings realized by the public sponsor.

If a P3 does not offer a financial benefit to the public sponsor, then there is simply no point in seeking alternative procurement. The entire purpose of a P3 is to leverage strengths from both the public sponsor and private investor i.e., cutting out each other's weaknesses to minimize cost and maximize construction speed and overall asset productivity. If the public sponsor finds itself exposed to increased financial risk after a P3, to the point where less financial risk exposure would occur should the public sponsor engage in traditional procurement, then the project cannot be considered successful. This increased risk exposure includes both outright financial risk (e.g., long-term availability payment or asset hand-back schedules) and residual financial risk as well – if the asset goes bankrupt, the state must assume control to keep the asset operational (ACT 2007b, c. 3 p. 61; see also Bankruptcy Risk on page 37).

The issue of how to allocate bankruptcy risk ties in more generally to proper risk allocation at the outset of the P3 process. The public sponsor should conduct a quantitative, objective VfM / PSC analysis to determine whether or not public procurement is the best option for a given project (see d) Fiscal Analysis and Modeling on page 13). Pursuing alternative procurement just for the sake of facilitating a P3 is not a sufficient justification to enter into a P3 arrangement. Such a project may expose the public sponsor to major financial risk, and at multiple levels. Successful P3s should not only benefit the public sponsor in terms of saving resources from the outset (e.g., construction and labor costs) but also they should minimize the public sector's outright and residual financial risk exposure over the long term. Ultimately, the endgame for politicians involved in P3s is to minimize both government spending and debt from projects that would appear as part of the government's bottom line in the general fund (Vining and Boardman 2008, p. 153). As such, P3s should work constructively towards achieving public sector financial savings. Some potential sources of financial savings from P3s are,

- decreased project financing costs;
- general reduction in public sector financial risk through transfer to private sector;
- reduction / elimination of public sector funding commitments;
- expedited delivery that decreases construction costs;
- "economies of scale" in the private sector during project design and construction;
- "cost-reduction incentives" in the private sector; and
- potentially-reduced private sector labor costs (Vining and Boardman 2006, p. 5).

A P3 that does not contribute to the public sponsor's drive to mitigate financial risk and more generally generate some sort of a financial benefit for the public sponsor cannot be considered successful.

4. The project's O&M service components are of at least the same quality as would be possible through traditional procurement.

In a P3, public sponsors tap private investors not only to increase project financing capacity in the face of lean public resources, but also to provide technical expertise throughout the project's design, construction, and O&M phases. Some private firms are so large that their bank of experience is quite impressive, to the point where some "have superior scale, scope, or learning economies because they are more specialized, larger, and have more experience in the construction and operation of the relevant businesses" than public sponsors (Vining and Boardman 2006, p. 4).

With that increased expertise comes increased expectations for the quality of the product delivered. Given that many firms in the private sector have at their disposal a wider array of financing instruments and technical experts than does the public sector, a successful P3 should result in the delivery of a facility *at least* of the same quality as a facility delivered through traditional procurement. A privately designed and built facility may even be of a higher quality than a comparably publicly designed and built work (Vining and Boardman 2006, p. 4). The facility should be operated and maintained *at least* at the same service level than a traditional procured facility. Because of the private sector's increased economies of scale and expertise, the operation may be of a higher level as well. If at least the same quality and service levels are not attained, the public sponsor is not getting optimal "bang for its buck" with regards to the P3.

5. The P3 has contributed positively to the overall efficiency of the transportation system.

Most of the characteristics of a successful P3 have, until this point, been almost exclusively focused on the financial performance of the P3 and its ability to minimize the public sector's financial risk. But the project's operational benefits are important when evaluating a P3 as well. If a P3 does not increase operational efficiency of the larger transportation system in some capacity (be it handling increased demand without congestion, decreasing travel times, or perhaps making travel safer) the P3 cannot be considered successful. Efficient financing and on-time delivery of a project are most certainly critical components of determining whether or not a P3 can be considered successful. But, if the facility doesn't actually increase network efficiency in any tangible way, no amount of innovative financing or environmentally-minded engineering / planning matters. The P3-delivered facility must increase network efficiency to be considered a success.

Pre-Implementation Attributes for Identifying Successful P3s

Methodology

We saw a need to derive, from past experience, a significant number of *ex-ante* indicators of P3 success – attributes that would indicate increased likelihood of P3 success if met before project implementation began. As such, we chose nine independent attributes to predict P3 success as per our definition. The attributes we chose were selected specifically because we felt, from past P3 experience and research, that they collectively covered the most critical factors in determining P3 "success" or "failure," both financially and operationally.

We reviewed 100 case studies of transport P3s worldwide. Of those, we found 69 successful projects. This does not mean that only 69 successful transport P3s exist in the world, just that only 69 percent of our sample met all five criteria in our definition. We then created a set of nine attributes that we hypothesized, in conjunction with existing P3 literature, to have significant predictive power as to whether or not a P3 would be successful. In short, the attributes we derived can serve as pre-project implementation indicators of success or failure. We reviewed all 100 case studies to identify, in each P3 project, the presence or lack thereof of the nine ex-ante success attributes to test our hypothesis.

The following is a description of each of the nine attributes chosen, including a rationale for picking each, the attribute's connection to the five-point definition of success laid out earlier, and the hypothesized relationship between the attribute and our definition of P3 success. After the description of the attributes, we present our research and then discuss the conclusions reached.

"Alt. Finance (F)" / "Alt. Ops (O)" / "Alt Maint. (M)": P3 contains some form of alternative financing, operations, and / or maintenance

If a P3 does not include some form of alternative finance, operations, and / or maintenance provisions, then the key strength of the P3 model has not been leveraged. If a project is simply DB, the government is merely contracting out a project and, in so doing, incurring all of the negative externalities and costs of P3s while gaining but a few minor benefits from the P3 model (Vining and

Boardman 2008, p. 151). P3s with some alternative F / O / M will better leverage the potential gains from the P3 model and will be in better shape to attain financial self-sufficiency than straight DB.

The presence of any private capital in the project's financing agreement is our measure of alternative financing (alternative F). We take alternative F to mean the leveraging of private capital[12] (debt, equity or both) to finance a public transport infrastructure project, rather than the use of financing techniques like TIDs which really just involve re-tooled or non-explicit public funding / financing arrangements. Alternative O&M would be constituted by the inclusion of a separate O&M contract within the larger P3 contract.

We expect that, for projects that meet our definition of successful, alternative F / O / M will be very frequent, as inclusion of private capital and O&M expertise in projects will lead to the realization of significant public sponsor benefits. The presence of alternative F / O / M also signifies the private sector has significant "skin in the game," increasing incentives for on-time and on-budget delivery (Vining and Boardman 2008, p. 152). The same logic applies to service levels. The private partner should be obligated to provide O&M at a level the same as or higher than what could have otherwise been provided by the public sector, and ultimately more cost-effectively as well (Iacobacci 2010, p. 24).

"Existing Capacity Constraints:" P3 conceived, in part, due to existing system capacity issues

Delivery of transport infrastructure projects and improvements, however significant they may be on their own merits, take on an entirely new importance and criticality when the transportation network of which they are a part is suffering from capacity constraints. Be it reduced throughput, speed restrictions, overcrowding, or unsafe operating conditions, capacity constraints can drag down the functionality of an entire transportation network and threaten economic growth.

P3s can expedite delivery of such critical infrastructure projects and oftentimes allow for delivery of those facilities well ahead of what was considered possible through traditional procurement

[12] See section v) Status of capital market and sources of capital starting on page 78.

(ACT 2007a, p. 12; PwC 2010, p. 8; Iacobacci 2010, p. 2; USDOT 2007, p. 4; Duffield 2008, p. 4). We expect most of the P3s that meet our definition of success to have come about because of existing capacity constraints. Presence of existing capacity constraints means that the facility will be more apt to have a significant positive impact on enhancing the efficiency of the transportation system. Furthermore, given the criticality of the project, all stakeholders should have an incentive to deliver the project as soon as possible and within budget.

That said, capacity constraints faced by a given facility or area indicate larger project finance or funding issues. Given the presence of capacity constraints, increased capacity should, in theory, be funded and built. The continuing presence of capacity constraints suggests a lack of public sponsor funding availability to add more capacity. This funding shortfall and facility demand motivates both P3s as well as the inclusion of private capital more generally.

Finally, existing capacity constraints indicate a large demand for travel, increasing the likelihood of significant tolling revenues to be realized, minimizing the amount of public resources required to support the project. We expected most, if not all successful P3s to address some sort of capacity constraints, both justifying the project initially and serving as a motivator for all stakeholders to make the partnership truly work.

"Total Cost = >$500 mil": P3 total cost in excess of $500 million

FHWA (2009, p. 3) and PwC (2010, p. 11) both indicated that in order to be successful, transport P3s require requisite complexity and scale. Given that P3s incur significant transaction costs, this argument is intuitive – the larger the overall cost of the project, the smaller, by percentage share, the transaction costs. Furthermore, the larger in cost a project, the greater the incentive of the public sponsor to seek some form of alternative procurement, all else equal – thus decreasing risks borne by the public sponsor. This is not to say that only larger projects should be considered as P3s, but rather that only larger projects will achieve sufficient economies of scale to justify alternative procurement in the first place.

We hypothesized that most of the projects that meet our definition will be of requisite economic scale to achieve economies of scale. We estimated the quantitative definition of a "large" project, one that has attained requisite economic scale, to be a project costing at least $500 million; our estimate is consistent with other project finance research conducted by the Harvard Business School (Esty 2004, p. 218). We also averaged the costs of the projects that met our definition of successful to provide perhaps a more accurate look at what constitutes requisite economic scope / cost.

"Few Existing Substitutes": P3 is not in direct competition with other nearby facilities

Bridges, tunnels, mountain highways, and other forms of very specialized infrastructure assets are, by their nature, non-substitutable and do not compete with very many other infrastructure assets. Such assets are ripe to be tolled – or to levy user fees in some other capacity – and are very attractive for P3 (perhaps more for concession than initial construction) as a result of their profit potential. Assets with few substitutes are more likely to achieve financial and operational self-sufficiency and create a financial benefit for both public and private sectors. We consider a substitute to be a parallel or readily-accessible facility, allowing for consumer choice – a free road next to a tolled, higher-speed interstate, for example.

We expected the projects that meet our definition of success to have few existing substitutes – with few substitutes comes increased investment as well as increased throughput and, ultimately, increased revenue-generating potential. We believe that P3s with few substitutes are more inclined to incorporate tolls and fully leverage their position, helping the facility to achieve financial self-sufficiency while also maximizing the financial benefit to the public sponsor.

While few existing substitutes may seem to be measuring the same qualities as existing capacity constraints, it is important to distinguish that the two attributes are, in fact, revealing very different tendencies of a P3. Existing capacity constraints is itself is a proxy of demand, whereas few existing substitutes is a proxy for overall infrastructure supply/demand diversion. Los Angeles freeways have plenty of existing substitutes (arterial and secondary streets, mass transit, etc) but there are very serious capacity constraints, as evidenced by the area's notorious traffic. Germany's Rostock Tunnel, conversely, has no existing capacity constraints – very little traffic uses the facility – but few existing substitutes (only the train traverses the mountain range out of the town). In short, existing capacity constraints is a demand-side attribute, whereas few existing substitutes deals more explicitly with supply-side project factors; both are needed to see the full picture. Projects with lots of substitutes (supply) and no existing capacity constraints (demand) are highly unlikely to be successful facilities in the long-term.

"Gov't Availability Payments": P3 relies on shadow tolls or availability payments

Availability payment-based (also referred to as "shadow tolled") P3s are attractive because payments for the project will come *after* the project is constructed and open for business. Availability payment-based P3s (and shadow tolled as well) are popular because they enable governments to defer major capital expenditure, one of – if not politicians' prime – aims in considering how to deliver infrastructure (Vining and Boardman 2008, p. 153). Moreover, availability payments and shadow tolls are invisible to users and can be an effective way to address public perceptions and political concerns about charging a traditional user fee or toll (PWC 2005, p. 1; Fitch Ratings 2007, p. 2-3; Dochia and Parker 2009, p. 1).

Availability payments differ from subsidies in that subsidies are payments intended to cover regular operating costs, whereas availability payments are used to amortize capital expenditure on a project over time. Availability payments and shadow tolls are, however, an acknowledgement that a given project will not recover capital costs from revenue generation alone. If an asset could recover initial capital costs with revenue intake, then availability payments or shadow tolls would not be needed. Another potential use for availability payments is to incentivize performance levels – be it by the contactor during the initial build phase, the operator once the asset is operational, or by any other party during the asset's lifespan. Such a scheme can even be implemented in conjunction with toll roads, as has been done with the I-595 Express Lanes project in Broward County, FL (FHWA 2010).

We chose to incorporate this attribute in order to further gauge the level of financial burden that would be experienced by the public sector. In the long-term, availability payments and shadow tolls do not decrease public sponsor financial risk or funding responsibilities so much as they maintain or even increase public sector financial risk exposure. State governments are essentially unable to seek bankruptcy protection, so availability payments are guaranteed. Furthermore, availability payments have an opportunity cost: given that availability payments financially "lock in" the public sponsor with a pre-determined long-term payment schedule, the funds over the course of the payment period cannot go towards other needed or wanted projects.

Thus availability payments in a sense "crowd out" other government expenditures; to what degree that crowding out effect occurs in the long term will be explored more in depth in Phase II. When paid over time to a private investor, availability payments may wind up being a high cost method of financing; in Phase II we will attempt to quantify the effective interest rate on projects that use availability payments. Ultimately, we hypothesized P3s which include some sort of availability payments to secure project financing will be less-apt to be successful.

"Gov't Funding": Government funding supports P3 operations

Availability payments are effectively payments from the public sector to the private sector for operation of the facility (which may also include performance-based compensation) once the facility has been built and is in operation. Government funding of a facility, however, is slightly different; it involves the government funding a facility's construction. While availability payments are effectively an "operating subsidy," government funding consists of the public sponsor explicitly reserving capital for construction of the facility and (potentially) operation of it as well. This funding may occur even with the presence of alternative finance or O&M – and small portions of government funding may be used even for projects with minimal public financing. In such cases, the funding would be expected to come in the form of debt service (in arrangements like GARVEE financing) or other regulatory / mitigation-related payments. Government funding is different from public sector financing in that public sector financing entails the responsibility to set aside the capital for initial construction of the project belongs to the public sector, while funding comes from either the facility itself (tolls) and / or other private sources over time.

Government funding is used largely in conjunction with DB contracts. If the public sponsor is responsible for project funding, then public sponsor financial risk remains significant. Furthermore, maximal public sponsor cost-savings through the P3 arrangement have not been achieved. Government funding, much like the previous availability payments attribute, indicates the extent to which the public sponsor incurs a penalty from the project. Projects that include government funding for operations are not expected to be correlated with project success.

"Contract Length": P3 contract length

We expected there to be an inverse relationship between P3 success and project contract length. Past research on P3s has shown increased contract length causes an inherent decrease in contract flexibility, locking all stakeholders into a contract highly vulnerable to macroeconomic shifts and fluctuations in the capital markets (discussed in section 6 starting on page 70) (Iossa et al. 2007, p. 75). Given the travails of long-term P3s like the Chicago Skyway, SR-125, and even the Virginia toll roads in Fairfax and Loudon Counties, past P3 experience has indicated that lengthy contracts indicate an investment which requires a long-term investment vision; i.e. positive ROI is far from imminent. Furthermore, we recognized that in poorly-performing P3s, contract-lengthening is a regular component of any refinancing package when debt default looms near – thus we expected an inverse association between contract length and P3 success. Finally, we also assert that a shorter contract will create an incentive for the private stakeholder to increase equity in the project and, as such, increase the incentive to optimize asset performance to, in turn, optimize ROI (Vining and Boardman 2008, p. 156). Ultimately, successful P3s, we hypothesized, would have shorter contracts than unsuccessful P3s.

Table 3 below, summarizes each of our nine ex-ante attributes and our expectation of how the presence or absence of each attribute will influence success or failure of the P3.

Table 3: P3 Attributes as Pre-Implementation Success Indicators – Expected Relationship

Alt. Finance (F)	Alt. Operations (O)	Alt. Maintenance (M)	Existing Capacity Constraints	Total Cost = >$500 million	Few Existing Substitutes	Gov't Availability Payments	Government Funding	Contract Length
+	+	+	+	+	+	-	-	-

+ : presence of attribute pre-implementation will increase likelihood of project success
- : presence of attribute pre-implementation will decrease likelihood of project success

The Sample

Before we discuss the pre-implementation success attribute distribution among the projects sampled, we feel it is necessary to clarify the designation of two particular projects, SR-91 Express Lanes[13] (SR-91) and the Chicago Skyway. The problems created by SR-91's noncompete clause resulted in OCTA (Orange County, California Transportation Authority) buying the facility following an effort by Caltrans to widen the adjacent road. This buyback potentially violates the third criterion in our five-point success definition (there is a measurable financial benefit / cost savings realized by the public sponsor). Nevertheless, we counted SR-91 as a successful P3 because it included the remaining four

[13] A tolled facility located in the median of California State Road 91.

items in our five-point list. While the OCTA is now exposed to some usage risk going forward, the construction and initial operating risks were successfully transferred to the private firm. Moreover, the OCTA had the benefit of knowing actual historical operating and maintenance cost and demonstrated revenue before it made its purchase. Additionally, institutional learning occurred following the project; noncompete clauses in P3 contracts should be crafted less rigidly than in the case of SR-91 (Wang 2010, p. 137). In short, we feel it appropriate to view SR-91 as a successful P3.

Conversely, the Chicago Skyway lease came close enough to bankruptcy for us to consider it in violation of our second criterion (the project has never entered bankruptcy or sought bankruptcy protection) (Peterson 2009). The privatization of the Chicago Skyway does not make the overall transportation system more efficient so much as it re-allocates revenues and tolling proceeds. It does not create a viable long-term financial benefit for the public sponsor. Rather, it created a one-time cash infusion. In addition, there is long-term risk associated with the financial instability and excessively high debt load of the Skyway deal. The Skyway initially achieved number four in our five-point success criteria (O&M parity with traditional procurement). However, once traffic levels began a precipitous and sustained decline, resulting in a significant revenue shortfall, O&M declined as well. Ultimately, the facility's revenue potential is limited, calling into question the viability of the 99-year lease and whether or not the public stakeholders truly got the most utility out of such a long-term deal in the form of a large, up-front lump sum payment. Therefore we classified the Chicago Skyway as a failure.

Also note that we excluded P3s that were simply design-build (DB) from our sample.[14] In our estimation a truly successful P3 will take a contract form other than DB. AECOM Consult Team observes that more than two-thirds of global road-related P3s between 1985 and 2004 have used the DB contract

[14] Though we excluded DB from our sample, DB-oriented projects do offer a number of significant benefits for the public sector, including expedited project delivery, a tendency towards cost containment (a minimizing of cost overruns, at the very least), enhanced project risk allocation, and increased project quality as well (ACT 2007a, p. 14; NCHRP 2009, p. 8). DB P3s can also serve as an effective "stepping stone" for governments wishing to commit to more innovative forms of infrastructure delivery in the future, but are inexperienced with the practice (ACT 2007b, c. 3 p. 14).

model (2007a, p. 60), and DB is now a fairly standard common practice. DB has been increasingly used over recent decades by state surface transportation agencies; it involves the state seeking a private contractor to carry out a project using government funds. Potential cost savings for DBs is limited to the difference between in-house and contracted services. It does not leverage government funds or generate new funds. It affects risk costs only to the extent that construction risk can be allocated to the private contractor.

Some nations have gone so far as to categorize DB under the "traditional" infrastructure provision approach (Iacobacci 2010, p. 2; Duffield 2008, p. 8). But DB, while politically expedient and less-complex than DBOM, DBFOM, or DBFO arrangements, "are best thought of as contracting out because these kinds of contracts rarely involve 'project aggregators and financiers' as the major private sector partners" (Vining and Boardman 2008, p. 151). As such, project transaction costs can rise and negate any lowering in production costs or efficiency gains "because government has to negotiate with, and monitor, suppliers who have their own (profit-maximizing) incentives" (Vining and Boardman 2008, p. 150).

Discussion of results

We present the data in two tables and one chart on the following pages. Table 4 on page 56 shows the 69 successful case studies out of the 100 total P3s reviewed; recall that in order for a project to be considered successful, it must meet all five criteria spelled out in our Definition of Successful P3s starting on page 41. Table 5 on page 63 shows the 31 unsuccessful case studies. Gray shading and the letter X (or other information where applicable) indicate the presence of a given pre-implementation attribute; n/a designates that information was not available for the given P3. Unless otherwise indicated, a blank space on the table indicates the absence of a given attribute, rather than a lack of information. The attributes are listed in order of decreasing magnitude (based on the successful projects) from left to right. The projects are, themselves, in no particular order other than the order in which they were reviewed. Figure 6 on page 67 compares the percentage of each attribute in the successful group (shown in yellow) and the unsuccessful group (shown in red). Again, the attributes are listed in order of decreasing magnitude (based on the successful projects) from left to right.

Table 4: List of Successful P3s

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
2nd Severn Crossing Bridge: Bristol, UK	X	X	X	X	$1,080	X			30		2
A25 Montreal: Quebec	X	X	X	X		X			35		19
Airport MAX LRT: Portland, Oregon	X						X		DB	X	34
Alameda Corridor, Los Angeles, CA	X	X	X	X	$2,400	X	X		n/a	X	7
Anton Anderson Memorial Tunnel: Whittier, AK		X	X	X		X	X		7	X	1
Atlantic Ciy Brigantine Connector: New Jersey	X			X		X	X		DB	X	1
Atlantic Station 17th Street Bridge: Atlanta, GA	X						X		4	X	1
Avenida de America IES (Intermodal Transit Exchange Station): Madrid, Spain	X	X	X		X				25		28
Bina Instra Motorway: Croatia	X	X	X	X	$727	X		X	32		27

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Bogota BRT: Bogota, Colombia	X	X	X	X	$3,300				n/a		3
Bremen GVZ (Rail Intermodal Facility): Germany	X	X	X	X	$500	X	X		BOO		27
CA-91 Express Lanes: Orange County, CA	X	X	X	X	$537		OCTA buy back of fwy	OCTA buy back of fwy	35	X	9
Canada Line: Vancouver, BC	X	X	X		$2,054		X		35		12
Central Texas Turnpike System: Austin, TX	X	X	X	X	$3,300				n/a	X	4
Charlottetown Transit: Prince Edward Island	X	X	X					X	5		32
CityLink: Melbourne, Australia	X	X	X	X	$2,000				34		2
Cochin International Airport: Kerala, India		X	X	X	$3,000	X			n/a		3
Coimbatore Bypass: India		X	X	X		X	X		BOT		31
Confederation Bridge, PEI	X	X		X	$840	X	responsible for bridge M		20		16
Country Park Motorway: Hong Kong, China	X	X			$930	X		Free ROW	30		2
Curitiba BRT: Brazil		X	X	X	X		Init. Capex		privatized		36
DC Streets: Washington DC	X	X	X						5	X	30
Dutch High Speed Line: Netherlands	X	X	X		$3,750			X	30		26

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
East Coast Road: Tamil Nadu, India	X	X	X	X					n/a		3
Edmonton Orbital SE: Alberta		X	X	X		X	X	X	30		21
Foley Beach Expressway: Baldwin County, AL	X	X	X	X		X	X		n/a	X	9
Gautrain Rapid Rail Link: South Africa	X	X	X	X	$3,700	X	X		20		14
Golden Ears Bridge: Vancouver, BC	X	X	X	X	$746	X		X	33.5		15
Hamburg International Airport: Hamburg, Germany	X	X	X	X	$525	X	X		4		6
Heartland Corridor: Midwest US	X	X	X	X		X	X		D(B)B	X	11
Highway 104 Cobequid Pass: Nova Scotia	X	X	X	X		X			30		25
Hudson-Bergen Light Rail: New Jersey		X	X		$2,200		X		30	X	29
I-75 Expansion: Collier/Lee Counties, FL	X			X		X		X	DBF	X	20
IROX I-75: FL	X			X		X		X	DBF	X	20
Isaac's Canyon Interchange: Boise, ID	X			X					DB	X	4
JFK Terminal 4: New York City, NY	X	X	X	X	$1,450				n/a	X	4
Kicking Horse Canyon Phase 2: BC	X	X	X	X		X		X	25		22

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Laibin B Power Plant: Guangxi Zhuang, China	X	X	X	X	$600	X			20		5
M1-A1 Link: Leeds, UK	X	X	X	X	$544			X	30		2
M2 Motorway: Sydney, Australia	X	X	X	X					45		10
M6 Tollway: Birmingham, UK	X	X	X	X	$1,700				53		2
Maputo Port Rehabilitation: Mozambique, Africa	X	X	X	X		X	Retains 49% ownership of port during period		15		33
N4 Toll Road: South Africa and Mozambique	X	X	X		$660	X			30		3
New York Ave/ Florida Ave/ Gallaudet Univ. Metro Station: Washington DC							X	X	DB	X	4
North Luzon Expressway: North Luzon, Philippines	X	X	X	X		X			30		3
Northeast Stoney Trail Freeway Extension: Alberta	X	X	X	X	$652	X		X	32		18
Okanagan Bridge Replacement: British Columbia	X	X	X	X	X	X		X	30		24
Penang Bridge: Penang, Malaysia	X	X	X	X		X	Built by govt, then leased		25		3

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Port of Aqaba Expansion: Aqaba, Jordan	X	X	X	X	$710	X			25		3
Port of Colombo Expansion: Colombo, Sri Lanka	X	X	X	X		X			30		3
Port of Galveston Cruise Terminal: Galveston, TX	X			X		X	X		DB	X	4
Queen Elizabeth II Dartford Bridge: London, UK	X	X		X					20		2
R1 Expressway: Slovakia	X	X	X	X	$895	X		X	25		13
Ressano Garcia Railway Company: Mozambique/ South Africa, Africa	X	X	X	X		X			15		33
Rosario-Victoria Bridge: Rosario/ Victoria, Argentina	X	X	X	X		X	X		25		2
Route 28 Phase II Expansion: Fairfax and Loudon Counties, VA				X			X		n/a	X	1
Sea-to-Sky Hwy Improvements: Vancouver, BC	X	X		X		X		X	25		17
SMART: Kuala Lumpur, Malaysia	X	X	X	X	$510				40		3

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Southeast Edmonton Ring Road: Edmonton, Alberta	X	X	X	X	$537			X	n/a		8
SR44 Corridor: New Mexico	X	X	X	X			X	GARVEE financing	DB	X	4
St. Lawrence Seaway Management Corporation: Quebec		X	X	X	$3,000	X	X		20		27
Sydney Harbor Tunnel: Sydney, Australia	X	X		X	$750	X			30		2
US-1 Improvements: FL	X			X		X		X	DBF	X	20
Vasco da Gama Bridge: Portugal	X	X	X		$883	X		X	33		27
Virginia Railway Express: Virginia	X	X	X					X	5	X	35
Warsaw International Airport: Warsaw, Poland	X	X	X	X		X			n/a		6
Westlink M7: Sydney, Australia	X	X	X	X	$2,300				34		10
Yitzhak Rabin Highway: Tel Aviv, Israel	X	X		X	$1,300			80% of residual ONLY in case of demand downside	30		2
York Bus Rapid Transit Phase I: Ontario	X	X	X					X	Partner		23
N	69	59	53	55	35	40	25	23	69	21	

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
%	100	86	77	80	51	58	36	33	100	30	

* Value in Contract Length column is an average.
Those projects in red italics are projects that have capacity constraints, few substitutes, and a contract length <26 yrs.

Sources:
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Table 5: List of Unsuccessful P3s

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
A2 Motorway: Poland	X	X	X		$1,270				40		14
Arlanda Express Rail Link: Sweeden	X	X	X		$650				40		15
Beiras Litoral/ Alta Toll Roads: Portugal	X	X	X	X	$1,500			X	35		6
Brisbane Airport Rail Link: Australia	X	X	X						35		2
Camino Colombia Toll Road: TX	X	X	X			X			Priv.	X	12
Channel Tunnel Rail Link: UK/ France	X	X	X		$9,000		Gov't takes over tnl	Gov't takes over tnl	n/a		6
Chicago Skyway: Chicago, IL	X	X	X		$1,830				99	X	1
Confederation Bridge: New Brunswick, Canada					$640	X	X	X	35		10

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Dulles Greenway: Loudon County, VA	X	X	X						42.5	X	1
Highway 104: Nova Scotia, Canada	X	X		X		X	X	X	30		10
Highway 407 Express: Ontario, Canada		X	X		$3,100		X		99		10
I-394 MnPass: Minneapolis, MN	X						X	X	DB	X	9
Las Vegas Monorail: Las Vegas, NV	X	X	X		$650		Initial Gov't Debt Issue		Priv.	X	12
London Underground P3: London, UK	X	X	X		$25,600		95% Gov't Grnty on Invst	X	30		13
M1-M15 Motorway: Hungary	X	X	X				Gov't takes over fwy	Gov't takes over fwy	n/a		6
Madrid Barajas Subway Extension: Spain	X		X				Gov't Ops	X	non-integrtd		17
Montreal Subway Extension: Canada					$745		X	X	DB		8
Northwest Parkway Lease: CO	X	X	X		$603				99	X	7
Oresund Bridge and Tunnel: Denmark / Sweeden					$5,400		X		DB		2

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Pocahontas Parkway: Richmond, VA	X	X	X						30	X	9
Randstad Tunnel: Netherlands	X	X	X	X					30		6
Rapid Transit System: Bangkok, Thailand	X	X	X	X	$2,000				30		3
Rostock Tunnel, Germany	X	X	X			X			50		5
Route 3 North Rehab.: Burlington, MA	X	X	X					X	DB	X	1
Southern Connector: SC	X	X	X						50	X	12
SR 125: San Diego County, CA	X	X	X	X	$635	X			35	X	1
Sydney Airport Rail Link: Australia	X	X	X		$8,000		$700mil bailout	$700mil bailout	DB		2
Tren Urbano: San Juan, Puerto Rico		X	X		$2,250		X		5		16
Yen Lenh Bridge: Vietnam	X	X	X				X		20		5
Zambia Railways (Freight): Africa	X	X	X			X		X	20		19
Zambia Railways (PAX): Africa	X	X	X			X		X	7		18

Project Name/ Location	Alt. Finance (F) - A	Alt. Ops (O) - B	Alt. Maint. (M) - C	Existing Capacity Constraints -D	Total Cost = >$500 mil ($mil) -E	Few Existing Substitutes - F	Gov't Funding - G	Gov't Availability Payments - H	Contract Length - I	American	Source
Transjamaican Highway: Kingston, Jamaica	X	X	X	X		X	X		35		20
N	32	27	27	6	16	8	15	13		10	
%	103	87	87	19	52	26	48	42		32	

* Value in Contract Length column is an average.

Sources:
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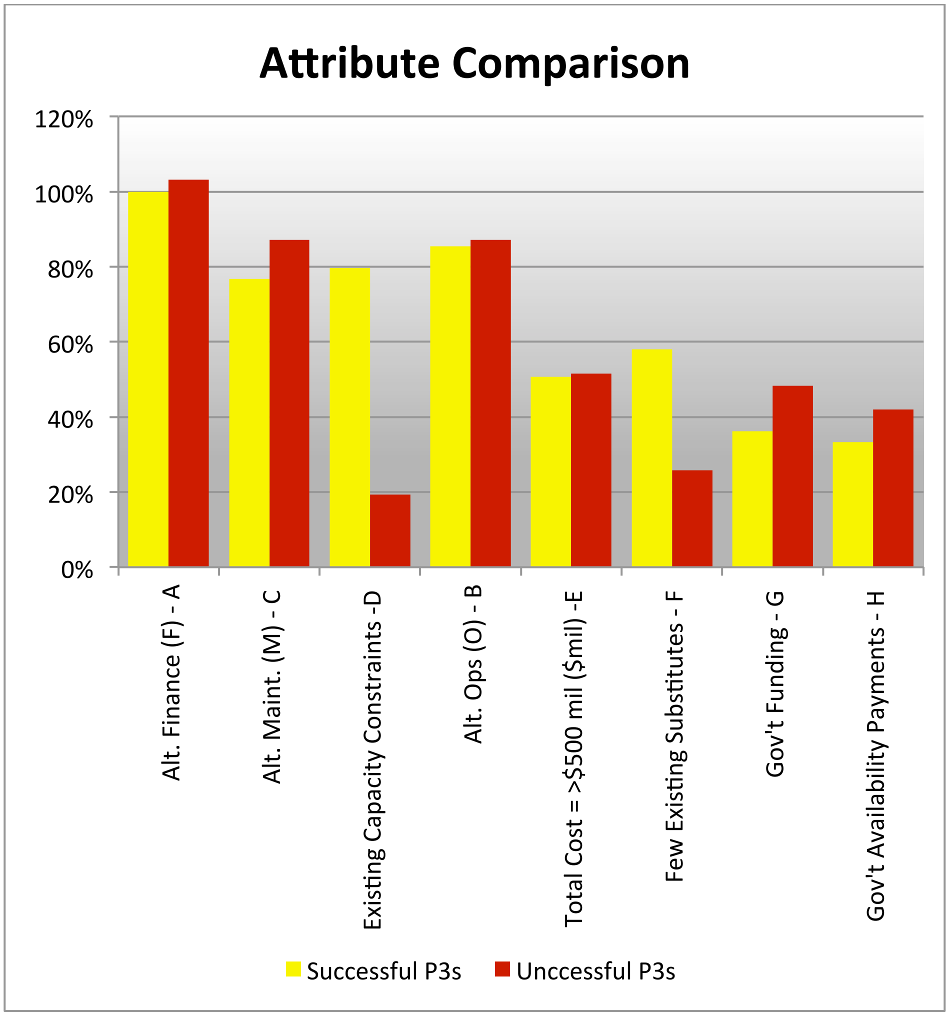
14, http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-1122908670104/1504838-1151587673078/PPPStructureExamples.pdf
15, http://www.internationaltransportforum.org/jtrc/infrastructure/Investment/PPPsuccessStories.pdf
16, http://www.fhwa.dot.gov/ipd/case_studies/pr_tren_urbano.htm
17, http://www.caminos.upm.es/Construcci%C3%B3n2005/economia/catedra/doc/Sanchez-Soli%C3%B1o_Vassallo_2009.pdf
20,http://jamaica-gleaner.com/gleaner/20080718/business/business1.html; http://www.infrastructureinvestor.com/Article.aspx?article=59888&hashID=1A5AE1CE2B93EB7F042D66AE27B225D95CDA695C

Figure 6: Chart comparing Successful and Unsuccessful P3s



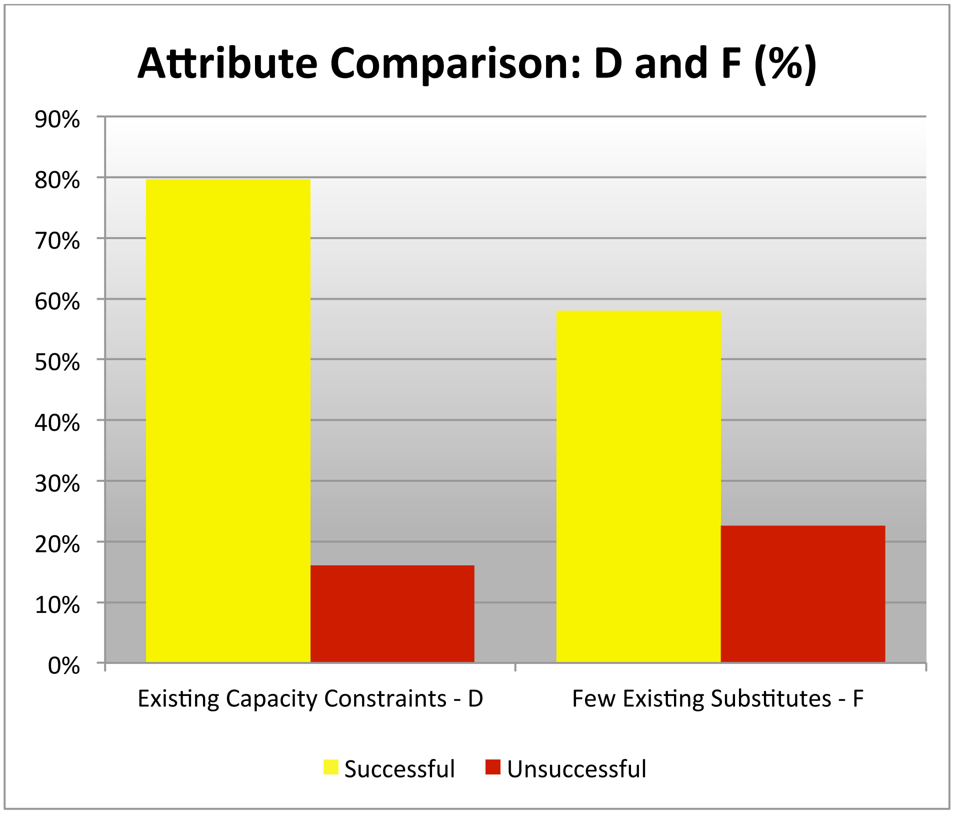
In terms of attribute distribution, the three most significant attribute s among the successful P3s – the three most frequently exhibited by P3s that met our definition of successful – were the inclusion of both alternative finance (87 percent of the total) and alternative operations (86 percent) as well as the presence of existing capacity constraints (80 percent). Given that our definition of success is heavily dependent on public sector financial savings, that alternative finance and operations are as significant among these P3s as they are is consistent with our early hypotheses. P3s that include alternative financing and operations will save the public sponsor significantly more financial resources than traditional procurement – a very compelling reason to deliver a project through a P3.

We found that alternative maintenance (77 percent) is slightly less widespread than operations and finance, but that may be explained by the fact that many contracts for alternative operations may, without explicitly stating so, also include maintenance provisions. In terms of the unsuccessful projects, shown in Table 5 starting on page 63, the story seems fairly similar to that of successful P3s – the presence of alternative F / O / M is very significant across all unsuccessful projects, with 84% of unsuccessful projects incorporating alternative F, alternative O, and alternative M. In fact, the distribution of success attribute s among the unsuccessful projects is generally very close to that of the successful projects across most attribute s.

Additionally, the project total cost minimum of $500 million, itself an indicator of project scale and complexity requisite for P3 success, was seen in about half of the projects in both groups. Had we lowered the threshold to $250 million the percentage rises from 55 percent to 60 percent of all successful, and from 48 percent to 71 percent of all unsuccessful, P3s surveyed

In addition to contract length, we found three attribute s with a difference of about 30 percent (or more) between the two groups of projects. See Figure 7 below.

Figure 7: Five Largest Attribute Variances



Each of these two key differences (plus contract length) is discussed below.

1) **Existing capacity constraints:** While eight-in-ten of the successful projects face existing capacity constraints, less than a 15% unsuccessful P3s do. Projects that occur within a system or area facing existing capacity constraints are bound to have a major positive impact on system efficiency and throughput; the efficiency gain across the entire network, as a share of total traffic, will inherently be much greater than if existing capacity issues are not present. Furthermore, whether or not a project is built due to existing capacity problems is itself a measure of market demand for the new facility. Demand for new infrastructure where capacity issues exist is clear; demand where no capacity constraints exist is less clear and requires more justification. Existing capacity constraints would also indicate an ideal location for tolls, as high traffic volumes will be travelling through the facility; existing capacity constraints may very well signify, in addition to potential gains in network efficiency, long-term potential for the P3 to support itself on toll revenues rather than public sponsor funding. Given the significance of the presence of existing capacity constraints, we can extrapolate that where existing capacity constraints is lacking, consistently high demand is lacking as well. As such, facility revenue and P3 success both wane in step with the presence (or lack) of existing capacity constraints.

2) **Few existing substitutes:** While over half of successful projects had few substitutes, just a fifth of unsuccessful projects did. If a P3 faces direct competition from a number of substitutes, demand is essentially watered-down, distributed not-necessarily-evenly across the various infrastructure assets. Unsuccessful projects, on average, were initiated within areas not facing capacity constraints and in areas that also had a number of substitutes for the proposed facility. What little demand existed for the assets was diluted; at the same time, however, the role of private finance (as mentioned earlier) was as significant in unsuccessful P3s as it was in successful ones. In short, unsuccessful P3s rely heavily on private financing for projects which exhibit little or no explicit present demand. As such, demand downside risk is placed almost exclusively on the private partner, leading to skyrocketing costs and minimal revenue generation once the facility is open – a lethal financial mix for an infrastructure project or, for that matter, any investment.

3) **Contract length:** Finally, in terms of contract length, our initial hypothesis was proven correct when comparing the length of contracts between successful and unsuccessful P3s. The average successful P3 had a contract length of 26 years while the average unsuccessful P3 had a contract length of 41 years. Such a difference is largely accounted for by the inclusion of two unsuccessful P3s – the Chicago Skyway and Highway 407 Express (Toronto) – both leased for 99 years. Furthermore, the difference may also be accounted for by the fact that many unsuccessful P3s are forced to refinance or are, in fact, sold at a lower price to another stakeholder. Either course of action would generally require a lengthening of the P3 contract in order to allow enough time for the private partner to reap an adequate return on investment. Either way, unsuccessful P3s are apt to have a longer, and more inflexible, contract than successful ones.

Existing capacity constraints, few existing substitutes, and project contract length appear to be the most important pre-implementation attributes of P3 success. The presence of one and two, coupled with a contract length (three) no longer than approximately 26 years, would indicate – pre-project implementation – increased likelihood of P3 success.

6) Market potential for private capital in California

In this section we will discuss the potential for the securing the use of private capital in California P3s. We will also discuss cautionary notes about over-reliance or expectations of private capital. There is widespread acknowledgement that declining revenues from fuel taxes will fail to cover the cost of new facilities, or even maintain existing ones; unfortunately, private capital is unlikely to be the sole source of funding make up that shortfall (Mineta et al. 2010, p. 28; USGAO 2008a, p. 30). Moreover, the introduction of private capital in to the transportation field will not necessarily increase the total pool of money available to fund new facilities; private investors may simply substitute investments in P3s rather than buy public general obligation bonds (Gómez-Ibáñez and Meyer 1993, pp. 4-5). Nevertheless, private capital and investors are likely to play an increasing role in building, operating, and even maintaining California's transportation infrastructure. In this section we will look at P3s and t) California's tax Laws and bond Rates, u) Federal programs and policies, and v) the status of the capital market and sources of capital.

t) California Tax Laws, Bond Rates

In order to attract private investment in transport, tax laws should be friendly to such investment. As bond rates rise, the cost of repaying transportation bonds also rises, making private investment relatively more attractive. However, bond rates go up for a reason. That reason may be indicative of a concern about California in particular (e.g., another budget crisis) or a broader market concern (e.g., a global credit crunch). Private investors will closely look at California's ability to borrow as in indicator of their ability to be repaid; this is especially true for a facility that is un-tolled and to be paid for via shadow tolls or availability payments. Likewise, if tax laws are unfavorable, private investors may look elsewhere. In this section we briefly discuss California's tax laws and bond rates.

Tax laws

We could find nothing to suggest that California tax law would need to change in order to encourage P3s. In our search we looked at industry websites such as The National Council for Public Private Partnerships, scholarly texts, and reports (e.g., see Pikiel and Plata 2007, p. 53). We found no one calling for any change to California tax policy to allow for (or encourage) P3s. There is one possible exception. To be clear we are not tax law experts. We believe that California does exempt from state tax the interest accrued to the holders of private activity bonds[15] provided that the bonds are for in-state infrastructure (see section 17133 of the California Revenue and Taxation Code). If we are wrong (i.e., California requires tax to be paid on the interest of PAB even when those PABs are issued to build in-state facilities) updating the code to exempt that interest would be a change in the tax code that may encourage P3s. Finally, none of the case studies on SR-91 or SR-125 indicated that any change in the California tax code was necessary or even desired (ACT2007b, c. 3 pp. 76-86; Wang 2010, pp. 141-146). California's tax code appears to be adequate as it currently stands. As part of Phase II we will ask private firms if there are any tax law changes they would like to see in California within the context of P3s.

Bond rates

California's recent 100-day delay in having a signed budget necessitated a cession of bond sales during the impasse period (Saskal 2010). The delay caused a compressed timetable for bond issuance which means that a large chunk of California debt flooded the market all at once; indeed November's sale was the biggest municipal bond sale ever (Albano 2010, p. 27). The delay may have cost the state millions of dollars as the market for municipal bonds was more favorable in the summer (Saskal 2010). Budgetary delays are but one reason that California has the lowest bond ratings of any of the 50 US states (Lockyer 2010, p. 9). In looking at the ten most populous US states (i.e., California's "peer group"), second only to New York, California has the highest of the three debt ratios[16] (Lockyer 2010, p. 8). In Table 6 below you can see the highlights of the rating agency comments.

[15] See Private Activity Bonds on page 76.

[16] The three ratios and California's current values are as follows: 1) debt to personal income: 5.6%, 2) debt per capita: $2,362, and 3) debt as a percentage of state GDP: 4.73% (Lockyer 2010, p. 8).

Table 6: State of California General Obligation Rating Agency Commentary

	Fitch Ratings	Moody's Investors Service	Standard & Poor's
Rating strengths	• Broad and diverse economy despite the current economic contraction • Manageable debt levels	• Large, diverse and wealthy economy • High likelihood of bond repayment due to the state's hierarchy of priority payments	• Indications of economic stabilization and revenue performance compared to the state's budget assumptions • Cash management legislation which improves cash balances throughout The year • A conservatively structured, albeit growing, debt burden
Rating Challenges	• A large and persistent structural imbalance combined with pronounced revenue cyclicality • Institutional weakness, including inflexibility imposed by voter initiatives and a partisan policy-making environment • Significant expenditure pressures and cash flow stress	• Political environment in which making timely and productive budget decisions is difficult • Reliance on one-time solutions (including past deficit borrowing) for longer-term problems • Limited financial and budgetary flexibility	• Two-thirds constitutional requirement for both budget approval and tax increases • General Fund revenue composition, which is sensitive to economic and equity market performance • Constitutional amendments that limit discretion over major portions of General Fund spending

Source, Lockyer 2010, p. 10.

With the passage of Proposition 26 in November of 2010 some of the difficulties of passing budget, a reoccurring theme in the "challenges" section in Table 6, should ease. Assuming the lower threshold for passage speeds the budget process, in time, one of the significant burdens on California's credit rating (the lowest in the nation) may ease. However, even if ratings improve, there will be little room in the budget for an increase in debt service. Here are the thoughts of one bond analyst as quoted in the newspaper, "The Bond Buyer,"

> California missed out on a favorable environment for issuers through late summer and early autumn, said Ken Naehu, managing director for fixed income at Bel Air Investment Advisors in Los Angeles. "That was a time when there was a lot of money chasing too few bonds," he said. Now the supply equation has turned around, as has the market's tone, Naehu said. "Just a few weeks ago, the market was in the buy anything mode," he said. "The market seems to have shifted [to] a cautious tone of looking for value." That means *California is likely to have to pay a price to place its debt, particularly given the continuous drumbeat of bad fiscal news about the state government*. "To move that amount of bonds is going to require some spread," he said (emphasis ours, Saskal 2010).

Given a) the high interest rates California is currently paying, and b) the high debt ratios California taxpayers are saddled with, we are not surprised that both the Little Hoover Commission and Governor Schwarzenegger call for the increased use of P3s (Little Hoover Commission 2010, pp. ix, 76, and 80-81; Schwarzenegger 2007, pp. ii, 2, 35, and 38-39). There is simply little room on California's balance sheet for more public debt and virtually no political appetite to increase fuel tax and use pay-as-you-go financing.

Unfortunately, the perennial budget battle and high bond rates may scare off private investors as both indicate that there may be some risk of delayed payments or worse (and highly unlikely) default. (See Payment Risk on page 35.) Ironically, working to improve California's credit rating could make the state more attractive to private investors while simultaneously lowering the cost of traditional public procurement.

u) Federal Programs and policies

At least since the passage of ISTEA the Federal Government has been a proponent of P3s in transportation. In this section we will briefly describe some the programs and policies which support that stated policy goal. The following is a list of what we will cover,

- P3 Programs at FHWA and FTA
- Private Activity Bonds,
- Special Experimental Project Number 15,
- Transportation Infrastructure Finance and Innovation Act, and
- Railroad Rehabilitation & Improvement Financing.

P3 Programs at FHWA and FTA

The Federal Highway Administration maintains an office of Innovative Program Delivery which coordinates FHWA's P3 efforts (USDOT 2010f). The office oversees the PAB, SEP-15, and TIFIA programs (USDOT 2010f). Each is discussed below.

The Federal Transit Administration (FTA) does not appear to have a P3 office per se, but there are a smattering of references to the Penta-P program – a study of P3s in transit (USDOT 2010e). In 2007, the FTA wrote a report to Congress titled, "Report to Congress on the Costs, Benefits and Efficiencies of Public-Private Partnerships for Fixed Guideway Capital Projects" (USDOT 2007). To date, only a handful of transit projects venture beyond the DB paradigm however; the Gold Line in Denver, Colorado and the MAX light rail airport extension in Portland, Oregon are two rare examples of transit projects that incorporated private finance (USDOT 2007, p. 14; USGAO 2009, p. 12). Unlike a successful tolled freeway, transit is heavily subsidized; therefore we are unsurprised to find little private investment.

Private Activity Bonds

In SAFETEA-LU, Congress authorized $15 billion of tax-exempt bonds which can be issued on behalf of private firms building public works (Neaher 2007, p. 3; see also, IRS 2006). The proceeds of these private activity bonds (PABs) can be used by private firms to construct highway or freight rail transportation facilities (USDOT 2010a). To date, USDOT issued or allocated $4.7 billion of PABs, leaving over $10 billion of PAB available (USDOT 2010a). The PAB program demonstrates the Federal Government's continued support of P3s and further reduces the finance cost differential between the public and private sectors[17] (USDOT 2010a).

Special Experimental Project Number 15

FHWA has a program known as Special Experimental Project Number 15 (SEP-15) that allows FHWA to waive certain of its requirements (specifically those found in Title 23 of the US Code) to allow

[17] See also j) Public perception re P3s and user fees, private investment in public infrastructure starting on page 30.

or encourage innovative use of P3 (USDOT 2010g). The program does not allow FHWA to waive environmental requirements (USDOT 2010g). States can apply to participate in the SEP-15 program by applying with their FHWA Division Office (USDOT 2010g).

Transportation Infrastructure Finance and Innovation Act

Known as TIFIA, this federal program provides "direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance" to private firms (USDOT 2010b). As an example, the South Bay Expressway (SR-125) received $140 million of TIFIA funds (USDOT 2010c). TIFIA loans can also be used as part of a P3 refinance package; in June of 2006 the new owners of the Pocahontas parkway in Virginia secured a $150 million TIFIA loan (Jones 2007, p. 4). On November 5, 2010 the interest rate was 4.15% for a 35-year TIFIA loan (USDOT 2010b). Prior to the debt crisis, TIFIA funds were underutilized and readily available; after the fall of Lehman Brothers in September 2008, private financing dried up and TIFIA loans funds quickly became oversubscribed (Dutton 2009; see also, USGPO 2009, pp. 63497-63501).

Railroad Rehabilitation & Improvement Financing

As part of SAFETEA-LU Congress authorized up to $35 billion in transportation infrastructure loans or loan guarantees (USDOT 2010d). Interest rates on the debt are equal to the cost for US borrowing, i.e., the current rate on treasury bills; the loan term is up to 35 years (USDOT 2010d). municipal governments, joint power authorities, government sponsored corporations, and joint ventures involving at least one railroad are all eligible to participate in the program known as RRIF (USDOT 2010d). Eligible uses are as follows,

- acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops;
- refinance outstanding debt incurred for the purposes listed above; and
- develop or establish new intermodal or railroad facilities (USDOT 2010d).

To date, USDOT lent or guaranteed slightly more than $1 billion; leaving just under $34 billion yet to be utilized (USDOT 2010d).

Summary

There are several discounted federal credit instruments available for P3 delivered projects. Despite the availability of these programs, only a tiny fraction has been allocated (the TIFIA program excepted). US States have not started many P3 projects so we are not surprised that the P3 credit facilities are underutilized. One of the questions we will ask during our interviews in Phase II will be about the awareness of these facilities. It may be that local officials are aware of the federal government's programs, but the terms are deemed onerous. In Phase II We hope to find out why California is leaving these programs unused.

v) Status of capital market and sources of capital

In this section we will discuss the capital market and other sources of capital.

Capital Markets

Private finance will, in all likelihood, play a role in California's future transportation funding. However, even in other places that have embraced P3s (e.g., Australia, Canada, and the United Kingdom), the P3 delivery method accounts for only ten to 20 percent of the total infrastructure provided (Iacobacci 2010, p. 2). Modern day financial transactions are almost inexplicably complex; weakness at any point in the chain can frustrate, delay, or even cancel the entire transaction. In this section we will a) provide a brief, highly simplified example of how a private firm might structure a transaction, b) highlight some of the risks in securing complete funding for a transaction, and c) caution about over reliance on the capital markets.

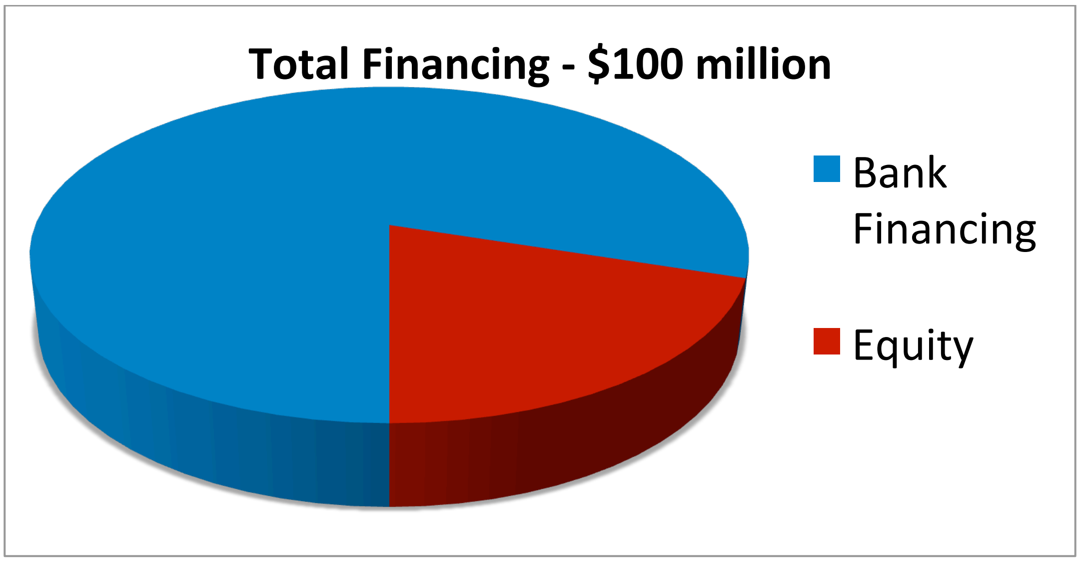
Hypothetical example of financing

Suppose the State of California entered into a P3 with Firm X. Firm X agrees to pay the entire cost of a $100 million project. The first thing that Firm X will do is form an independent, subsidiary company or special purpose vehicle (SPV); the SPV[18] will be a single purpose entity whose only asset is the project itself and only liabilities are the debt associated with the project and the equity invested by

[18] See also Bankruptcy Risk on page 37.

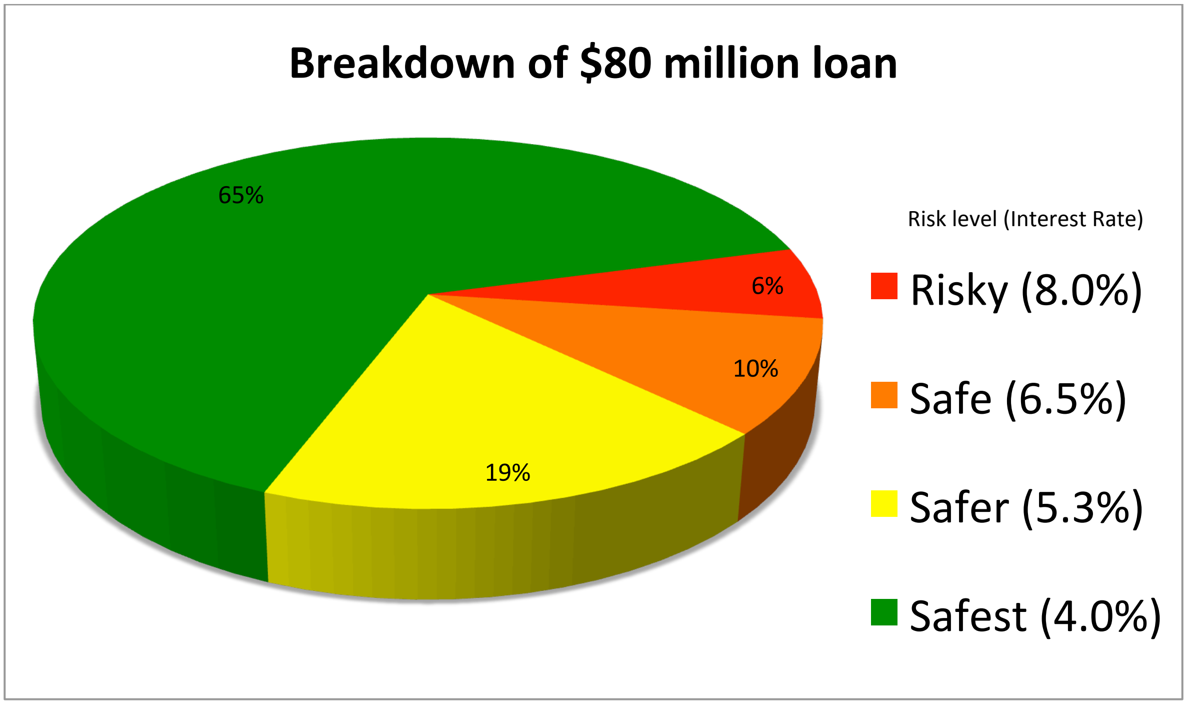
the parent company, Firm X (Yescombe 2007, pp. 108-109; Vining and Boardman 2008, p. 153; Wang 2010, p. 57). Further suppose that Firm X funds the SPV project with 20 percent equity and then seeks 80 percent bank financing (Yescombe 2007, p. 115; Iacobacci 2010, pp. 26, 37). Firm X may also seek equity investors to help fund the 20 percent of the deal that is equity (Vining and Boardman 2008, p. 153). For a graphical representation of the breakdown of the total project cost, see Figure 8 below.

Figure 8: Example Financing Breakdown



Assume that Bank A approves the SPV for an $80 million loan (this loan is represented by the blue slice in Figure 8). Once Bank A funds the loan to the SPV, it is unlikely to hold the loan on its balance sheet for long. Instead Bank A will likely break the $80 million loan in to smaller pieces known as tranches and resell those as bonds; each tranche will be assigned a risk level and a corresponding interest rate in order of its loss position. See a hypothetical example of a loan breakdown in Figure 9 below.

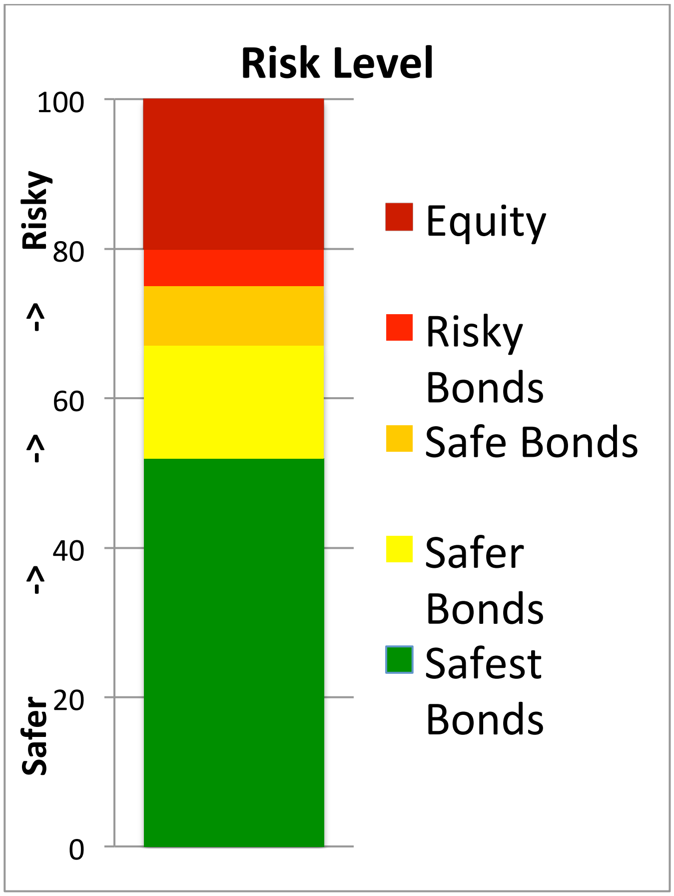
Figure 9: Example Loan Breakdown



The percentages shown on the pie in Figure 9 represent the portion of the $80 million loan. The percentages shown in parentheses in the legend of Figure 9 represent the interest rate that Bank A might offer its customers (i.e., bond buyers) to compensate them for the risk they assume.

If the facility were to go bankrupt, after a sale of the facility, the Safest Bond buyers would be repaid first; if there is money left over, the Safer Bond buyers are compensated next, then the Safe Bond owners get their share. The process would proceed until either there are no remaining proceeds from the sale or everyone is repaid. See Figure 10 below. The y-axis represents the investment amount. If the sale price were $100 million, everyone would be repaid. If the sale price were $90 million everyone would get paid, except Firm X and any equity investors; they would only get 50 cents on the dollar of their equity investment back. If the sale price were $60 million, all the Safest Bond owners would get repaid, and the Safer Bond holders would see some of their principal returned, but everyone else would lose out.

Figure 10: Risk breakdown



Returning to the bond pricing discussed earlier, see Figure 9 on page 79. Recall that the first loss tranche (i.e., the Risky Bonds) earn 8% but the safest piece earns only 4%. The bank has to pay a premium to attract investors to the riskier tranches whereas the safer pieces can be priced lower. See Table 7 below for a breakdown of the rates and the weighted average.

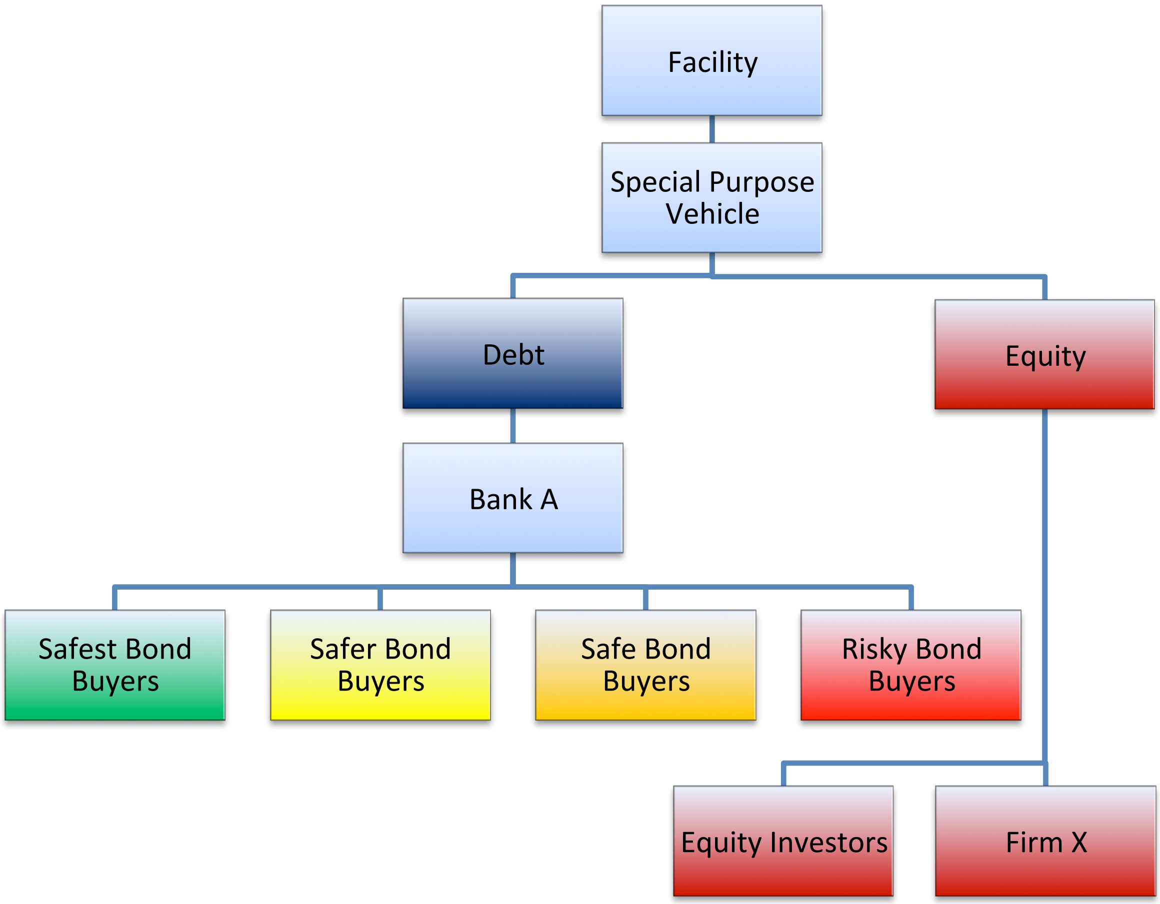
Table 7: Hypothetical breakdown of $80 million bank loan

Risk Level (% of total)	Total Bond Amount	Interest Rate
Risky Bonds (6%)	$5 million	8.00%
Safe Bonds (10%)	$8 million	6.50%
Safer Bonds (19%)	$15 million	5.25%
Safest Bonds (65%)	$52 million	4.00%
Total / Weighted Average	$80 million	4.73%

As you can see from the table, the weighted average interest rate is approximately 4.73 percent. Bank A will charge the SPV say 5% on the $80 million loan, perhaps more, and make profit on the spread (the difference between the weighted average of the rates it pays to its bond holders and the rate it charges to the SPV). The bank will also make money on the fees it charges both to the SPV, in the form of upfront finance charges, and to the customers who buy the bonds, in the form of commissions or transaction fees. There are two key advantages for the bank. First, as all the risk of project failure is off-balance sheet, it will be the bondholders who will lose out if the facility falls in value. Second, while the bank makes money on the spread over the life of the bonds, it also makes money on the transactions fees upfront.

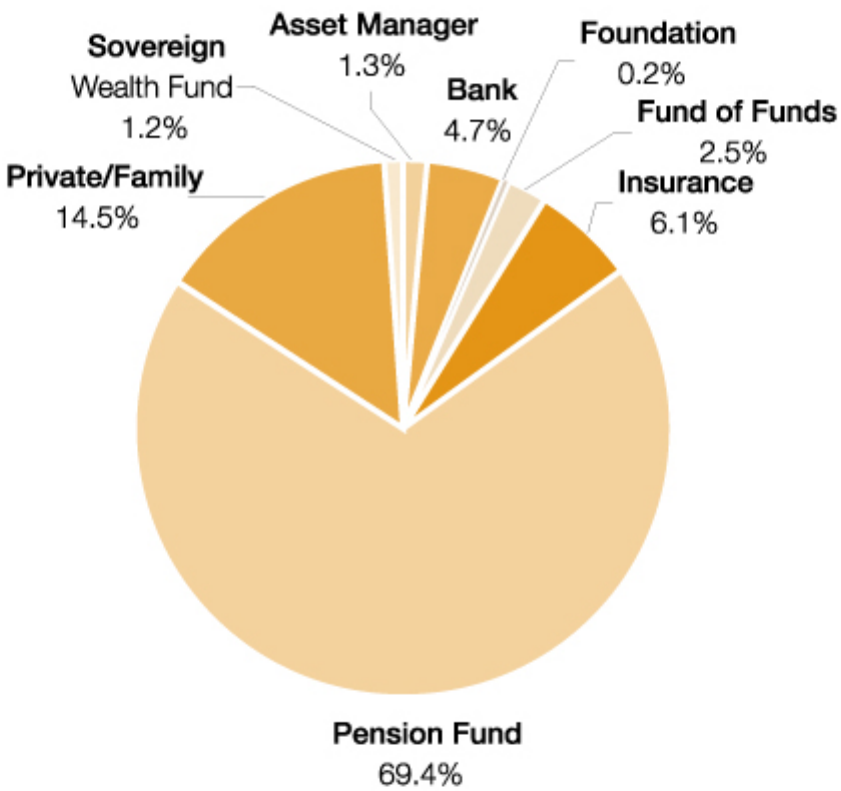
Figure 11 below ties everything in our highly simplified example together. In looking at the bottom two rows, risk increases as one moves from left to right.

Figure 11: Hierarchical representation of the transaction



So who ultimately invests in P3s? In most cases private firms (looking for equity) and banks (looking for bond buyers) will solicit funds from institutions (pension funds, university endowments, insurance companies, foundations, other banks, etc.), hedge funds, and high net worth individuals from around the globe (Garvin and Bosso 2008, p. 163; see also Yescombe 2007, pp. 98, 135). These investors might buy at any level of the stack depending on their investment needs at the time. Figure 12 below shows a breakdown of the type of investors in one of Macquarie's P3 investment funds. If any one of these groups decides that P3 investment is not a part of their investment strategy or goals, the funding for future P3s could be in jeopardy.

Figure 12: Break down of investors in a typical P3 fund



Source, MacQuarie 2010.

Thankfully, the public sponsor should be largely shielded from the complexity of the financing transaction (Yescombe 2007, p. 134). The reason that we outlined this highly simplified example is to give the reader a taste of the complexity and the potentially large number of players involved. Once any deal is closed, the risk to the public sponsor of the firm securing the financing is minimal. The trouble is not on any particular project, but really on the next project. Investors will only invest in *future* P3s if their existing P3 investment pays off. High profile failures of P3s – even if outside of California – could make institutions, hedge funds, and high net worth individuals reluctant to invest in P3 funds in general. Even if P3 investments exceed investor expectations, private investment firms might not be able to get financial commitments for new P3 projects because of competition from a) another existing investment vehicle, e.g., equities or (other types of) bonds, or b) a new investment vehicle, e.g., an investment bank securitizes future revenue from green energy.

Global capital markets are fickle and can be very flighty. For example, suppose that the customers who normally purchase the Safe Bonds decide to invest their money elsewhere. If this pool of money dries up, the bank will stop issuing loans to private firms involved in P3s, who in turn will stop bidding on future P3 requests for proposals. So the risk to the public sponsor lies in expecting future projects to be delivered through P3s when that market is far from certain. This is exactly what happened in the market for bonds backed by commercial mortgages (discussed in the next section). Reliance on P3s could endanger California's ability to deliver much-needed infrastructure if institutions, hedge funds, and high net worth individuals decide to pull capital out of P3 bonds or equity.

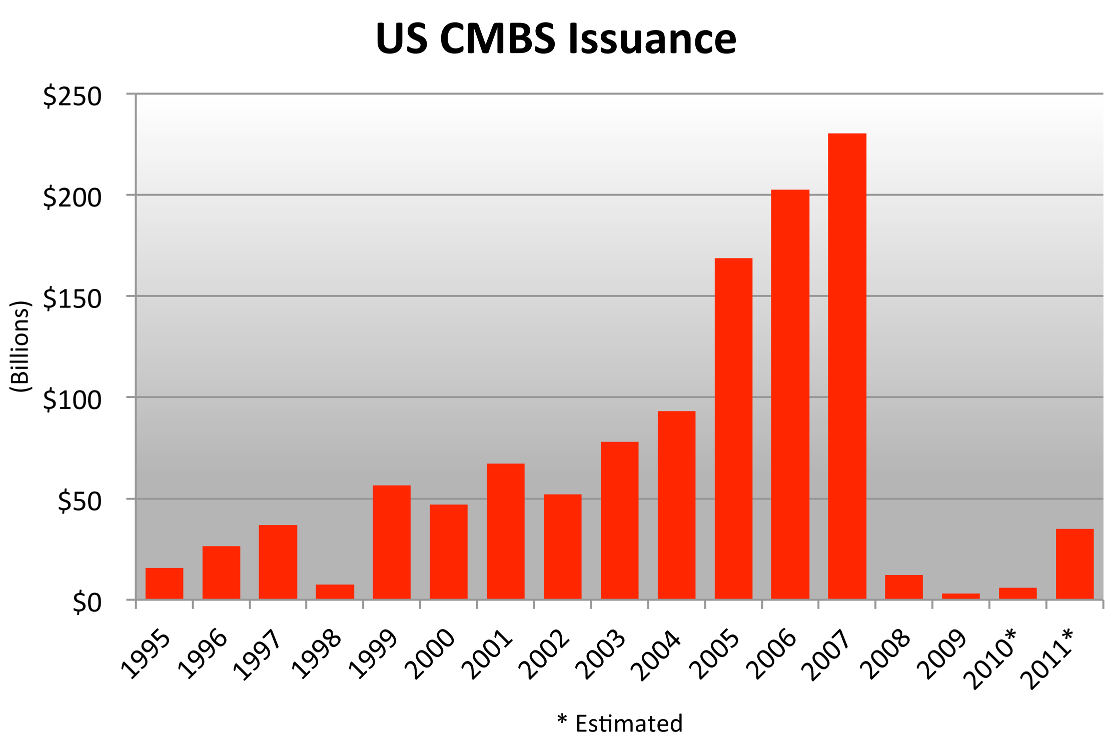
Availability

The state cannot assume that even for a project well suited to P3 delivery that an agreement with a viable investor will materialize. Also, broader capital constraints, like those seen in the recent financial crisis, may prevent access to private funds (Iacobacci 2010, pp. 38-39). There are three main risks that could lead to a contraction in the availability of P3 capital:

1) failure in the P3 market (e.g., the bankruptcy of SR-125);
2) failure in a similar, though not necessarily directly related, capital market (e.g., a sovereign bankruptcy like Argentina in 2001, or a municipal bankruptcy like Orange County in 1994); and
3) a market-wide credit crunch (e.g., the savings and loan crisis in the late 1980s or the global financial crisis in the late 2000s).

As an example of how quickly the available funds can contract, consider the market for commercial mortgage backed securities (CMBS). These are bonds sold to investors and are backed by mortgage payments from commercial real estate owners (in the same way that a P3 bond would be backed by user fees or availability payments.) The financial crisis of 2008 and 2009 led to a rapid contraction of all types of credit. However, the collapse of the CMBS market stands out. In 1995 there was very little issuance of CMBS. See Figure 13 below. The CMBS market grew at an astronomical rate, peaking in 2007 at over $230 billion. The CMBS market froze (despite sound fundamentals in that market) when the residential mortgage market showed signs of failure (Solomon and McCluskey 2010, p. 399). By 2008, the CMBS issuance had all but dried up and the market for trading existing securities had all but frozen. By the fall of 2010, some Wall Street banks were tentatively issuing a smattering of CMBS (approximately $4.5 billion in the first nine months of 2010) but clearly a dramatic drop from the peak (Kay and Thompson 2010). The lesson to be learned here is that the volatility of capital markets and investors cannot be overestimated.

Figure 13: Commercial Mortgage Back Securities, US Issuance 1995 to 2011



Source, 1995 to 2009: Commercial Mortgage Alert, January 2010. Source, 2010 (calculated by annualizing a September 2010 year-to-date value), 2011 (authors' estimate): Kay and Thompson (2010).

Like the market for CMBS, the relatively nascent market for P3 bonds could be susceptible to wild swings in availability unlike the more mature municipal bond market. When looking at Regional

Transportation Plans with 25-year horizons, no one can predict the availability (or lack) of capital for private firms, especially in the later years of the plans. We think that there could be long-term implications from over-reliance on P3s. In Phase II we will seek data on the P3 bond market and compare that to the market for municipal general obligation bonds.

State or Municipal Pension Funds

In 2008 Texas Senator Steve Ogden suggested using dollars from that state's pension system to invest in transportation projects (Elder 2008). And it is not just in P3-rich places like Texas where there is talk of state pension involvement. People have been talking about getting California's public employee pension fund (CalPERS) significantly involved in infrastructure investment for years. Phil Angelides (then Democratic primary candidate for governor) proposed using state pension funds for infrastructure investment over four years ago (Davis 2006, p. B5) Indeed in 2007, the California Public Employees' Retirement System (CalPERS) set a 1.5 percent (of total CalPERS assets) target to be held in its "infrastructure program" (CalPERS 2010). However the first investment did not come until three years later; moreover, the investment is a 12.7 percent equity stake in London's Gatwick airport (CalPERS 2010). In all likelihood, there are United Kingdom-based public pensions that could have invested in the London airport. CalPERS could have invested in a P3 in the US or even California. Why didn't CalPERS invest in the recapitalized SR-125, for example? CalPERS investment advisors will seek the best return on their investment dollars which may be an investment in a California P3 or not. Consider this analyst's opinion,

> Mark Weisdorf, [is the] global chief investment officer of infrastructure investments for J.P. Morgan Asset Management, … [His] clients include public and private pension funds, and he predicted that U.S. public pension funds increasingly will turn to infrastructure as an alternative to stocks and bonds. … State pensions likely will prefer to diversify any such investments around the nation instead of putting funds into a project in their own state, [Weisdof] said. "It will be diversified, less subject to political persuasion, based on economics." Weisdorf stressed that his clients' interests were his first priority. "The pensioners want a decent return. We don't use regional or political issues to impact our decisions," he said. (Gralla 2009).

Timing is the main issue. When CalPERS made their investment in Gatwick it presumably met their needs for return and duration. For example, suppose that CalPERS had plenty of short-term investments. If a series of five-year bonds secured by a Californian P3 came for sale and a 20-year equity investment in a foreign airport became available at the same time, CalPERS would more likely invest in the long-term deal. State pension funds have a fiduciary responsibility to their plan participants. Any legislative requirement, or even political pressure, on a state a pension fund to invest in in-state P3s could interfere with the fund's ability to safeguard its investments and maximize its return to participants.

We could not find any data showing the volume of P3s or P3 bonds. We hope that we can get some data from P3 firms showing the size of the P3 market (or at least the P3 bond market). It may be that there are too many states and municipalities around the world chasing after too few P3 dollars. In such a market the private investor has the advantage, meaning better terms and more profit. In Phase II we will look into these market dynamic to see how they may affect California's ability to attract funds.

Conclusion

In this paper we discussed five of the topics from the Phase I Research Road Map: 1) Analytical tools, 2) The California Political Environment and Challenges to P3, 3) Structuring P3 Projects, 4) Criteria for evaluating potential P3 projects, and 6) Market potential for private capital in California. Note that topic 5, Best practices and lessons learned, was covered in a separate deliverable. We have made some recommendations based upon the literature and analyzed the existing research with an eye toward applicability in California. We also identified areas to further study as part of Phase II.

1) Analytical Tools

We examined the key analytical tools integral to ensuring potential P3 viability, including: demand analysis and modeling, life cycle cost forecasting, construction cost variability and uncertainty, and fiscal modeling and analysis. Following that review, we conclude that, in order to maximally protect the public interest, the public sector must either offer potential P3s to a given private partner with a guaranteed revenue stream like tolls or user fees, or it must be very sure that availability-payment-based P3s actually reduce public sector risk, both outright and residual. Determining whether or not a project is able to be supported by user fees alone – or instead by a combination of user fees and availability payments – is contingent upon verifying both demand for the facility and various contingency and life cycle costs. If the project does not reduce risk or is otherwise infeasible based on VfM / PSC analysis traditional procurement may make the most sense. While not always true, public procurement can oftentimes be the most expedient and risk-averse form of project procurement, especially given economic uncertainty. Ultimately, part of deeming a P3 "shovel-ready" is to deem it "wallet-ready" as well.

2) The California Political Environment and Challenges to P3s

We identified elements of the California political environment that might potentially pose challenges to P3s. Agencies involved with any infrastructure project in California can be very large and not even necessarily the same for a similar project in the same county. Public sponsors in California, e.g., Metro, Caltrans, or SFMTA, have the local knowledge and experience to get projects done in their respective service areas. We found no empirical evidence that a private firm could navigate the approval process any better than a public sponsor, nor that they could gain that local project management knowledge and expertise any more effectively than a public sponsor.

Ultimately, until research on the public's true thoughts on P3s is conducted, we cannot definitively conclude how the aggregate "public" perceives P3s. The public may see the P3 aspect of a given project as secondary to the overall status/condition of the project itself – a factor which only further adds to their own already-conceived notions of a given project. We found no evidence that supported the notion that P3s which incorporated user fees were seen as somehow more acceptable by users and / or citizens if a private entity was charging the fee (rather than the government).

3) Structuring P3 Projects

We identified key elements in successfully structuring P3 project contracts, principally how best to allocate risk among the various parties involved in the project. No matter what the contract provisions are, allocating risk effectively – transferring requisite risks to private investors, while keeping certain public sponsor-centric risks internalized by the government – has proven extremely difficult both in theory and practice (Vining and Boardman 2008, p. 152). The government sponsor will always retain the risk of either, a) renegotiating a troubled deal in order to complete a facility, or b) not delivering the facility at all (Yescombe 2007, p. 20) – regardless of which risks are transferred. We conclude that the private sponsor will seek compensation tantamount to the risk gained – risk transfer comes at a premium, driving project costs up. Additionally, we recommend and endorse the eight rules of P3 structuring – as laid out in Vining and Boardman (2008) – to best minimize P3 lifecycle transaction costs, as taxpayers will only benefit from cost savings through alternative procurement if transaction costs are less than the private-sector efficiency benefits (Vining and Boardman 2008, p. 159).

4) Criteria for evaluating potential P3 projects

We defined what constitutes a successful P3 facility and then found a pool of 100 facilities to study. Successful projects (per our definition) outnumbered unsuccessful ones at roughly a three-to-two ratio. We surveyed nine pre-implementation attributes in our sample, seeking trends in their distribution among both successful and unsuccessful P3s. Indeed, we found three pre-implementation success indicators for P3s. They are: 1) existing capacity constraints, 2) few existing facility substitutes, and 3) contract length. We conclude that potential projects that face existing capacity constraints, have limited existing substitutes with which they compete, and have a contract term of approximately 30 years or less in length will be more apt for success as a P3 than those that do not.

To be clear, our findings are do not necessarily imply causality, i.e., only projects that possess the most frequently occurring attributes will be a success. Rather, public sponsors should carefully consider if P3 delivery is appropriate for each project. Public sponsors should evaluate P3 delivery for proposed projects with those attributes common to successful P3s.

6) Market potential for private capital in California

We also looked at the capital market and discussed its unpredictable nature. The complexity (and fragility) of P3 financing transactions, while shielded from the public sponsor, make forecasts of capital availability murky at best. California will be competing for private money with other public sponsors worldwide. Moreover, public sponsors will be subject to the market's interpretations of the success or failures of P3s in California and around the globe. Like others, we cautioned against the optimism that P3s might make up a large fraction of California's transportation capital needs; recall that in even the most P3-supportive places they typically make up ten percent of projects, or at most 20 percent (Little Hoover Commission 2010, pp. 21, 71; Iacobacci 2010, pp. 2, 40).

Research on all these topics will be conducted in Phase II of the project. This report completes our deliverables for Phase I.

Acronyms and Terms Defined

In the following table we outline the acronyms and terms we use in the report.

Table 8: Definitions of Acronyms and Terms

Term or Acronym	Definition
BTH	California Business, Transportation and Housing Agency
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act singed by then-Governor Ronald Reagan in 1970.
CMBS	Commercial Mortgage Backed Securities
CTC	County Transportation Commission
DB	Design-Build. Contract type in which one private firm is responsible for both design and construction of facility, instead of one firm for each individual phase.
DBFO	Design-Build-Finance-Operate. Contract type in which private partner is responsible for all aspects of the project except maintenance.
DBFOM	Design-Build-Finance-Operate-Maintain. Contract type in which private partner is responsible for all components of the project from beginning to end.
DBOM	Design-Build-Operate-Maintain. Contract type in which private partner is responsible for all aspects of the project except financing.
FHWA	US Federal Highway Administration
FRA	US Federal Railroad Administration
FTA	US Federal Transit Administration
GARVEE	Grant Anticipation Revenue Vehicle. A form of debt financing in which more grants are allocated to state / local government than it can pay for at present, with debt service repaid with future formula grants and / or sales tax revenues. (e.g., Los Angeles 30 / 10)
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
LCC	Life Cycle Costs. The aggregated cost of all inputs required to design, construct, and maintain an infrastructure asset.
Metro	Los Angeles County Metropolitan Transportation Authority. This is the CTC covering Los Angeles County.
MPO	Metropolitan Planning Organization. For example, SCAG in southern California or MTC in the San Francisco Bay Area.
MTC	Metropolitan Transportation Commission. The MPO covering the San Francisco Bay area counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma.
NPV	Net Present Value
O&M	Operations and Maintenance
OCTA	Orange County (CA) Transportation Authority
P3 or P3s	Public-Private Partnership(s)

Term or Acronym	Definition
PAB	Private Activity Bonds. In SAFETEA-LU Congress authorized $15 billion of tax-exempt bonds that can be issued by states for the benefit of private companies.
PSC	Public Sector Comparator A hypothetical, risk-adjusted cost estimate for a given project where the asset is delivered exclusively by the public sector through traditional procurement.
Public Sponsor	As used in this report, public sponsor refers to any public agency that might propose, build, and / or maintain a transportation facility, e.g., SFMTA, Metro, Caltrans, or Gold Line Phase II Construction Authority.
RFP	Request for Proposals. Issued by a public sponsor to solicit bids for a project.
ROI	Return on Investment
RRIF	Railroad Rehabilitation & Improvement Financing
RTIP	Regional Transportation Improvement Plan
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient, Transportation Equity Act—A Legacy for Users. The Department of Transportation reauthorization bill passed in 2005.
SCAG	Southern California Association of Governments. The MPO covering Southern California counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura.
SFMTA	San Francisco Municipal Transportation Agency
SH-121	Texas State Highway 121. An 85-mile tolled state highway in north central Texas running between Fort Worth and US Highway 82.
South Bay Expressway	California State Road 125 or SR-21. A 10-mile highway built in San Diego as P3 concession.
SPV	Special Purpose Vehicle. A single purpose entity company created by private investors to hold the assets and liabilities associated with a P3.
SR-125	California State Road 125 or South Bay Expressway. A 10-mile highway built in San Diego as P3 concession. Also known as the South Bay Expressway.
SR-91 Express Lanes	Tolled facility located in the median of California State Road 91.
STIP	State Transportation Improvement Plan
TAZ	Traffic Analysis Zone. Small geographic areas characterized by population, employment and other relevant factors to the demand modeling process; when aggregated, TAZs represent hypothetical travel patterns within an urban area.
TID	Transportation Improvement District. A designated area adjacent to a project in which a special improvement tax is levied based on property value.
TIFIA	Transportation Infrastructure Finance and Innovation Act of 1998, providing credit assistance for transportation projects of both regional and national significance.
TIGER I and TIGER II	Transportation Investment Generating Economic Recovery Grants; first round of grants issued as part of American Recovery and Reinvestment Act of 2009 (TIGER I), second round issued in 2010 (TIGER II).
TIP	Transportation Improvement Program
TPES	Tri-Services Parametric Estimating System. LCC estimation system that approximates LCC by drawing on models of different facility types and determining critical cost parameters.

Term or Acronym	Definition
USDOT	US Department of Transportation
VfM	Value for Money. A means of evaluating future cash flows to determine whether a capital project is best-suited for traditional / public procurement or through alternative procurement like a P3.

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